Digital India
Power To Empower

Annual

REPORT

2023-24

Ministry of Electronics & Information
Technology, Government of India

Annual
REPORT
2023-24

सत्यमेव जयते

MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY
GOVERNMENT OF INDIA

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Executive Summary

Digital India, a flagship programme of Government of India, is leading the digital transformation for ease of living, ease of doing business, ease of governance and expansion of digital economy in the country. Digital India initiatives have played pivotal role in maintaining continuity in delivery of public services and benefits to the common citizens, enabling relief to Industry & businesses, and enabling quick decision making within government during the pandemic times. Post-pandemic, Digital India continues to make the impact and unleash the power of digital technologies to accelerate the digitalisation across the government, to further improve the quality of living for people, to make the country self-reliant and globally trusted partner. India's resilient Information Technology (IT) prowess and electronics supply chain provide confidence to the world.

The year 2023-24 witnessed the initiation of several new transformational initiatives such as National Programme on Artificial Intelligence(AI), Entity Locker, Graphene Aurora Program, Centre of Excellence (CoE) on E-Waste Management, STPI(Software Technology Parks of India)'s LEAP AHEAD for startups, YUVA PRATIBHA, Indian Web Browser Development Challenge etc., among others, by MeitY. India enacted "The Digital Personal Data Protection Act, 2023" to safeguard the rights of common citizens in the digital space and at the same time, to foster the data driven innovation in the startup and digital ecosystem. The draft National Strategy on Robotics has been released in July 2023 for public consultation. IndiaAI Mission, a comprehensive national-level program has been launched to democratize

and catalyze the AI innovation ecosystem in the country and to ensure the global competitiveness of India's AI startups and researchers.

Also, the year emerged as the remarkable one showcasing the prominence of India to lead the digital revolution globally. The AI Supercomputer 'AIRAWAT (AI Research, Analytics and Knowledge Assimilation)', installed at Centre for Development of Advanced Computing (C-DAC), Pune has been ranked 75th in the World. India's digital success story mainly in terms of India Stack, Digital Public Infrastructure(DPI), Digital Public Goods, etc., caught the attention of the World. During the G20 under Indian Presidency, India's depth and strength in digital technologies, digital solutions, DPI, digital diplomacy, digital literacy, and digital economy were showcased to the World. In a historic move, the G20 Digital Economy Working Group and Ministerial meetings led by MeitY, the groundbreaking consensus was built on (1) the Framework for Systems of DPI, (2) One Future Alliance (OFA) for financing DPIs in LMICs, (3) Global DPI Repository (GDPIR), (4) High-level Principles to support businesses in building safety, security, resilience and trust in the Digital Economy, (5) Roadmap to facilitate cross country comparison of Digital Skills, (6) Toolkit for designing and introducing digital up-skilling and re-skilling programms, (7) Virtual Centre of Excellence for fostering Digitally-Skilled Talent, among others.

India assumed the Chair of GPAI in 2023. In the GPAI Summit held at New Delhi and led by MeitY, India united the representatives from 28 member

countries and the European Union, forging an extraordinary platform for profound discussions on the urgent matters shaping the ever-evolving landscape of AI. GPAI New Delhi Declaration was endorsed unanimously, and it built the consensus among GPAI members on advancing safe, secure, and trustworthy AI and commitment for supporting the sustainability of GPAI projects.

MeitY has established India Stack / DPI as the main catalyst in the overall growth, transformational change and tech-led innovation in the digital ecosystem and digital economy. Aadhaar, Unified Payment Interface (UPI), DigiLocker, Unified Mobile App for New-Age Governance (UMANG), Digital Infrastructure for Knowledge Sharing (DIKSHA), Co-Win, Poshan Tracker, GeM, Application Programming Interface (API) Setu, etc., have demonstrated the transformational potential of DPI. UIDAI has achieved over 138 crore enrolments, DigiLocker has surpassed enablement of access to over 600 crore public documents, UPI has enabled on an average 30 crore plus daily digital payments. Digital BHASHINI is resulting in AI based text-to-text, text-to-speech and speech-to-speech language technologies and solutions. The Ayushman Bharat Digital Mission (ABDM), launched as a nationwide digital platform in healthcare, provided Health ID to over 50 crore people. The Government is working on key sector Healthcare, Education, Agriculture, Logistics, Women and Child Development, etc., and proposes to develop nationwide sectoral DPI weaving together multiple existing and new projects with central support in key sectors of the economy.

Government has taken several initiatives to promote electronics manufacturing and as a result,

the electronic manufacturing is on high growth trajectory. The domestic production of electronic items has increased substantially from ₹3.88 Lakh Crore (US$60 Billion) in 2017-18 to ₹8.22 Lakh Crore in 2022-23 (US$101 Billion), growing at a Compound Annual Growth Rate(CAGR) of 16.19%. The key drivers of growth are large domestic market, and availability of skilled talent and low-cost labour. India's electronics production is expected to reach US$300 Billion by 2026. Production Linked Incentive schemes for Phones, IT Hardware and Electronic Components have been successful in attracting global champions while providing a fillip to domestic companies and making them national champion companies with global aspirations. Emerging domains of AI, ML, IOT are becoming the new driving forces behind the growth of ICT hardware segment. In furtherance of the vision of AatmaNirbhar Bharat and positioning India as the global hub for Electronic System Design and Manufacturing (ESDM), a comprehensive program for the development of semiconductors and display manufacturing ecosystem in India approved with an outlay of ₹76,000 Crore (>US$10 Billion) is attracting global semiconductor majors to open their semiconductor fabrication units in India.

India is recognised as a global hub for IT services and has emerged as the World's 3rd largest start-up ecosystem, having 100 + unicorns. Emerging technologies like 5G, IoTs, Advance Data Analytics, AI, Cloud computing, Augmented and Virtual Reality, 3D printing, robotics and blockchain etc. are shaping the innovation and disruption in Industry and the operating business models and these will continue to redefine the excellence and the future of technology led transformation. Several CoEs have been setup

to promote startups, incubation and innovation in these areas. Efforts are also on to enable Indian IT professionals to attain world class skills in these technologies through a Future Skills Programme.

The Annual Report 2023-24 of MeitY highlights the achievements of Digital India initiatives, the contribution of MeitY and its organisations namely CCA, UIDAI, CERT-In, NIC, C-DAC, SAMEER, C-MET, NeGD, NIELIT, STPI, STQC, DIC, ERNET, NIXI, etc. The report also highlights the focus of MeitY on citizen centricity, digital governance, DPI, digital connectivity, digital economy, digital innovation, digital skilling, emerging technologies, digital trust, cybersecurity, electronics manufacturing, semiconductor fabrication, etc., which are paramount for quality public service delivery, empowerment of common citizens, strengthening of digital economy, Industry, and technology startups. These will ultimately lay the strong foundation for realising the goal of Viksit Bharat by 2047.

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Overview of MeitY

1. Vision, Mission, Objectives, Structure and Functions of MeitY

1.1 Introduction

Ministry of Electronics and Information Technology (MeitY) is responsible for formulation, implementation and review of national policies in the field of IT, Electronics and Internet (all matters other than licensing of Internet Service Provider).

1.2 Vision

e-Development of India as the engine for transition into a developed nation and an empowered society.

1.3 Mission

To promote e-Governance for empowering citizens, promoting the inclusive and sustainable growth of the Electronics, IT and ITeS industries, enhancing India's role in Internet Governance, adopting a multipronged approach that includes development of human resources, promoting R&D and innovation, enhancing efficiency through digital services and ensuring a secure cyber space.

1.4 Objectives

- **e-Government:** Providing e-infrastructure for delivery of e-services.

- **e-Industry:** Promotion of electronics hardware manufacturing and IT-ITeS industry.

- **e-Innovation/R&D:** Implementation of R&D Framework - Enabling creation of Innovation/

R&D Infrastructure in emerging areas of ICT&E/Establishment of mechanism for R&D translation.

- **e-Learning:** Providing support for development of e-Skills and Knowledge network.

- **e-Security:** Securing India's cyber space.

- **e-Inclusion:** Promoting the use of ICT for more inclusive growth.

- **Internet Governance:** Enhancing India's role in Global Platforms of Internet Governance.

1.5 Functions of Ministry of Electronics and Information Technology (Electroniki Aur Soochana Praudyogiki Mantralaya)

1. Policy matters relating to IT; Electronics; and Internet (all matters other than licensing of Internet Service Provider).

2. Promotion of internet, IT and IT enabled services.

2A. Promotion of Digital Transactions excluding Digital Payments.

3. Assistance to other departments in the promotion of e-Governance, e-Commerce, e-Medicine, e-Infrastructure, etc.

4. Promotion of IT education and IT-based education.

5. Matters relating to Cyber Laws, administration of the IT Act, 2000 (21 of 2000) and other IT related laws.

5A. Matters relating to online gaming.

6. Matters relating to promotion and manufacturing of Semiconductor Devices in the country.

7. Interaction in IT related matters with international agencies and bodies e.g. Internet for Business Limited (IFB), Institute for Education in Information Society (IBI) and International Code Council – on line (ICC).

8. Initiative on bridging the Digital Divide: Matters relating to Digital India Corporation.

9. Promotion of Standardization, Testing and Quality in IT and standardization of procedure for IT application and Tasks.

10. Electronics Export and Computer Software Promotion Council (ESC).

11. National Informatics Centre (NIC).

12. Initiatives for development of Hardware/ Software industry including knowledge–based enterprises, measures for promoting IT exports and competitiveness of the industry.

13. All matters relating to personnel under the control of the Ministry.

14. Unique Identification Authority of India (UIDAI).

15. Semi-Conductor Laboratory, Mohali.

1.6 Organisation Structure

The Secretariat of MeitY headed by Secretary is assisted by FA, and Group Coordinators and Heads of Organisations under the administrative control of MeitY. The organisation chart is as follows: -

MEITY ORGANISATION(S) STRUCTURE

Minister (E&IT)

MOS (E&IT)

Secretary

Groups and their Heads in MeitY	Attached Offices	Autonomous Societies	Section 8 Companies	Statutory Organisations	Company registered under Companies Act, 1956
	National Informatics Centre (NIC)	C-DAC (Pune)	NICSI (PSE under control of NIC)	Controller of Certifying Authority (CCA)	CSC e-Governance Services India Ltd.
	STQC Directorate	C-MET (Pune)	National Internet Exchange of India (NIXI)	Indian Computer Emergency Response Team (ICERT)	
		NIELIT (New Delhi)	Digital India Corporation (DIC)	Unique Identification Authority of India (UIDAI)	
		SAMEER (Mumbai)	i My Gov		
		STPI (New Delhi)	ii NeGD		
		ERNET-India (New Delhi)	iii MeitY Startup Hub (MSH)		
		Bhaskaracharya National Institute of Space Applications and Geo-Informatics [BISAG (N)],	iv India Semiconductor Mission (ISM)		
		Semi-Conductor Laboratory, (Mohali)	v Digital India Bhashini Division (DIBD) (Independent Business Divisions (IBDs) within (DIC)		
			National Institute for Smart Government (NISG))		

In order to operationalise the objectives of MeitY, schemes are formulated and implemented, either directly or through its Responsibility Centres (Organisations/Institutions) under its jurisdiction. To make the technology robust and state-of-the-art, collaborations with academia and the private/public sector are also sought. MeitY has two Attached Offices (viz., NIC & STQC); six Autonomous Societies (viz., C-DAC, C-MET, NIELIT, SAMEER, STPI and ERNET India); three Section 8 companies [viz., NICSI, NIXI and Digital India Corporation (DIC)]; three Statutory Organisations (viz., CCA, ICERT and UIDAI), and one Company registered under Companies Act, 1956 [viz., Common Service Centre (CSC) e-Governance Services India Ltd.] under its charge to carry out the business allocated to the Ministry.

WORK ALLOCATION – AS ON 06.03.2024

Sl. No.	Name & Designation	Work Allocation
1	Shri Bhuvnesh Kumar Additional Secretary	• Personnel, Societies and General Administration, I&DC [Library] • NICSI • Cyber Laws and Data Governance Division *[GC-Sci.G(SC)]* • R&D in Electronics Division *[GC-Sci.G(SV)]* • R&D in IT Division *[GC-Sci.G(SV)]* • Matters related to CMET and CDAC *[GC-Sci.G(SV)]* • R&D in Cyber Security Division *[GC-Sci.G(TP)]* • Matters related to UIDAI *[GC-Sci.G(TP)]*
2	Shri Abhishek Singh Additional Secretary	• Cyber Security Division *[GC-Sci.G(SU)]* • Matters related to ICERT *[GC-Sci.G(SU)]* • Artificial Intelligence & Emerging Technology *[GC-Sci.G(KB)]* • Work relating to Global Partnership on Artificial Intelligence (GPAI) *[GC-Sci.G(KB)]* • Human Centred Computing (HCC) Division *[GC-Sci.G(KB)]* • India *AI* *[GC-Sci.G(KB)]* • DIBD *[GC-Sci.G(KB)]* • HRD, NIELIT and RajBhasha Section *[GC-Sci.G(AKP)]*
3	Shri Krishan Kumar Singh Joint Secretary	• Digital Economy Division (DED) • Software Industry Promotion Division including DIIF • Start Ups, Innovation, IPR and Entrepreneurship • STPI, MSH • Coordination Division (including SGoS)
4	Shri Rajesh Singh JS & FA	• Integrated Finance Division (IFD)

Sl. No.	Name & Designation	Work Allocation
5	Shri Sushil Pal Joint Secretary	• International Cooperation Division • Electronics Hardware (PLI) • Semiconductors • SCL • Productivity & Employment Generation • Electronics Hardware (excluding PLI), CRO *[GC-Sci.G(AN)]* • Matters related to STQC and CCA *[GC-Sci.G(AN)]* • Internet Governance Division • NIXI • CVO
6	Shri Sanket S Bhondve Joint Secretary	• Digital Governance Division • Digital India Corporation (DIC), NeGD, MyGov, CSC • BISAG(N) • NIC, NISG • Designated Officer (u/s 69A)
7	Smt. Savita Utreja Scientist G & GC	• Cyber Security Division *[through AS(AS)]* • ICERT *[through AS(AS)]*
8	Smt. Asha Nangia Scientist G & GC	• Electronics Hardware (excluding PLI), CRO *[through JS(SP)]* • Matters related to STQC and CCA *[through JS(SP)]*
9	Shri S K Marwaha Scientist G & GC	• CC&BT and E-Infrastructure Division • SAMEER, ERNET • RTI, Grievances and Parliament Section
10	Smt. Sunita Verma Scientist G & GC	• R&D in Electronics Division *[through AS(BKj* • R&D in IT Division *[through AS(BK)]* • CMET, CDAC *[through AS(BKj]*
11	Shri AK Pipal Scientist G & GC	• HRD, NIELIT and RajBhasha Section *[through AS(AS)]*
12	Smt. Kavita Bhatia Scientist G & GC	• Artificial Intelligence & Emerging Technology *[through AS(AS)]* • Work relating to Global Partnership on Artificial Intelligence (GPAI) *[through AS(AS)]* • Human Centred Computing (HCC) Division *[through AS(AS)]* • India AI *[through AS(AS)]* • DIBD *[through AS(AS)]*
13	Dr. Sandip Chatterjee Scientist G & GC	• Cyber Laws and Data Governance Division *[through AS(BK)]*
14	Ms. Tulika Pandey Scientist G & GC	• R&D in Cyber Security Division *[through AS(BK)]* • Matters related to UIDAI *[through AS(BK)]* • Nodal Officer for responding to any queries/ clarifications sought in writing/ through email by any media companies on any issues related to MeitY • Website and Social Media activities

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Digital India: Power to Empower

2.1 Introduction

Digital India, a flagship programme of the Government of India, aims to transform India into a digitally empowered society and knowledge economy. It weaves together a large number of ideas and thoughts into a single comprehensive vision so that each of them is seen as part of a larger goal. The focus of the Digital India Programme **(DIP)** is on being transformative to realize - IT (Indian Talent) + IT (Information Technology) = IT (India Tomorrow) and making technology central to enable change. This programme pulls together many existing schemes. The programme targets to provide digital services, digital access, bridge the digital divide, language divide and thereby, ensure digital inclusion, financial inclusion, and digital empowerment. The targets are sought to

be achieved with the power of technology that is affordable, developmental, sustainable, and inclusive. The vision is centred on three key areas, namely Infrastructure as Utility to Every Citizen, Governance & Services on Demand and Digital Empowerment of Citizens.

2.1.1 Extension of Digital India Programme

The Government, in August 2023, approved the extension of the 'DIP' with a total outlay of ₹14,903.25 Crore during the period of the 15th Finance Commission i.e., 2021-22 to 2025-26. The details are given at **Annexure-I.**

2.1.2 Vision of Digital India

To transform India into a digitally empowered society and knowledge economy.

Vision Area 1: Digital Infrastructure as a Utility to Every Citizen includes:

- High-speed internet as a core utility

- Cradle to grave digital identity - unique, lifelong, online, authenticable

- Mobile phone & Bank account enabling participation in digital & financial space

- Easy access to a Common Service Centre

- Shareable private space on a public cloud

- Safe and secure Cyber-space

Vision Area 2: Governance & Services on Demand includes:

- Seamlessly integrated across departments or jurisdictions

- Services available in real-time from online & mobile platforms

- All citizen entitlements to be available on the cloud

- Services digitally transformed for improving Ease of Doing Business

- Making financial transactions electronic & cashless

- Leveraging GIS for decision support systems & development

Vision Area 3: Digital Empowerment of Citizens includes:

- Universal Digital Literacy

- Universally accessible digital resources

- All documents/ certificates to be available on the cloud

2.2 Digital Infrastructure

2.2.1 Digital Identity

2.2.1.1 Aadhaar Data Vault (ADV) as a service

While using the Aadhaar services of UIDAI, if any service or application requires to store Aadhaar number in their application, the same should be stored in encrypted format in a separate system 'ADV.' This project has been initiated with the objective of facilitating the secure management of Aadhaar numbers. In order to save initial as well as long term maintenance cost and to cater the requirements of departments, MeitY promotes the use of Aadhaar Data Vault as a service.

Achievements:

- ADV implemented by C-DAC has been integrated with 42 services of various departments such as SIDBI, Election Commission of India (ECI), Assam Finance Department, OMC Information System, Employees State Insurance Corporation and Assam Revenue Department etc. The service also offers value adds such as identification of same Aadhaar number for the schemes etc.

- Total transactions: **216.54** Crore.

2.2.1.2 MeriPehchaan [National Single Sign-On (NSSO) platform]

In order to access various Government services and portals, citizens have to use different IDs and passwords which they need to remember. Many a times, it becomes very difficult to remember these IDs and passwords for citizens. In order to address this concern, NSSO with the three SSOs at back end, namely Parichay/Jan-Parichay by NIC, e-Pramaan by C-DAC Mumbai, DigiLocker by NeGD, has been envisaged (www.meripehchaan. gov.in), which is a user authentication service wherein single set of credentials can provide access to multiple online applications or services.

NSSO provides Single-Sign-On (SSO) along with Password, OTP, Digital Certificate and Biometric (fingerprint/iris) as configurable authentication factors.

For citizens, it eliminates the need to repeatedly prove their identities to different applications and hold different credentials for each application. To the application owner; it helps to save time, efforts and cost to build the authentication systems for every service independently. The NSSO platform also empowers the Government to rollout services envisioned for the citizens in a seamless and efficient way of providing convenience to citizens as well as government Ministries/Departments/States.

Achievements:

- Currently **9,135** services of various Ministries/States have been integrated with NSSO. Key services include EPFO, COWIN, DigiLocker, eShram, Mizoram DICT, Service Plus, mSevanam, MyGov, S3Waas, Bihar State Services, DIT Sikkim, QSim etc.

- Over **94.97** Crore transactions have taken place on the MeriPehchaan platform.

2.2.1.3 e-Sign (e-Hastakshar)

e-Sign is an online electronic signature service, which can be integrated with service delivery applications via an API to facilitate an e-Sign user to digitally sign a document. Using authentication of the Aadhaar holder through Aadhaar e-KYC service, online electronic signature service is facilitated. e-Sign service facilitates instant signing of documents online by citizens in a legally acceptable form. Using this, an Aadhaar holder can electronically sign a form/document anytime, anywhere, using device such as Personal Computer or Laptop or Mobile.

Achievements

- 18 agencies namely, eMudhra Ltd., C-DAC, Safescrypt, (n)Code Solutions, Verasys, IDSign, NSDL e-Governance Infrastructure Ltd., Panta Sign, CSC, RajCOMP Info Services Ltd., CDSL, Xtra Trust, ProDigiSign, SignX, Care 4 Sign, RPSL, Ventures Ltd and Capricorn have been empanelled to offer e-Sign Services.

- Total **65.20 Crore** e-Sign issued by all ESPs. Out of these, **15.01 Crore** e-Sign issued by C-DAC (i.e. under e-Hastakshara project).

- **12** outreach programs have been conducted by C-DAC for e-Sign proliferation in the year 2023 with various Central/State Government organizations.

- Currently **220 agencies** are leveraging e-Sign 2.1 Production service.

- The services are being leveraged by various departments/ applications such as National Health Authority (NHA), NIC, DigiLocker, Centre for e-Governance Karnataka Government, Directorate General of Human Resource Development (DGHR), Ministry of Railways, EPFO, India Post Payments Bank, J&K UT, Department of Panchayati Raj & Rural Development of Andhra Pradesh Government, UP Forest and Wildlife Deptt. etc.

2.2.2 Enhancement of NIC National Cloud Services

NIC has been providing Data Centre/ Cloud services to the Government at Central and State level to ensure Government services internally and for citizens. Under NIC cloud services more than 21,000 virtual servers have been allocated for various e-Governance applications to more than 1470 Ministries/ users and over 5000 websites of

the Government are being served through NIC cloud. For rapid deployment of new services and strengthen the existing services to citizens from the Government, MeitY has approved a proposal of NIC for enhancement of ongoing NIC National Cloud Services being offered from National Data Centres over a period of 3 years. The project is being implemented by NICSI.

The project has the following key features:-

i.   **Cloud Infrastructure Capacity:** This will enable the provision of around 14,000 medium/small sized virtual servers over the period of three years. This infrastructure will provide additional Block/ Unified/ Object/ Software defined raw storage of over 36 Petabytes.

ii. **Cloud Management solution:** It will ensure increase automations of function to enhance quality of services, which will result in better adoption of Cloud services and reduce the overall manpower requirement.

iii. **Improvement in Cyber Security Posture:** It would help NIC to manage various cybersecurity aspects of the cloud infrastructure.

iv. **Workshop/Training of Cloud Services:** Workshops/trainings of core teams of Government Ministries/Departments which enables the users for utilization/managing and monitoring of cloud services.

2.2.3 National Data Centre in North-East Region (NDC-NER)

To strengthen the digital transformation and service delivery in the NER, MeitY has approved the project for setting up of "NDC-NER" at Guwahati, Assam on 19th September 2020. This project is in line with "Vision Document for Digital North-East by 2020". This Project is being implemented by NIC through

NICSI over a period of five and a half years.

The NDC-NER is proposed with the following key features:-

i.   NDC-NER building with Ground plus 5 floors with a facility of 200 racks (G+3) for Data Centre and Cloud infrastructure (IT and Non-IT). 4th and 5th floor shall be built and reserved for future expansion.

ii. It would provide a robust, highly available & significantly scalable infrastructure with adequate redundancy to enable Government to render efficient delivery of citizen services.

iii. It will have Security Operation Centre (SOC), Network Operation Centre (NOC) and Centre of Excellence (CoE) for Application Security.

iv. It will act as Disaster Recovery site for various applications hosted in other Data Centre in the region.

2.2.4 GI Cloud (MeghRaj)

To deliver ICT services over Cloud to all the Ministries/Departments at Centre/State/UTs level and utilize the benefits of Cloud computing, Government of India has initiated an ambitious initiative- "GI Cloud", also named as 'MeghRaj'. It is designed to promote the use of Cloud technology to enhance the efficiency, scalability and cost-effectiveness of IT services within the Government. The vision of this initiative is to accelerate delivery of e-Services in the country, while optimizing ICT spending of the Government. As per the MeghRaj policy, "Government departments at the Centre and States to first evaluate the option of using the GI Cloud for implementation of all new projects funded by the Government. Existing applications, services and projects be evaluated to assess whether they should migrate to the GI Cloud".

Major benefits of GI Cloud:

On demand scalability of infrastructure to meet the long-term capacity requirements and elasticity to cater to the peak load requirements. The major components of MeghRaj include:

- Setting up of State and National Clouds.

- Setting up of an e-Gov Appstore.

- Empanelment of Cloud Service Providers.

- Setting up of Cloud Management Office (Policies, Guidelines, templates, security norms, certification, etc.).

- Awareness workshops, training programmes and migration support for cloud adoption by Departments.

- MeghRaj (GI-Cloud) service Directory.

- Setting up of Clouds by other Government entities.

- Rapid development, deployment, and re-use of ICT applications.

- Enable conversion of CAPEX to OPEX paving the way for consumption based billing and faster procurement of IT Infrastructure services.

Achievements:

The first National Cloud implemented by NIC is already being used by more than 1,730 applications of Government Departments. NIC Cloud can be accessed using the following link: https://cloud.gov.in/

Initiatives under DIP hosted on National Cloud include:

- Digital India Portal

- Digital Locker

- Make-in-India

- Skill Development

- Smart Cities

- Online Registration System (e-Hospital)

- Aadhaar based Biometric Attendance of Government employees

- Jeevan Pramaan - service for pensioners

- MyGov - the largest citizen engagement platform of the Government

The e-Gov Appstore under GI Cloud can be accessed using the link http://apps.gov.in/.

MeitY has empanelled 21 Cloud Service Providers for a variety of Cloud deployment models (Public Cloud, Virtual Private Cloud, and Government Community Cloud) and Cloud Service offerings (IaaS & PaaS). The empanelled CSPs are Microsoft Corporation (India) Private Limited, Tata Communications Limited, Global Data & Mobility Solutions, BSNL, ESDS Software Solutions Private Limited, Net Magic IT Services Private Limited, Sify Technologies Limited, CtrlS Data Centre Limited, Cyfuture India Private Limited, Webwerks India Private Limited, Amazon Web Services India Pvt. Limited, Nxtra Data Limited, Jio Platforms Limited , Google Cloud India Pvt Ltd, IBM India Private Limited, ITI Limited, Oracle India Pvt. Ltd, RailTel Corporation of India Limited, NTT Global Data Centres & Cloud Infrastructure India Pvt. Ltd., Pi Datacenters Private Limited, Yotta Infrastructures Solution Pvt Ltd and Protean eGov Technologies Limited. The status of the audit and the contact details of the empanelled CSPs can

be accessed using the link https://www.meity.gov.in/content/gi-cloud-meghraj

2.2.5 Geographic information System (GIS)

GIS based decision support system (DSS) platform was established under the National Centre of Geo-Informatics (NCoG) which was approved on 31st December 2015.

NCoG is providing single source GIS platform for sharing, collaboration, location-based analytics and decision support system, catering to Central and State Government departments across the country. It is developed by NeGD in collaboration with Bhaskaracharya Institute for Space Applications and Geo-Informatics (BISAG).

Some of the key features of NCoG based applications include:

i. Base map available at 1:5,000 scale.
ii. Compatibility of multi-purpose geo-datasets.
iii. Allows user to plot assets/features on their own.
iv. Self-sustainable.
v. Cost effective.
vi. Based on Open-Source (no software procured).

NCoG is also working on the following new projects:

i. **Social Benefits Management System-** A web portal for loan management, disbursement and recovery. GIS support for monitoring of loan recovery – Design and Development phase.

ii. **Industrial Performance Monitoring System-** A web portal for Ministry of Statistics and Programme Implementation and 11 other Ministries to use this portal to report data of their industrial sector.

iii. A dashboard to manage Technology and Innovation Support Centre to capture R&D Activities is also being created for DIPP.

iv. **Delhi Police -** Design, development, amalgamate and maintenance of 'Delhi Police. One Touch Away' - a citizen centric app with 26 services provided by Delhi Police through the previous apps or Web applications.

v. **Ayushman Bharat, MoHFW-** Infrastructure and disease level mapping of health facilities, including primary, secondary, and tertiary care and identification of gaps therein to plan for new health and wellness centres establishment.

vi. Implementation of National Mission on Cultural Mapping (Ministry of Culture).

Following are the Key Achievements on NCoG till 30th September 2023:

- Total number of Applications: 702

- Total number of Web applications: 630

- Total number of Mobile applications: 72

- Number of Central Ministries/Departments/Agencies: 40

- Number of States/UTs: 21

2.2.6 Bhaskaracharya National Institute for Space Applications and Geo-informatics (BISAG-N)

The Union Cabinet chaired by the Hon'ble PM approved the "Elevation of (BISAG) to (BISAG-N)" as an Autonomous Scientific Society under MeitY on 19th February 2020. Approval was published through Gazette notification on this subject matter, and same was published in the Gazette of India,

Extraordinary (Part-I, Section, I) on 22nd April 2020 by MeitY. Different SATCOM Programs started like Vande Gujarat, SWAYAM PRABHA, PM e-Vidya, DIGISHALA, etc. to enhance TV channel based educational and developmental programmes 24x7 on DTH.

BISAG (N) has been set up to undertake technology development & management, research & development, facilitate national & international cooperation, capacity building and support technology transfer & entrepreneurship development in the area of geo-spatial technology.

BISAG (N) has three main domain areas: satellite communication, geo-informatics, and geo-spatial technology.

Activities undertaken by BISAG (N):

i. Technology Development and Management:

- Develop GIS-ERP based planning and decision-making tools for almost all the sectors of Government of India and States (in collaborative mode).

- Provide AI based services in select sectors.

- Standardize geo-spatial data sets of different sectors and integrate it with attributes in collaboration with the concerned Government agencies.

- Use of AI for quality control of geo-spatial data and applications.

- Geo-spatial data-based technology support to security agencies.

- In-house development of the technologies related to Government, security agencies, business, and citizens.

- Geo-spatial management: Technology, Data/information, Applications, and related businesses.

ii. Academic Research & Development:

- **Research:** Related to robustness, efficient and secure geo-spatial data and services besides development and use of applications in applied sciences and engineering.

- **Development:** AI, Big Data Analytics, Data Mining, Image Processing, Cloud computing, IoTs and other emerging technologies that may feed into applications development of different sectors.

- **Technology Integrations:** Geo-spatial Sciences, Information Sciences, Mathematical Sciences, Operational Research, Management tools and Governance processes, modelling, Business intelligence etc.

- **Capacity Building/ Skill Development:** Technical and managerial skill development and capacity building to handle applications development. It will also enhance adoption of new technologies, education, and training in Governance processes.

iii. National/International Co-operation:

- Explore geo-spatial technology based academic and professional businesses at both national and international levels based on mutual co-operation and mutual knowledge sharing.

iv. Technology Transfer / Entrepreneurship Development:

- Facilitate development of entrepreneurship in the domain of geo-spatial technologies.

- Technology transfers to such stakeholders as required by Government of India, in order to achieve its overall objectives, under DIP.

v. Technology Transfer / Entrepreneurship Development:

- Broadcast and enhance TV channel based educational and developmental programmes 24x7 on DTH to provide quality education in the remotest areas of the country. BISAG-N also broadcast educational channels on specific Government programmes to educate and increase awareness of the programmes directly to the stakeholders.

vi. Expansion of Satellite Communication Facility at BISAG-N Gandhinagar.

- Government has established state-of-the-art telecast facility at BISAG-N which is now being used to telecast 302 Educational DTH TV channels under different programmes of Government of India.

vii. Projects launched by BISAG-N for various Ministries/Departments

a. Veterinary Council of India Portal:

This application facilitate registration, grievance management, transfer renewal and cancellation of National Registration certificate for Veterinarians in VCI and State Councils for Department of Animal Husbandry & Dairying launched on 29th April 2023.

b. Practitioner Registration Portal for National Commission for Homeopathy:

This portal provides National Registration Certificate for Ayush Practitioners in NCH and State Councils for Ministry of Ayush launched on 3rd May 2023.

c. e-Learning Management System (e-LMS):

This web-based portal, development for Ministry of Ayush, provides comprehensive learning environment and used to plan, implement and access a specific learning process for students and has multiple type of content in various formats like pdf, audio, video, online labs, etc. The students can access these study materials 24x7**.**

d. Indian Heritage Mobile Application:

The application offers a standardized mechanism to browse and gather information about all the Indian heritage sites (Monuments, Museums and Excavated Sites) for Ministry of Culture.

e. Adopt a Heritage (Smarak Saarthi Portal):

The portal has been developed for Archaeological Survey of India (ASI)/ Ministry of Culture to collaborate with the private/ public sector companies/ Trusts/ NGOs/Societies etc.

f. e- Permission Portal:

The portal facilitates the end-to-end approval of Permission at the monuments for Ministry of Culture.

2.2.7 PM GatiShakti National Master Plan for Multimodal connectivity

A Geo-spatial and other emerging technologies-based platform has been developed to support National Master Plan for Multi-modal Connectivity under the guidance of Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Government of India has been developed. The main objectives of open based Portal is a collaborative institutional mechanism between various stakeholders including Central and states/UT Government, local bodies and service providers to facilitate the Right of Way (RoW) application process through a single interface. Currently, more than 1000 portals are developed under PM GatiShakti Portal and more than 1600 layers have been integrated under it. Further, BISAG-N has provided more than 6,000-man days capacity building to multiple officials from Different States, UTs, Ministries/Departments under PM GatiShakti.

The PM GatiShakti National Master Plan has also garnered interest in neighbouring countries. Accordingly, a team of experts from the Ministry of External Affairs (MEA), DPIIT and BISAG-N visited Nepal and Bhutan to brief the usage of PM Gati Shakti National Master Plan for infrastructure development. Recently a delegation from Nepal also visited BISAG-N Gandhinagar campus for this purpose.

2.2.8 Public Internet Access Programme including Wi-Fi in Universities

Wi-Fi has become an universal expectation among universities / institutions for students, faculty and staff as well as visitors / guests. Wi-Fi connectivity is a high-speed wireless access to Internet/ Intranet

resources on any-time any-where basis across the campus.

A. Wi-Fi at Patna University

A project has been initiated for setting up a model Wi-Fi enabled campus network at Patna University with tier-3 architecture upgraded to 10 Gigabit Fiber optic redundant backbone. It shall be a Controller based secure Wi-Fi Network with Centralized Monitoring and Management System. This network shall provide high speed wireless access to Internet and Intranet resources to campus employees, staff, faculty, teachers, students, official visitors and guests on any-time, any-where basis across the campus. This shall improve delivery of student-centric services, employee performance & efficiency and provide real-time access to information.

Three Wi-Fi zones have been created for establishing Wi-Fi Campus Network in Patna University.

B. Strengthening of ICT Infrastructure in Himachal Pradesh University, Shimla

The objective of the project is to provide Wi-Fi connectivity in buildings in the University campus and installation of On Screen Evaluation System.

- Infrastructure for On Screen Evaluation System is functional and is being used for all courses of UG/PG/B.Ed. degree programmes. This system is also being used extensively by faculty members to examine, evaluate the answer sheets and preparation of award sheets.

- Wi-Fi network is operational and is being used by students, faculty members, visitors etc.

Alternate technology using Optical Wireless Communication

C. Optical Wireless Access Network for Rural and Urban Communication

The objective of this project for rural communication is to provide digital connectivity to the last mile user in rural areas by complementing investment made by the Government of India in energy-efficient infrastructure. The implemented technology will utilize the existing solar cells or photodiodes as data receivers. Using DC biased optical Orthogonal Frequency Division Multiplexing (DCO-OFDM) modulation scheme, maximum data rate of 18.8 Mbps has been achieved at a distance of 3m and video streaming up to 6m has been achieved in an indoor environment.

The objective of the project for urban communication is to make use of the high data rate capability of Li-Fi and more extensive coverage area of Wi-Fi and develop a hybrid LiFi-WiFi testbed for evaluation. A hybrid LiFi-WiFi testbed, access point selection, resource allocation algorithms and link aggregation simulation experiments have been developed.

2.3 Mobile based online Governance and Services on Demand

2.3.1 National e-Gov App Store

The e-Gov AppStore is a National level common repository of customizable and configurable applications, components, and web services, that can be re-used by various Government agencies/ departments at Centre and States, with the vision to accelerate delivery of e-services as envisaged under NeGP and optimizing the ICT spending of the Government. Core and common applications that have high demand and are replicable across the Central and State levels, are the potential applications to be included in e-Gov AppStore and they can be hosted on the National Cloud. The project enables re-use of already developed applications without incurring further cost and effort in development of those applications.

Project Objectives:

- Service model changed from "Customization from beginning" to "Customization at the point of consumption".

- Speeding up the development and deployment of e-gov applications.

- Easy replication of successful applications across States.

- Ensuring uniqueness by providing Universal Software ID to each productized application.

- Avoid duplication of effort and cost in development of similar applications.

- To increase the scale of applications by reducing resource dependency.

- Ensure availability of certified applications following common standards at one place.

Achievements:

- Currently 57 applications are uploaded on eGov App Store, and 21 applications have been funded for productization under the outlay of the project.

- Important guidelines on Application Development & Re-engineering have been prepared in consultation with various Govt. &

private agencies (CGG, C-DAC, NIC & industry experts) and published.

- State level awareness workshops have been organized in various states to educate the Application Owners on Cloud ready application development & deployment.

- "Revamping of MMPs /Projects" i.e., Transport, PDS, Prisons, Scholarship etc. was undertaken.

- AppStore Portal has been upgraded to a new version with improved performance and upgraded framework, and increased functionality.

2.3.2 India Portal

India Portal provides a 'single-window access' to information and services that are electronically delivered from all Government departments, institutions, and organisations. It has been the most popular source of information to a wide range of stakeholders - from citizens, to Government, to business and to Indian diaspora. It is a gateway of Indian Government websites at Centre, State and District levels. The portal is also integrated with MyGov and Data Portal to present the citizen engagement activities and open data across various sectors.

The India Portal has over 3.9 million visitors per month (4.0 million-page views) and 6.14 Lakh registered users. Till date, India Portal has published ~26,121 metadata. India Portal is also a platform for the promotion of various Government initiatives/ events such as:

- Micro site for Republic Day showcasing the Republic Day celebrations, President's speech to the nation and awardees of various awards that has been designed, developed, and maintained at https://knowindia.india.gov.in/republic-day-celebration/index.php

- Micro site for Independence Day which is maintained at https://knowindia.india.gov.in/independence-day-celebration/index.php

- Spotlights covering important Government initiatives and events like Combating Coronavirus, Fight Against COVID-19, Building AtmaNirbhar Bharat & Overcoming COVID-19, Helping MSMEs Grow & Reviving Economy, Collaborating to Overcome COVID-19, Educating Young Minds & Building a Stronger Nation, PM Street Vendor's AtmaNirbhar Nidhi (PM SVANidhi), SVAMITVA - Integrated Property Validation for Rural India, Pandit Madan Mohan Malviya National Mission on Teachers and Teaching, Unnat Bharat Abhiyan - Promoting Self-sufficient Village Republics, Union Budget 2021-2022, PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan) Scheme.

- Monthly newsletters that are sent to subscribers of India Portal to keep them updated about the latest content on the portal. The portal also has a Social Media presence through

  ➢ Facebook page that is maintained at https://www.facebook.com/NationalPortalIndia

  ➢ Twitter handle is maintained at https://twitter.com/indiagovin

Other initiatives/activities under the aegis of India Portal are:

National Government Services Portal (https://services.india.gov.in)

To facilitate the availability of online services that are provided by various Government entities from one platform, in a citizen centric manner under categories like health and wellness, education and learning, money and taxes etc, the National Government Services Portal has been developed. The portal lists 13,558 services that can be searched by category.

Guidelines for Indian Government websites (GIGW) (https://guidelines.india.gov.in)

GIGW was formulated under the India Portal project and has been helping to achieve the objective of making the Indian Government websites Usable, User-Centric and Universally Accessible.

The first version of GIGW was released in 2009. Subsequently, with the change in technology and user needs, a new version of the guidelines was proposed and came into effect from February 2019. The new version features inclusion of the latest standards in web technologies and accessibility, and a new section with guidelines pertaining to Mobile Apps. GIGW has also been adopted by DARPG and included in the Central Secretariat Manual of Office Procedure (CSMOP).

Know India (https://knowindia.india.gov.in)

This website showcases India's profile, its unique and rich culture & heritage, National Identity Symbols, States/UTs/Districts etc. The microsites on Republic Day and Independence Day celebrations are a part of this website.

2.3.3 User experience for Government Websites & Apps (UI/UX 4G)

To adapt best practices by government Departments in UI/UX (User Interface/User experience) a project named as "User Experience for Government Websites & Apps (UX4G)" also

known as UI/UX4G was launched. The initiative is to assist various government departments in improving the user experience (UX) and user interface (UI) of their digital applications by building capacities within the government and assisting in redesigning and revamping applications. The goal is to create a more user-friendly and enjoyable experience for the end-users. It is mainly focused to examine GIGW compliance of Government websites/ apps, to identify areas of improvement in UI/UX, create a framework and guidelines to help Government Departments to adopt better UI/UX, develop libraries of GIGW compliant ready to use, reusable Web Components, sensitize them and extend necessary technical hand-holding support on use of web components for improving the quality of UI/UX.

Project Objectives:

- Act as an enabler and facilitator in developing a framework and guidelines for user centric experience on Government Websites & Mobile Apps, especially the UI/UX for ease of use.

- Provide ready to use web components, tools, solutions, technical support, etc. for Government Departments so that they can provide best user experience.

- Enable Government Departments to improve their quality-of-service delivery through citizens' feedback.

- Enable Government Departments to conduct any kind of surveys for better planning.

- Build capacities within Government for better UI/UX and Design thinking in order to improve ease of access and navigation of Government websites and Apps.

Achievements:

- Improved and developed the design interface for 46 websites and 9 mobile applications of

Govt. Departments under the project till now.

- Framework created and Guidelines prepared for Government Departments to adopt better UI/UX.

- To focus on identified pain areas and improve services accordingly, Government services have been integrated to collect citizen feedback. This initiative has provided a department centric advanced analytical report with service improvement indicator so that department can focus on those areas.

- Government departments have been sensitized and necessary technical hand holding support been extended on the use of web-components.

- For better UI/UX and design aspects of Government websites/apps various training programs, workshops and hackathon has been conducted in the field of UI/UX for Government departments. So far, 30 workshops have been conducted online under the UX Capacity building program.

- Repository to use design templates prepared for Government Ministries/ Departments at Centre & State level. These design templates are compliant with Government guidelines & e-Gov Standards.

- Library development of GIGW compliance.

2.3.4 National Scholarship Portal (NSP)

NSP is an end-to-end integrated unified portal for all scholarship schemes offered by Central Ministries/Departments and states. NSP offers hassle-free services to all stakeholders like online scholarship application submission, tracking by student's verification by institute and final disbursement of scholarships amount directly into a student's bank account. This new unified system brings transparency by avoiding duplication and ensures timely disbursement.

Objectives of the project:
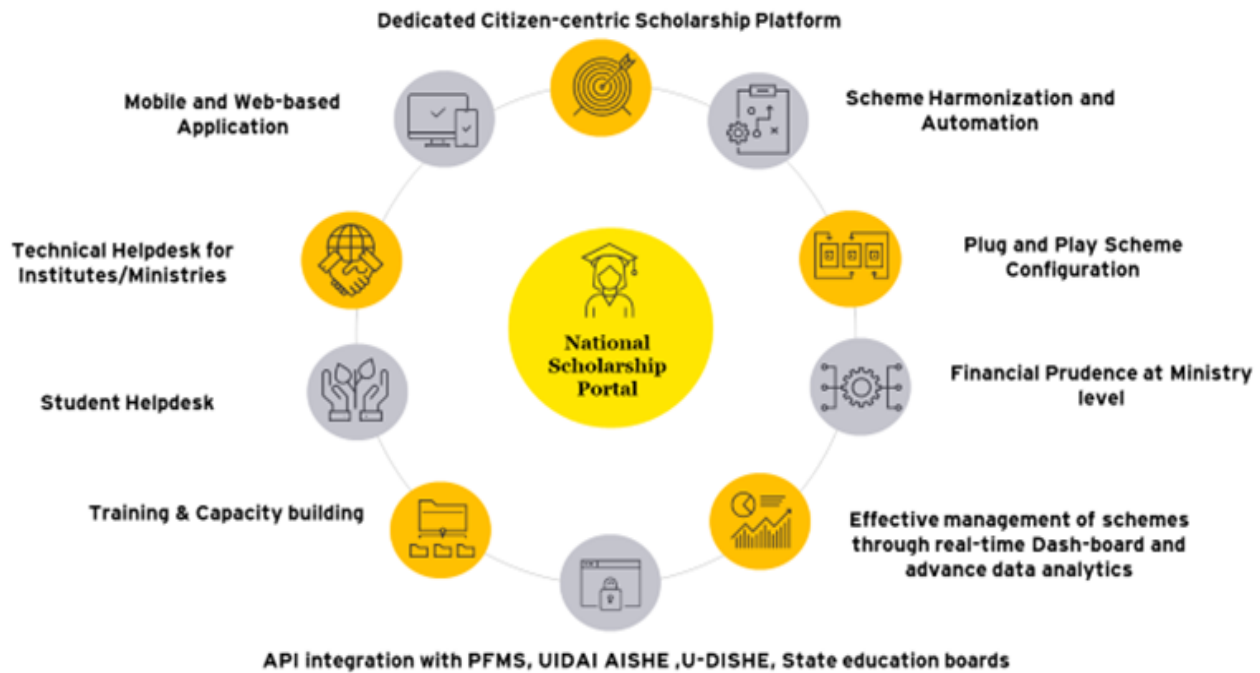
Impact: NSP Statistics for AY 2022-23

- Central Ministries/State On-boarded: 29
- Schemes Onboarded: 140
- Beneficiaries: 0.78 Crore (approx.)
- Scholarship Disbursement: ₹7,036 Crore (approx.)

Commutatively, from Academic Year 2016-17 to till now, approximately 11.50 Crore applications received and Approx. 30,000 Crore disbursed to over 5.78 Crore beneficiaries.

Stakeholder wise benefits

Stakeholder wise benefits

Beneficiary/Student

- Single source of truth for scholarship related Informaton
- Simple digital application process
- Timely disbursement
- Transparent System - low level of grievances
- Centralised Helpdesk
- Status update via Dash Boad/SMS

Institute

- Single platform to handle multiple schemes
- Unified standard process for all schemes
- Consolidated realtime dash board
- Technical support

Administrator/State Officials

- DBT in true sense
- Consolidated dashboard
- Paper less verification
- System and algorithm based merit generation
- API based integration with PFMS, UIDAI, UMAG, U-DISHE /AISHE etc

Scholarship Ministry

- End-to-end Computarization
- Smooth Monitoring
- National level preventive de-duplication
- Realtime dashboard

Major outcomes: AY 2022-23

Sr. No.	Beneficiaries	No. of Beneficiaries	Amount Disbursed (₹)
i.	Female	41,18,192	35,06,10,86,150
ii.	Male	37,28,625	35,29,82,51,617
iii.	Other	186	16,64,162
iv.	**TOTAL**	**78,47,003**	**70,36,10,01,929**

2.3.5 DigiLocker : Revolutionizing Paperless Governance

In the pursuit of achieving a vision for paperless governance, DigiLocker has emerged as revolutionary in the issuance and authentication of digital documents and certificates, rendering physical paperwork obsolete. The year 2023-24 witnessed remarkable progress and transformative developments in the DigiLocker ecosystem.

DigiLocker – Benefits to Citizens

Document Wallet Important Documents Anytime, Anywhere

Authentic Document No need for verification

Cloud Space Free 1 GB Space

Easy Secure Delivery Tamper Proof

Paperless Governance Electronic exchange of documents

Consent Based Consent based documents sharing

Legal Status — Issued Documents from DigiLocker are at par with original documents in paper format*

*As per the Information Technology (Preservation and Retention of Information by Intermediaries Providing Digital Locker Facilities) Rules, 2016 notified under IT Act 2000 in July 2016.

Users	Issued Documents	Issuers	Requesters
265.31 Million	6.73 Billion	1703	199

Key Achievements:

- With an year-on-year growth of 34% in registered users and approximately 14% growth in issued documents, DigiLocker continues to be a beacon of progress.

- DigiLocker is seamlessly integrated with e-District services of 30 States, Land Records of 8 States, and PDS services of 30 States, DigiLocker's integration with 36 Education Boards, including CBSE, CISCE, and NIOS, underscores its extensive reach within the education sector.

- The recent Union Budget 2023 underscored the government's commitment to enhancing ease of living through DigiLocker, a key

building block under India Stack. This solidifies DigiLocker's position as the nation's preferred digital document repository.

- DigiLocker's credibility received a significant boost with expanded recognition from regulatory bodies. Amendments to the Prevention of Money-laundering Rules facilitated seamless acceptance of digital Know Your Customer (KYC) documents by the Ministry of Finance. Financial authorities such as RBI, SEBI, and IRDAI also embraced DigiLocker-issued documents as integral components of their KYC processes.

- DigiLocker introduced an address update feature, allowing citizens to seamlessly update their information. This feature aligns with TRAI's initiative to capture address updates for over 1.14 Billion mobile subscribers.

- Designated as the exclusive National Academic Depository by the Ministry of Education (MoE) and UGC, DigiLocker plays a crucial role in managing academic data and documents at a national level.

- The success of the Academic Bank of Credits (ABC) ID has led to the introduction of APAAR ID, aligning with the "One Nation, One Student ID" initiative under the National Education Policy (NEP) of 2020.

- Recognizing the need for streamlined document management, DigiLocker is set to introduce the Family Locker feature, allowing users to consolidate and manage proof documents within a single account..

Entity Locker:

Apart from above-mentioned achievements, one of the major accomplishments is Entity Locker developed as an integral part of the DigiLocker platform, which aims to provide organizations with a secure digital storage vault and a streamlined system for issuance and verification of documents.

It offers a wide range of valuable ***benefits such as Enterprise Vault, Easy Access, Document Sharing, APIs for Integration Capabilities, Privacy, Security, and Consent***.

- With Entity DigiLocker, corporate entities, MSME enterprises, Government Agencies (like GEM, GSTN, MSME, NFRA, etc.) and other non-individual agencies can easily access and verify important documents and certificates in a secure and paperless manner, leading to increased efficiency and productivity.

- Development of both web and app (Android & iOS) versions of Entity Locker are completed. An entity Locker for Digital India Corporation has been opened as part of initial implementation of this service. The service is now available for other agencies.

2.3.6 Electronic Transaction Aggregation & Analysis Layer (eTaal 3.0)

A large number of e-Governance initiatives are being implemented in the country by the Central and State Governments and Organizations for ensuring efficient, affordable, transparent, and convenient service delivery to citizens. Several of these initiatives have national importance and are included in the country's IT strategy. Some applications use internal performance measurement mechanisms defined through Service Levels and KPIs, but there is no standard metric to evaluate the impact of all initiatives. In view of the rapid growth in the number of services delivered through electronic means in India, MeitY and NIC, the nodal ICT Organization, identified the number of end-to-end electronic transactions as the best indicator for measuring the real-time performance of e-Governance services in terms of service delivery to citizens.

Accordingly, eTaal (URL: https://etaal. gov.in) portal was developed, which is an electronic dashboard for providing a real-time view of eServices being delivered across different States and levels of Government. eTaal provides an aggregated view of eTransactions performed through e-Governance applications implemented including, but not limited to, the national level projects such as Digital India initiatives. eTaal automatically pulls the eTransaction count from the applications integrated with it using API technology.

In April 2022, eTaal 3.0 was developed. The key objectives of the eTaal 3.0 portal are to measure qualitative aspects of eService delivery for efficient performance comparison across Central Ministries/ States/ UTs/ Smart Cities and to integrate and display regional comparison of eServices and eTransactions up-to district level. The new portal displays a single comprehensive view for status of all eServices. In addition, eTaal 3.0 will offer a plethora of emerging technology-features such as AI enabled Chatbot and Predictive Analysis and

Business Intelligence (BI) dashboards to generate meaningful insights.

Achievements:

- As of 14th November, 2023, more than 64,928 Crore e-transactions have been recorded since launch of eTaal portal.

- 4,200 e-Services have been integrated since launch of eTaal portal.

- 809 e-Services with the granularity upto district level are integrated.

- Average growth of ~50% year-on-year in the number of eTransactions.

- Qualified eServices on a 9-parameter Key Performing Indicator (KPI) framework. Each eService is evaluated and scored on parameters such as Use of Digital Signatures, ePayment integration, Implementation of Mobile Application, Local Language Interface, Application Security Audit, Accessibility etc.
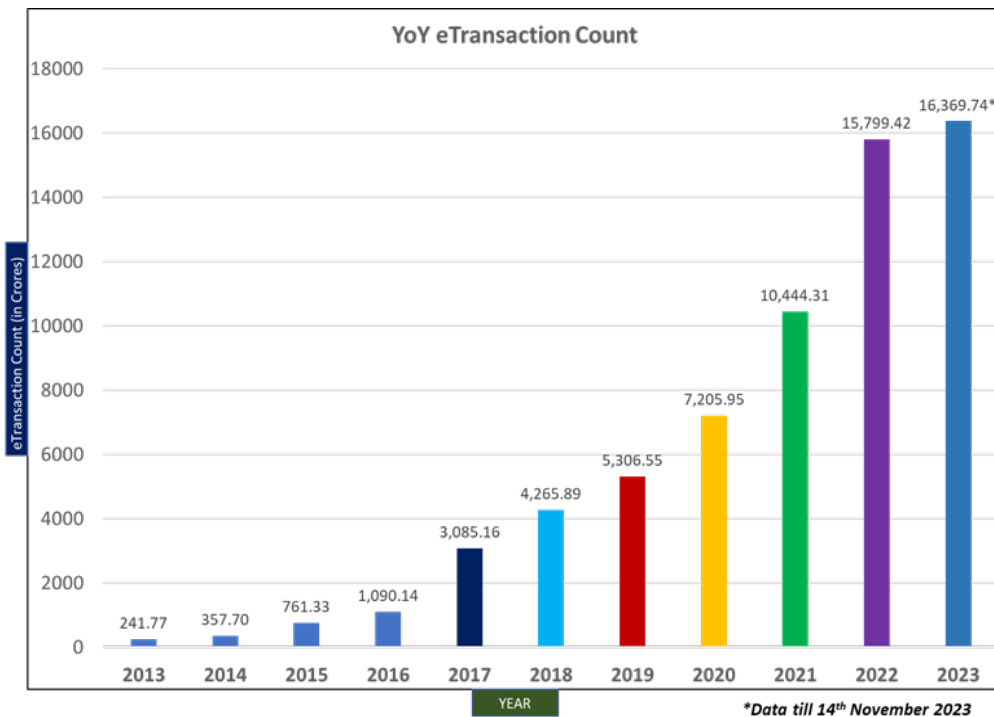
Figure 1: Year-on-Year Number of eTransactions

2.3.7 Implementation of National Data Highway (NDH)/ API Setu

MeitY, in 2015, had notified the 'Policy on Open APIs'. The policy intended to promote efficient sharing of data among data owners and inter-and-intra Governmental agencies to achieve the objective of interoperable systems in order to deliver services in an integrated manner. The key objective of this project is to facilitate implementation of Open API Policy and build open and interoperable digital platform to enable seamless service delivery across government. Under the project, a platform namely, 'API Setu' has been developed.

Achievements

- Number of published APIs: 5,200
- Number of publishers: 1,500+
- Number of Consumers: 571
- More than 210.00 crore transactions
- **Key publishers:** PAN, Driving License, Registration of Vehicles, COVID Vaccination Certificate, CBSE etc.
- **Key consumers:** eSanad, NABARD, Centre for e-Governance, Karnataka, Department of Higher Education, Haryana etc.

Notable use cases of the platform

- University of Delhi uses API Setu to check the academic credentials of CBSE students applying to the University on real time basis.
- Karnataka State Police utilizes API Setu to check candidates' class X and XII marks while applying for a job. With this step, the overall recruiting period has been cut in half.
- e-Sanad is an application of Ministry of External Affairs used to verify the educational qualifications of students asking for admission to overseas universities. e-Sanad now has access to over 18 school boards via a single application. API Setu has removed the need for duplicate integrations with each board, saving a significant amount of money and effort.
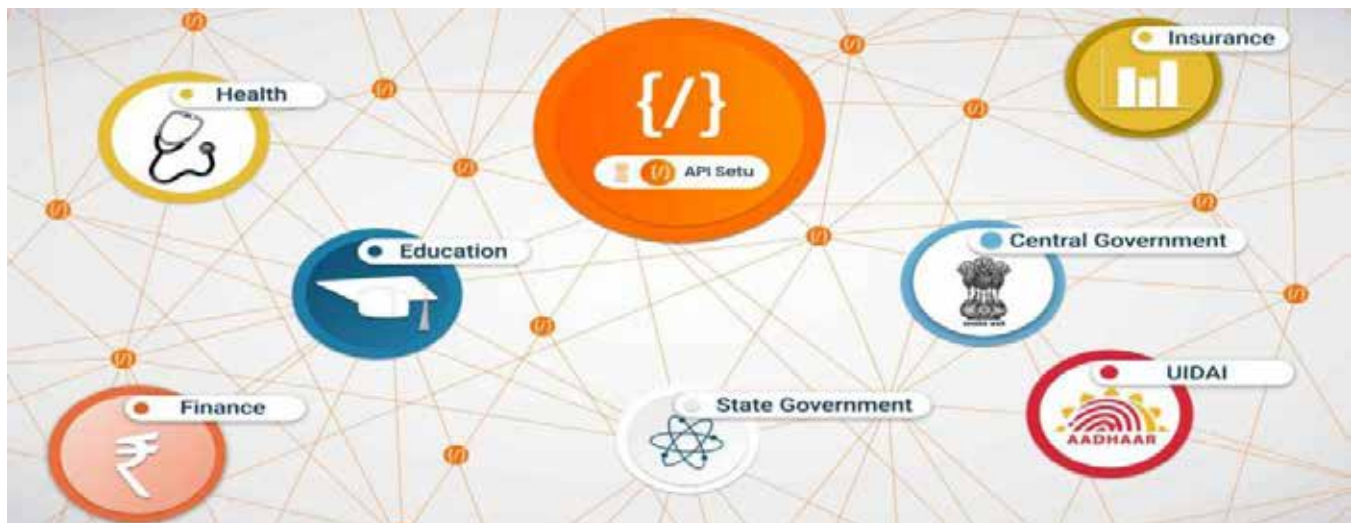
2.3.8 PRAGATI 2.0 (Pro-Active Governance and Timely Implementation)

(a) Hon'ble PM of India launched this ambitious multi-purpose and multi-modal platform PRGATI on 25th March, 2015, as a part of Digital India program, e-Governance, reforming Government through Technology.

(b) PRAGATI is aimed at starting a culture of "Pro-Active Governance and Timely Implementation". It is also a robust system for

bringing e-transparency and e-accountability with real-time presence and exchange among the key stakeholders.

(c) PRAGATI is a unique integrating and interactive platform through which Hon'ble PM monitors the implementation of various government schemes, grievances, state and central related projects & programmes, by directly interacting with all stake holders through Video Conferencing on a single platform. This programme has proved effective in addressing and resolving issues by bringing down the inter-departmental communication gap and thus minimizing the time taken for implementation of projects and schemes.

(d) It's a three-tier platform where Hon'ble PM interacts with the Secretaries to Government of India and Chief Secretaries of States on single platform, through which PM is able to discuss the issues with the concerned on Central and State officials directly with full information and latest visuals of the ground level situation.

(e) This is the PM's unique initiative for resolving bottlenecks in project implementation, cutting delays, reviewing the progress of flagship government initiatives, keeping tabs on handling & resolution of public grievances. Initial phase of PRAGATI Project was approved in year 2015 for a period of 5 years (i.e., till 31st March 2020), which was further extended

30th September, 2020 due to COVID-19, emergency situation. The PRAGATI 2.0 was approved with an outlay of ₹47.09 Crore for another 5 years.

(f) Using the PRAGATI video conferencing infrastructure, Government of India has reviewed more than 340 (Central/States) Projects worth around ₹17.05 Lakh Crore, programmers/Schemes of various Ministries/ Departments and 18 Sector Grievances. Hon'ble PM has chaired 43 PRAGATI Video Conferencing sessions till date in both PRAGATI 1.0 and PRAGATI 2.0 projects.

(g) In addition to defined objectives, Hon'ble PM also used the PRAGATI Video Conferencing infrastructure for various Inaugurations, flagging off, Mela, Launches and international conferences:

S. No.	Event Name	No. of Video Conferences
i.	Flagging off Vande Bharat Trains and Inaugurations	37
ii.	Rozgar Melas, Viksit Bharat events and launches	17
iii.	International conferences	5

(h) Hon'ble PM also used the PRAGATI Video Conferencing infrastructure for various international events, including the Voice of Global South Summit (VoGSS) and the G20 Programme, launches of projects under bilateral agreements with many countries. VoGSS occurred in mid-January of this year, and on November 17th of the same year, it was organized again, connecting more than 140 Countries through video conferencing. NIC also participated in the G20 program, connecting over 20 Countries and Organizations through video conferencing.

- **Voice of Global South Summit- Inauguration & Concluding Session held on 17th November-2023**

  The Inauguration and Concluding sessions of VoGSS summit was done under Chairmanship of Hon'ble PM of India on November 17th November. The summit has been organized successful through video conferencing. The program was organized by Ministry of External Affair (MEA). The technical support was provided and managed by NIC Video Conferencing Technologies and Services Division. More than 140 countries participated through video conferencing. Inauguration session was held from 10:00 a.m. to 11:00 a.m. and concluding session was held from 5:30 p.m. to 7:30 p.m. Eight number of various ministerial sessions were also conducted and managed by NIC's various teams.
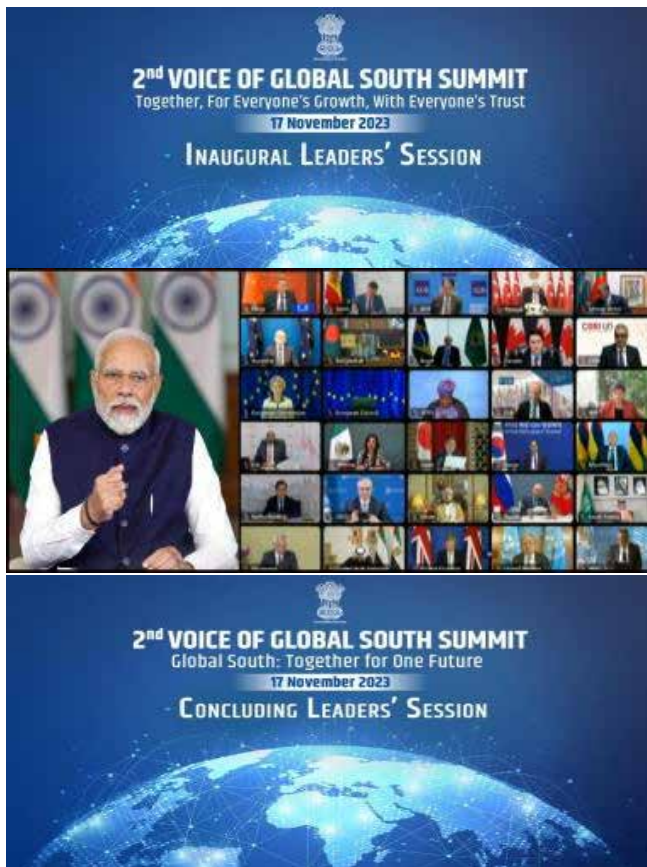
- **Virtual G-20 Summit held on 22nd November-2023**

  The G20 leader's summit Under Chairmanship of Hon'ble PM of Bharat, has been successfully organized and managed by NIC on November 22nd 2023. It was a virtually meet program, organized by Ministry of External Affair (MEA). The Video Conferencing platform and support was provided by NIC Video Conferencing Technologies and Services Division.

  Total Forty-One (41) countries were connected in this high-profile virtual meeting in which the Head of Country had participated in the meeting. The Twenty (21) member countries along with nine (9) guest countries and eleven (11) International Organizations participated. Entire conference has lasted for more than 3.5 hours without any technical glitches.

2.3.9   myScheme

To meet Universal Transparent Tracking of Applications and Responses to Applications (UTTARA) project's objective of developing an online platform for schemes search and discovery, myScheme - a product for advanced and personalised search for eligible schemes was launched by Hon'ble PM on 4th July, 2022 during Digital India Week-2022 in Gandhinagar. myScheme is a National Platform that aims to offer one-stop search and discovery of the Government schemes. The platform helps the citizens to find the right Government schemes for them. It also guides on how to apply for different Government schemes. The portal may be accessed at https://www.myscheme.gov.in/ and mobile App may be downloaded from https://play.google.com/store/apps/details?id=in.gov.negd.myscheme.

(a) The present status is as follows:

Sl. No.	Title	Present status
i	Web and Mobile Application	Launched on 04.07.2022
ii	Schemes Added	2,000 [Central (520) & State (1,480)]
iii	States/ UTs On boarded	35
iv	Languages Supported	2 (Hindi and English)
v	Scheme Search & Discovery Module	LIVE
vi	Personalized Search	LIVE
vii	Check Eligibility Questionnaire	LIVE
viii	GovForms (powered by DigiLocker)	Live
ix	No. of visitors on Web Portal	12 million
x	Presence on other Government Platforms	3 (e-Shram, UMANG, and API Setu)

(b) Department On-boarding:

- More than 40 workshops have been organised with the different Central Ministries/ Departments

- Several workshops have been organised at the State Level.

- More than 40 Nodal Officers have been nominated from Central Ministries/Departments

2.3.10 Sign Language Accessibility for e-Governance Services

National Policy on Universal Electronic Accessibility policy released by MeitY in 2013 and the Right of Persons with Disabilities Act, 2016 recognize the need to eliminate the discrimination on the basis of disabilities and to facilitate equal access to electronics & ICTs.

The project being developed by C-DAC Trivandrum in collaboration with Amrita Vishwa Vidyapeetham, Kollam, aims at providing accessibility of e-Governance services, with use case of UMANG which provides numerous services of various government departments on single platform, to differently-abled persons as currently these services are not accessible to them.

Achievements:

- Indian Railways Chat flow and analysis of APIs for form filling – In Progress. (Development is delayed due to access permission in API Setu and NDA submission in progress).

- Deployment of eRaktkosh Chatbot in UMANG Production – In Progress.

- Automatic testing interface with visualization for Analysis – In progress.

- Unified ISL Chatbot for UMANG services for production deployment – In Progress.

- Answer Video recording of Rail madad and UTS – Completed.

- CNN transformer based ISL recognition model training for UTS – competed.

- Gesture analysis based on timestamp for improving accuracy – Completed.

- Improvisation of AI modelling accuracy of Indian Railways - In progress.

- Experiments of Sentence transformers model and rule based for QA modelling of Rail madad and UTS - In Progress.

- Experiments on state-of-the-art network using Two Stream key points pipeline training – In progress.

2.3.11 eGOVMMCASES – Development of Multimedia Cases with teaching notes on eGovernance Initiatives of Government of India

Case-based learning is an established approach used across disciplines where students apply their knowledge to real-world scenarios, promoting higher levels of cognition. Using a case-based approach engages students in the discussion of specific situations, typically real-world examples and development of problem-solving skills. Multimedia cases have their prime appeal due to their supplementing print content with visuals, both in the form of interactive illustrations and videos. Keeping in view the above facts, this project has been initiated wherein the key is to develop 20 multimedia cases on different e-governance initiatives of Government of India by providing a comprehensive summary of the project's background and its current status & make it available on a web-based platform. Out of these 20 cases, atleast 8 cases would be targeted to publish at Harvard Business Publishing.

- Seven cases (Aadhaar, GeM, Olabs, CoWIN, API Setu, and eSign) presented at the XVIII International Conference on Public Policy & Management from 22nd to 24th August at IIM Bangalore as part of preliminary feedback on the approach. The conference was attended by academicians, students, research scholars, policy regulators, auditing and rating agencies, lawyers, and NGO professionals.

- Cases that need primary data with 500 sample sizes identified, and case writers have started working on the same.

- 5 cases with teaching notes in the Beta stage, with one DigiLocker case uploaded as a multimedia case. Link: https://www.amrita.edu/school/project-egovmmcases/cases/

- 4 full cases with teaching notes (Jeevan Pramaan, BHIM, Passport Seva, and eCourts) submitted to the 9th Pan IIM World Management Case Conference. Conference Theme- Entrepreneurial Innovation and Digital Governance for Inclusive and Sustainable Growth to be held at IIM Sambalpur from 21st to 23rd December 2023.

2.3.12 To set-up India Enterprise Architecture (IndEA) at NeGD

In order to facilitate better governance to citizens and enable whole-of-government approach, policy integration and use of big data analytics is required. These trends require breaking of sectoral barriers and silos and re-architecting the Government as a single enterprise. Keeping in view the above facts, MeitY formulated IndEA Framework along with its Adoption Guide. The vision of IndEA is "to establish best-in-class architectural governance, processes and practices with optimal utilization of ICT infrastructure and applications to offer ONE Government experience to the citizens and businesses".

For pilot implementation of IndEA, a project titled 'To set-up IndEA Division at NeGD' has been initiated wherein 2 Ministries/ Departments (Education & Agriculture) and 2 States/ UTs (Meghalaya & 1 more State) have been targeted. Major objective of the project is to raise maturity of existing e-Services to Level IV i.e. Connected Services (ref. United Nations e-Service Maturity Model), simplify processes, enhance enterprise security, make use of the latest technology, facilitate information-based decision making while driving efficiency, cost benefits, sharing and reuse. Role of MeitY is to provide only technical support and concerned Ministry/State would be the owner of their respective platform.

Achievements:

IndEA blueprinting and implementation in States:

- The blueprint for Megh EA and its implementation in the State chosen department is completed and same has also received UN Award for Enterprise Architecture.

- Demonstration of MeghEA's pilot implementation viz. e-Proposal system was organized wherein SeMTs of 8 NE States were invited to learn and explore the replication in their States.

IndEA blueprinting and implementation in Ministries:

- **Education:** NDEAR document has been launched by Hon'ble PM for school education and its implementation is being worked out. Blueprint exercise for Department of Higher Education (DHE) called NDEAR-HE is in advance stage of preparation.

- **Agriculture:** The concept paper for IDEA for Agriculture is prepared and published. Its implementation is being worked out. MeitY supported IDEA endeavour and its implementation through AgriStack.

- **Health**: The blueprint for NDHM and its implementation in the form of Ayushman Bharat Digital Mission (ABDM) is initiated. It has been launched by Hon'ble PM.

- **Urban Development**: Support is provided for National Urban Digital Mission.

- **MSME:** Support is provided in integrated National MSME Digital Portal.

- **Tourism:** National Tourism Policy has been framed taking into consideration IndEA and RFP support for PMU provided by NeGD.

- **Social Justice & Welfare:** Committee and Working Groups have been finalised and meetings are being held. Proposal for setting PMU is approved and process of mobilizing resources has been started by NeGD.

- **PM GatiShakti:** This portal is being implemented by BiSAG(N).

- **Skill & Employment:** Meetings of the working group under the Chairmanship of Additional Secretary, MoLE and focus groups (Unnati, MSME) have been held for development of public national platform for skills and employment. Working Group report is also prepared.

- In respect of Awareness and capacity building, various State/UT level workshops have been conducted so far.

- To promote replication of MeghEA solutions in North-East States, workshop on solutions by Government of Meghalaya was organised by NeGD in March 18, 2024

- **IndEA repository:** This has been established to store all the project documents, guidelines, e-learning material, architectural building blocks, reference architectures, model domain architectures, standardized templates, cases studies, best practices, lessons learnt, tools and artefacts etc. for use by Government departments and agencies.

2.3.13 Open Government Data (OGD) 2.0 – Micro Services Based Architecture Leveraging Cloud Technology

MeitY under the aegis of National Data Sharing and Accessibility Policy (NDSAP) initiated OGD Platform India (https://data.gov.in), to share government data with its citizens. The Platform has been set-up and managed by the NIC.

OGD 2.0 - Micro Services Based Architecture Leveraging Cloud Technology has been initiated from May, 2020. The Platform provides Government-to-Government (G2G) service by allowing Ministries/Departments/States/ Organizations to publish and manage their datasets on the Platform through a Chief Data Officer (CDO). The datasets are available to all free of cost.

As on 9th November, 2023 OGD India has 6,16,641 dataset resources. 13,072 catalogs have been contributed by more than 561 CDOs, 2,037 Visualizations created, 206,531 APIs created. Datasets on OGD have been viewed 33.02 million times and downloaded 9.90 million times. More than 2,06,531 APIs are available for users.

Further, out of the total 6.16 Lakh datasets more than 25% are contributed through web Services/ APIs. All these datasets are updated with their respective granularity. Some of them are updating multiple times during a day (real-time) e.g., Real time Air Quality Index (AQI), Current Daily Price of Various Commodities from Various Markets (Mandi), etc.

OGD is also available as SaaS (Software as a Service) model for State instances. States such as Sikkim (https://sikkim.data.gov.in), Tamil Nadu (https://tn.data.gov.in), Karnataka (https:// karnataka.data.gov.in), Kerala (https://kerala. data.gov.in), Punjab (https://punjab.data.gov. in), Andhra Pradesh (https://ap.data.gov.in), Uttarakhand (https://uk.data.gov.in) and Odisha (https://odisha.data.gov.in) have created their own Data Portals using OGD SaaS. A dedicated Data Portal for Smart City Mission (https://smartcities. data.gov.in) has also been launched to facilitate data contributions from 100 Smart Cities.

OGD PMU has been conducting regular sessions with Ministries/Departments to release more real time High Value Datasets (HVDs) on data.gov.in. Quarterly workshops for Awareness, Sensitization and OGD Ecosystem updates are conducted for CDOs. A dedicated page is available on the portal to showcase all HVDs contributed by the respective Ministries/Departments.

2.3.14 e-Governance Standards and Guidelines

Standards form an important pillar in 'Digital India'. 'Standards in e-Governance' is a high priority activity, which ensures sharing of information and seamless interoperability of data across e-Governance applications. MeitY had set-up an institutional mechanism under Digital India to evolve/ adopt standards in e-Governance under the project titled 'e-Governance Standards and Guidelines'. Key objective of this project is to develop/adopt ICT standards/guidelines/frameworks for effective and efficient implementation of e-Governance projects.

Achievements:

- For 5 areas namely, 'Anonymization of data', 'Zero Trust Architecture', 'IoT Devices', 'Mobile device security' & 'InDEA' 2.0, draft reports finalized by Working Groups (WGs). In addition, public feedback on InDEA 2.0' has been completed.

- During 2nd Brainstorming meeting, the new topics/areas were identified and recommended by the expert group to be taken up for suitable development of guideline/ framework under

the e-Governance Standards & Guidelines project: (a) Cloud Inter-operability/Portability (b) Enterprise Architecture (EA) Security (c) Metadata and Data Standards of Agriculture (d) Metadata and Data Standards of Education (e) Metadata and Data Standards of Logistics.

- Working Group on Cloud Interoperability and Portability (WG-CIP) was held in online mode and the exercise of document preparation is on after discussions with relevant Sub-Committees. Meeting among the WG member for Metadata and Data Standards (MDDS) on Logistics (MDDS-Logistics) was also conducted.

- 13 State level workshops and 1 Academia awareness workshop have been conducted on already notified standards/guidelines/frameworks.

- After testing and security audit of newly developed website, it has been made live.

2.3.15 Unified Mobile Application for New-Age Governance (UMANG)

UMANG has been developed as a single mobile platform to deliver major Government services. Hon'ble PM has dedicated UMANG to nation on 23rd November, 2017. UMANG App helps in addressing major problems/ challenges in delivery & consumption of citizen centric services by way of unifying the major citizen centric services from various government departments of Centre and States in a single unified mobile App with Core Platform integrated with DigiLocker, PayGov, Rapid Assessment System (RAS), Map services etc. UMANG aims to bring power to the fingertips of citizens. UMANG platform is available in 23 languages.

Achievements:

- UMANG has been developed as a single mobile platform to deliver major Government services

with Core Platform integrated with DigiLocker, PayGov, Rapid Assessment System (RAS) etc.

- Till 31st March 2024, UMANG has about 1,984 services (895 – Central and 1,089 State Government services) from 313 departments of Central/ State Government Ministries/ departments and Government departments and many more are continuously being on-boarded. About 6.31 Crore users are registered with UMANG and more than 418.31 Crore transactions have taken place on UMANG.

- Revamped UMANG Android app was launched with a new UI/UX providing more personalized and secure experience.

- UMANG has partnered with CSC e-Governance Services India and 11 private partners to facilitate delivery of more than 1,000 UMANG services in an assisted mode.

2.3.16 Conversational AI platform for delivery of UMANG/Government services

This is an AI based service delivery project for integration with existing UMANG services being deployed by NeGD. The main object of the project is to get the Government services delivered easily and on the other hand enable Government departments to deliver their services through this new technology. The said platform aims to benefit both the citizen as well as departments.

Achievements:

- 35 Services from 15 Departments are Live on Bot as of 30th October 2023

- Total Logged Users(cumulative): 76.00 Lakh

- Total questions asked (cumulative): 4.61 Crore

- Voice bot over cloud is under Beta Live in

English & Hindi Languages for 7 services from 4 Departments.

- Chatbot is available on the Web and Mobile (iOS + Android) with text and voice-enabled input features.

2.3.17 Adaptive Assistive System for the Moderate Mentally Disabled Children

Mental disability is a key area where ICT intervention is required. The project aims to benefit moderate mentally disabled children (category 2) and it involves developing a system that will help moderate developmentally disabled children in their daily routine activities such as basic self-care, healthcare, safety, and communication. Key objective of this project is to design and develop a framework along with content to teach the moderate mentally disabled children of ages 6 and above by encompassing the identified attributes and activities. The system can also teach them repetitive tasks that can help them acquire skills that may benefit them in their interaction with normal people.

Achievements:

- After visiting the special schools and conducting brainstorming sessions/workshops in various States, a list of around 200 topics has been finalised.

- The design and development of the framework have been completed. Content integration is also being done in parallel.

- Content validation is being performed, and the suggestions given by the experts are being incorporated into the content. Around 45 topics have been fully validated, and the content is showing on the portal. And the remaining work is being done. The development of mobile applications is in process.

- 17 workshops (both minor and major) and meetings along with Collaboration with 80 special Educators, psychiatrists, doctors and 38 special schools in various tates has been done.

2.3.18 AI-based Predictive Analytics of visitors to Public Places and its Applications for better People Management

This is analytics based public specific platform being developed by BHU, Varanasi. The aim is to develop a hardware-software combined prototype for AI-based data capture, processing and analytics. It involves image processing, data acquisition, IoT, machine learning and predictive analytics. Collected data will be stored, pre-processed, and analysed by using state-of-the-art AI and machine learning techniques. Analytical outcomes will help in making strategies and taking decisions for effective people management and better user experience.

Achievements:

- This project has successfully developed an AI-powered architecture for efficiently monitoring public spaces .

- The complete technical setup, including hardware and software, has been successfully deployed and tested at three different locations (Sri Vishwanath temple in BHU, Central Library and Computer Science dept in BHU).

- The system provides real-time data on people count, age and gender profiles, and even analyzes visitor emotions.

- The age and gender recognition algorithms surpass existing state-of-the-art solutions. Research findings are published in prestigious international journals

- The project created a valuable dataset of

Indian faces annotated with various attributes. This fills a critical gap in available resources for AI research and applications in India.

- The developed architecture and algorithms are adaptable for wider deployment in various people management scenarios.

2.3.19 iMedDesk - AI Assisted Medical Services Framework by C-DAC, Noida

India's healthcare infrastructure is distributed across the country, ranging from primary healthcare centers to large tertiary hospitals, as well as healthcare administrative bodies. In order to make healthcare services accessible to the masses, it is essential to provide easy-to-use interfaces to end users (doctors and patients) to be able to effortlessly use the system. As present interfaces are web-based, users are constrained to access specific information that is available by navigating through the web pages. Additionally, lack of knowledge of medical terms may also present constraints in accessing information, especially for patients. iMedDesk - AI Assisted Healthcare Services Framework aims to develop a mechanism for helping patients seeking information regarding medical or healthcare services at hospitals and aiding doctors to enable them to cater a greater volume of patients in healthcare.

AI Assisted Healthcare Services Framework aims to develop a mechanism for helping patients seeking information regarding medical or healthcare services at hospitals and aiding doctors to enable them to cater a greater volume of patients in healthcare. It would provide assistance through intelligent mobile interfaces that support text and audio input. This would provide quick and easy access of essential healthcare services for the masses.

Achievements:

- The design and development of the investigation module's workflow, along with, identification of intents, entities, and data collection for training the Natural Language Understanding (NLU) models for the Doctor Desk medication module is finished and completed.

- Experiments conducted for Intent extraction system for natural language medication enquiries (completed)

- Work on integrating with the Hospital Information System (HIS) APIs for real-time medication question answering and the execution and parsing engine for processing medication inquiries is under development

- Template based Answer generation for medication enquiries (in progress)

2.3.20 Integrated Citizen Engagement Platform (INCEP)

MyGov is a Government of India's Citizen Engagement Platform which collaborates with multiple Government bodies/ Ministries to engage people in policy formulation and seeks the opinion of people on issues/ topics of public interest and welfare.

InCEP by MyGov Approved on: 1st July, 2021 for 5 years i.e. till 30th June 2026

Outlay: ₹245.7 Crore

Achievements:

Since inception in 2014, MyGov has engaged 4.73 Crore+ citizens in participative governance as MyGov Sathis and from July 2021, InCEP came into force and till 31st March 2024 it has achieved over 2.93 Crore user registration, currently average growth of 42,000 registration per day, 515 tasks with over 4.88 lakh submissions, 112 discussions hosted with 6.48 lakh submissions, 869 quizzes having 134.5 lakh participations, 40 polls and surveys receiving 117.2 lakh votes and 98 innovate activities with 146.58 lakh submissions.

2.3.21 CollabFiles (https://collabfiles.nic.in)

The objective of the project was to provide a centralized platform for Government officials and employees to create and manage office documentation such as documents, spreadsheets etc. To facilitate portability of documents in standard formats such as xml, txt, docx, xlsx, odt etc., Logs for sharing of documents.

Approved on: 30th December, 2022 for 3 years

Outlay: ₹11.687 Crore

Achievements:

Currently, there are 20,000+ users, working on 29,000+ files. 100+ Department including Major Ministries / Departments are Department of Telecom, Census of India, Railway Board, Director General Defence Estates, Enforcement Directorate, Ministry of Home Affairs, NIC etc.

2.3.22 GovDrive – Storage as a Service (https://drive.gov.in)

The objective of the project was to provide Storage as a Service for the Government of India via cloud-based multi-tenant platform to Government officials for sharing documents. To provide a document storage (10 GB to each user) and synchronization service for Government officials through GovDrive application. The project aims to deploy a service that includes user agents for all devices and will enable Government officials to store, share, access, delete and /or modify the documents /files /folders online.

Approved on: 6th January, 2023 for 3 years

Outlay: ₹55.91 Crore

Achievements:

As of today, the Beta version of the platform is up and running with 10 GB of free storage space to store documents and/or folders securely for current user base of 75-100 users across 6 departments/ Ministries (PMO, MeitY, NIC, Sansad, MHA and Supreme Court) with facility of Uploading/ Downloading single and multiple.

2.3.23 Gov.in Secure Intranet Portal

With the vision of Hon'ble Minister of State, MeitY, and Ministry of Skill Development and Entrepreneurship, Gov.in Secure Intranet was developed as a secure platform that shall act as a single gateway to provide access to multiple applications used in day-to-day operations of government officials.

Gov.in Secure Intranet is an initiative in the domain of G2E with the target audience comprising of all Ministries and Departments. It provides plethora of features and access to multiple applications thorough a single sign-on without logging separately into those applications.

Users can access calendar scheduler, manage tasks and appointments, and work with reports and dashboards. The application also allows users to monitor the status of ongoing tasks assigned to a person or a team.

The platform offers the following features on a single interface that benefit users:

i. The *Engagement Manager* allows managing and tracking meetings and events via a single platform. A user, even if mapped with multi-ministry or multi-departments, can view all current and upcoming events or engagements. It is also integrated with other portals such as eOffice, email, Bharat VC, PRAYAS, Sparrow etc. providing a one stop solution.

ii. With the help of *Task Manager*, user can gain insights from quality aspects to measure team performance. A user can assign a specific task, align the team to perform the action, and monitor the project's progress through its various stages from start to finish.

iii. Prioritization of tasks based on requirement can be achieved with the help of enhanced visibility and efficacious workflows that are possible with the *Goal tracker*.

iv. Categorically sorted data and tracking of events, activities, reports, and documents on a single platform help to achieve contingency time for any unanticipated work.

v. Lastly, *the Reports & Dashboards module* allows user a 360° view to see the progress on pending work, task assigned to the team, upcoming engagements, high priority assignments etc. in real-time, helping decision making and progress monitoring.

Figure 2: Functionality Stack of Gov.in Secure Intranet

Achievements:

- Users can access 18 PARICHAY Applications such as *Bharat VC, Sparrow, Swagatam, Sandes Web etc.* with a single sign-on in Gov. in Secure Intranet without logging in those applications separately

- Users get notification of login, upcoming

meetings & appointments, and other engagements through *SANDES* application

- API based Integration with PIB for latest news and updates on Gov.in Secure Intranet

- Users and administrators can review status by filtering through *Business Allocation Rules* for Ministry and monitor progress

- Development of AI based features such as *Word Cloud, Phonetics Search, Smart Search, AutoCorrect, and Engagement Optimizer*

- Mobile Application on both Android and iOS

2.3.24 PRAYAS - Pursuing Excellence in Governance

A Dashboard of Dashboards has been developed by NIC/NICSI, as per the directions of the PMO to present Pan-India picture of critical KPIs of important Schemes/Projects of Govt. of India at a single place for better monitoring and decision-making. It provides powerful visualizations, robust analytics, and actionable insights to enable Government to align well with key policy makers and program executioners, enhancing data-driven Governance. It has been developed by the Centre of Excellence for Data Analytics (CEDA) under guidance of the Apex Office with inputs and data from concerned Ministries/Departments. The data is electronically pushed directly from the MIS/IT Systems of concerned Ministries/Departments using APIs. The platform provides actionable insights and enables concerned Ministries/ Departments to take appropriate measures at the right time. The Portal has been successfully demonstrated to the Hon'ble PM on 4th September 2020. It has also been demonstrated to all Hon'ble Union Cabinet Ministers and Ministers of State during October-November 2021.

Electronic collection

Alerts for **Data Quality**

Whole of Government

Straight from **Scheme MIS**

Monthly/Daily updates

Up to District Level

Prayas - Key Drivers

PRAYAS provides holistic view of the flagship programs and schemes for better monitoring, implementation and reach through critical KPIs. It is a 'Dashboard of Dashboards' (https://prayas.nic.in), currently having 168 Schemes/Projects with 1063 KPIs of 58 Ministries/Departments across 7 Sectors. The entire life cycle to prepare a dashboard for one scheme/project having 5-6 KPIs takes 5-6 days. This includes API based integration from IT systems of Ministries/Departments, Data exploration and preparation, creation of Visualization based on standardized format consisting of Overview, Map view and Time series including design elements (headers, logo, etc.) for particular scheme.

Key Features of PRAYAS:

I. Holistic view of all the schemes and programs across Ministries and Sectors on single platform.

II. Provision for quick view of the most critical/outcome oriented KPI.

III. Helps compare progress status and intended outcomes of each scheme across administrative geographies and identify top performers and trailers.

IV. Analysis of the coverage of the scheme based on geographic granularity and target beneficiaries.

V. Specific focus on status of stage-wise scheme implementation and progress in aspirational districts across the country.

VI. Profiling of Scheme with respect to KPIs at State & District Level.

VII. Data representation well supported by visual aids in form of graphs, charts, time series, maps etc.

VIII. Quadrant analysis of the KPIs of the scheme (based on availability of Type of data).

2.4 Digital Empowerment

2.4.1 Collaboration Application Development Platform by opening the Source Code of Government Applications (Open Forge)

OpenForge (https://openforge.gov.in) is a collaboration platform similar to Github that provides industry standard tools and features for version control, release management, code repository, requirements/ bugs trackers and document repository. It is the Government of India's platform for the open collaborative development of e-Governance applications. This platform provides strategic control to government departments over their software source code. In 2015, MeitY rolled out the "Policy on Collaborative Application Development by Opening the source code of Government Applications" which provides a framework for archiving government custom-developed source code in repositories and opening these repositories for promoting reuse, sharing and remixing.

Project Objectives:

• Provide a platform for maintaining code repositories and version control for government source code.

• Promote a culture of open collaborative application development between public agencies and private organizations, citizens and institutions.

• Reduce development cycles and fasten the rollout of e-governance applications in the country.

• Deliver e-governance services and solutions of higher quality and security through increased transparency and mass peer review.

- Reduce e-governance project cost and bring down total cost of ownership through a system of reuse, remixing and sharing.

Achievements:

- Currently, OpenForge has 13,044 registered users.

- So far, 2,821 projects have been onboarded.

- Till now, 7,909 GIT repositories have been created and 6,74,036 GIT pushes have been made.

- Many projects of national importance such as CoWIN, Poshan Tracker, GeM, UMANG, DigiLocker, Smart City, API Setu, iGOT Karamyogi, Ayushman Bharat CPHC-NCD, etc. are on this platform for day-to-day development activities.

- 410 NIC users are onboarded on OpenForge platform and a total of 200+ NIC projects registered.

- Source code of some projects such as Smart City, Digilocker issuer App, Aarogya Setu etc. made public.

2.4.2 Knowledge and Resource Centre for Accessibility in ICT

To develop accessibility standards and procurement guidelines for hardware & software, MeitY has implemented a project- Knowledge & Resource Centre for Accessibility in ICT (KAI) through C-DAC, Pune. MeitY and C-DAC have formulated the Accessibility Standards, Guidelines for ICT products and solutions.

Project Objectives:

- Standards for Accessibility requirements for ICT.
- Notify standard with BIS.
- Training and capacity building.

Achievements:

- IS 17802 (Part-1): 2021 - Accessibility for the ICT Products and Services (Part-1 Requirements) published and Gazette notified by BIS.

- IS: 17802(Part-2): 2022 - Accessibility for the ICT Products and Services (Part-2 Determination of Conformance) published and Gazette notified by BIS.

- Regular end to end monitoring of issues/ incidents related to ICT Accessibility Sugamya Bharat Abhiyan Portal.

- Conducted several large-scale awareness and capacity building workshops for ICT Accessibility.

- Constitution of Taskforce for drafting of Standards (EN 301:549).

- Formulation of sub-committee in BIS (LITD 31).

2.4.3 National Knowledge Network (NKN)

NKN is an innovative, cutting-edge, robust, and secured network, which provides a centralized multi-gigabit high-speed digital connectivity backbone for research & educational institutions and Government Organisations spread across India.

NKN was approved in March 2010 by Cabinet Committee of Infrastructure (CCI) to be implemented by NIC over a period of 10 years at a total outlay of ₹5,990 Crore, which has been enhanced to ₹6,548.2 Crore. Subsequently, duration of NKN has been extended year-on-year with the current extension being till 31st March 2024. The approval for the next phase of NKN [i.e. Digital India Infoway (DII)] is under process. The EFC for DII is ready.

NKN is the only network globally, that carries R&E, Internet, and e-Governance traffic as three independent verticals under one umbrella.

NKN Impact on e-Governance

NKN has been empowering Digital India, as it is the primary backbone for all e-Governance initiatives in the country.

NKN has been playing a vital role in enhancing digital capabilities and implementing the digital initiatives of the Government of India. It addressed the challenging task of providing a robust, and secured network which enabled the government to implement Government to Government (G2G) and Government-to-Citizen (G2C) services seamlessly and in time-bound manner for implementing the

Digital India Initiative.

NKN Status: National Reach(as on August 2023)

- Under NKN, 1,789 links have been extended to institutions, comprising almost all the major IITs, Central Universities, State Universities, NITs, IIITs, IIMs, hospitals in tertiary care such as AIIMS, PGIs, State Government hospitals, national laboratories under DAE & DST, DRDO, MHRD, ICAR, ICMR and a host of other government institutions / departments.

- The outreach includes 584 district links under NKN covering 514 districts across India.

- Today NKN has 31 Points of Presence (PoPs) in various State Capitals (including 7 Super Core PoPs).

- The network strength of NKN comprises of high speed (10G) core backbone with uniformly spread 96 core links across the country comprising of 88 core links with 10G bandwidth, 7 core links with 2.5G bandwidth and 1 core link with 1G bandwidth.

- In its progressive outreach, NKN has provided 10G bandwidth to 71 Edge links covering 56 Institutes, 1G bandwidth to 994 Edge links covering 972 Institutes and 100M bandwidth to 754 Edge links covering 753 Institutes.

- The network has a peak traffic flow of 20 Petabytes and average traffic flow of 1.5 Tera Bytes in a day.
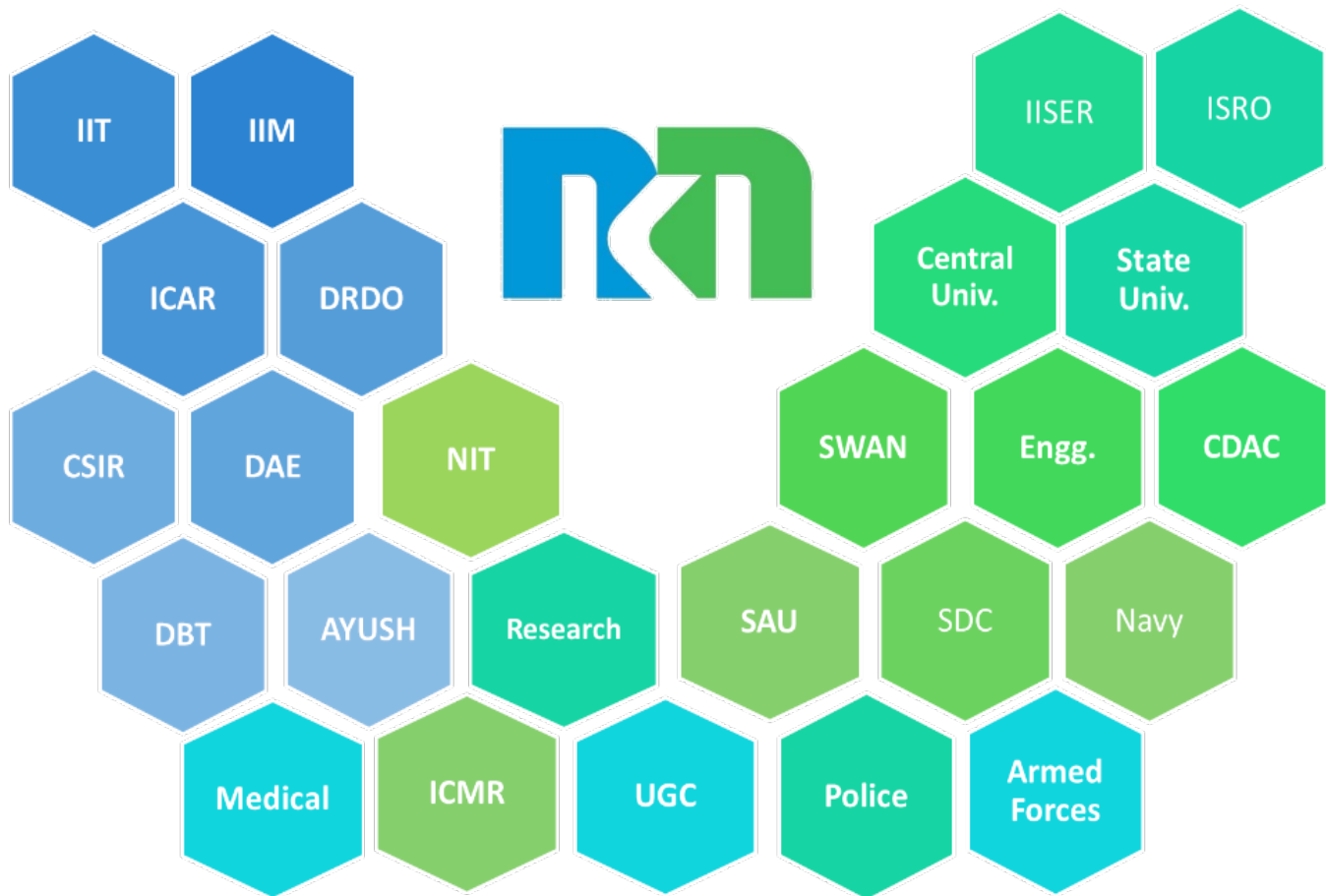
NKN Status: International Reach

- NKN has been significantly expanding its global reach by establishing 3 International PoPs at Singapore, Amsterdam, and Geneva (CERN).

- For increasing its Global outreach, NKN has peered with other National Research and Education Networks (NRENs) such as Asi@ connect in Asia Pacific, CERN and GEANT in Europe, SingAREN in Singapore, Internet2 in USA, LEARN in Sri Lanka, BdREN in Bangladesh, DrukREN in Bhutan and NORDUnet for Nordic countries.
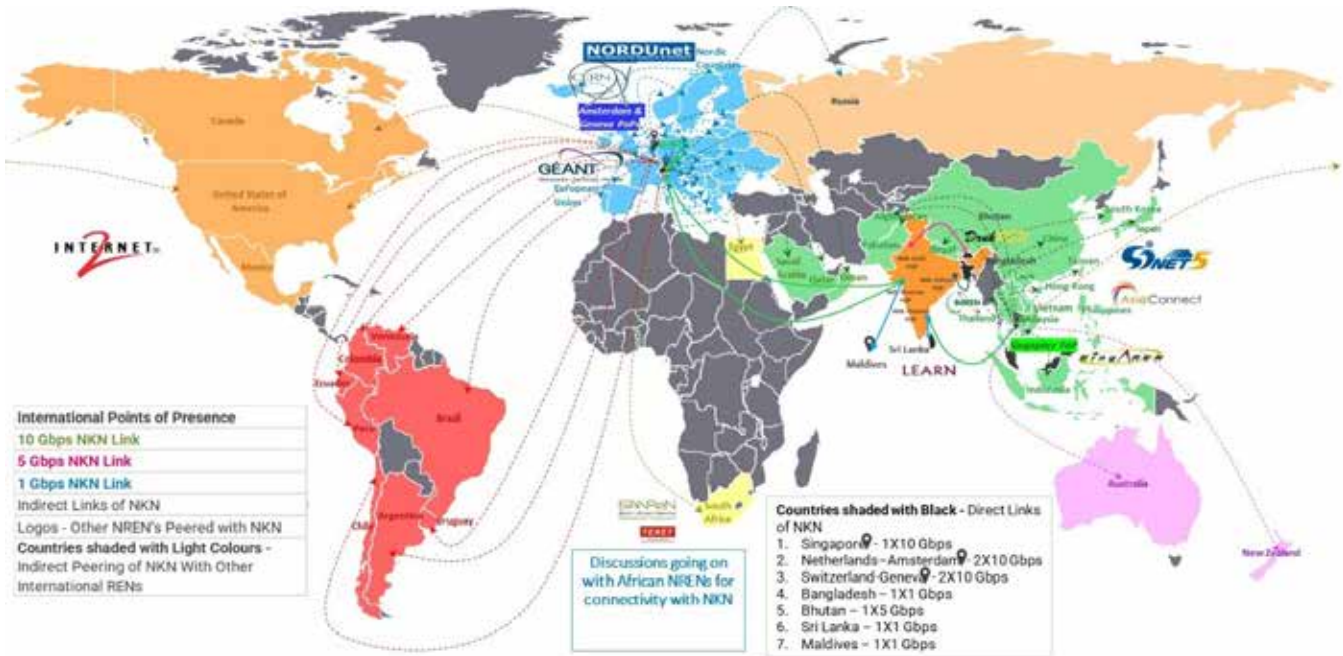
- NKN has established direct links with Singapore (1X10 Gbps), Netherlands-Amsterdam (2X10 Gbps), Switzerland-Geneva (2X10 Gbps), Bangladesh (1X1 Gbps), Bhutan (1X5 Gbps), Sri Lanka (1X1 Gbps) and Maldives (1X1 Gbps).

- As per the vision of Hon'ble PM of India, to bolster sub-regional collaboration among SAARC and BIMSTEC countries, NKN has already expanded its connectivity to Bangladesh, Bhutan, Sri Lanka, and Maldives.

Achievements:

Facilitating Digital India

NKN facilitates Digital India, as it is the backbone for all e-Governance initiatives in the country. In addition to educational Institutions, NKN connects 4 NDCs, 31 SDCs, 30 SWANs, Ministries, Departments, and mission-oriented agencies such as S&T, DRDO, Earth Sciences, Space, ICAR, MHRD, amongst others.

Connecting Remote Locations

- **Connectivity in NE region:** NKN has ensured stable connectivity in the NE region by connecting major institutions and enabling digital inclusion in the region.

- **VSAT Connectivity in remote locations:** NKN has successfully established a high capacity SCPC VSAT connectivity at Kavaratti, Lakshadweep and Port Blair, Andaman & Nicobar Islands.

- **Connectivity in J&K and Ladakh:** NKN has extended connectivity to some of the major
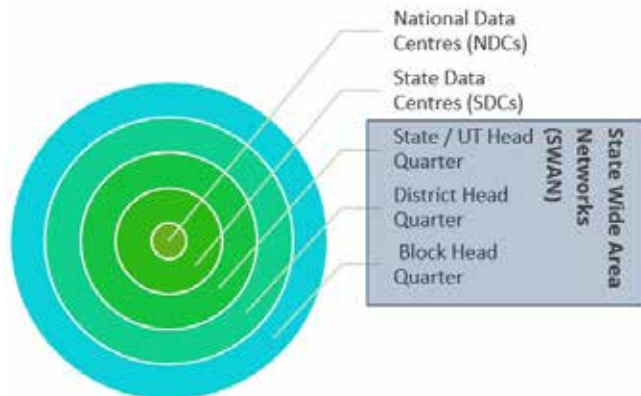
institutions of J&K and Ladakh such as IIT Jammu, IIM Jammu, University of Jammu, Sher-e-Kashmir, Defence Institute of High-Altitude Research (DIHAR) Leh, etc.

- **Submarine connectivity:** Established a link of capacity 1 Gbps through BSNL to Andaman & Nicobar Islands.

Secure Network

NKN's security eco-system is balanced, robust and provides a secure backbone network for its user community that can recover quickly from breakdowns and other cyber-attacks.

- Vulnerability Assessment and safeguarding of the network is performed regularly via multiple tools, e.g., DDOS Implementation, etc.

- For time synchronisation, NKN has implemented Network Time Protocol (NTP) which is an Internet time synchronisation protocol used to synchronise computer clocks to a time reference using the IP network/internet.

- NKN currently provides multiple free of cost services to the Institutes like SSO, DDOS, DNS, LDAP, etc.

NKN as a Backbone is Building Resilience in Higher Education Institutes have fully utilized NKN Network in creating a virtual eLearning platform as a contemporary way of working
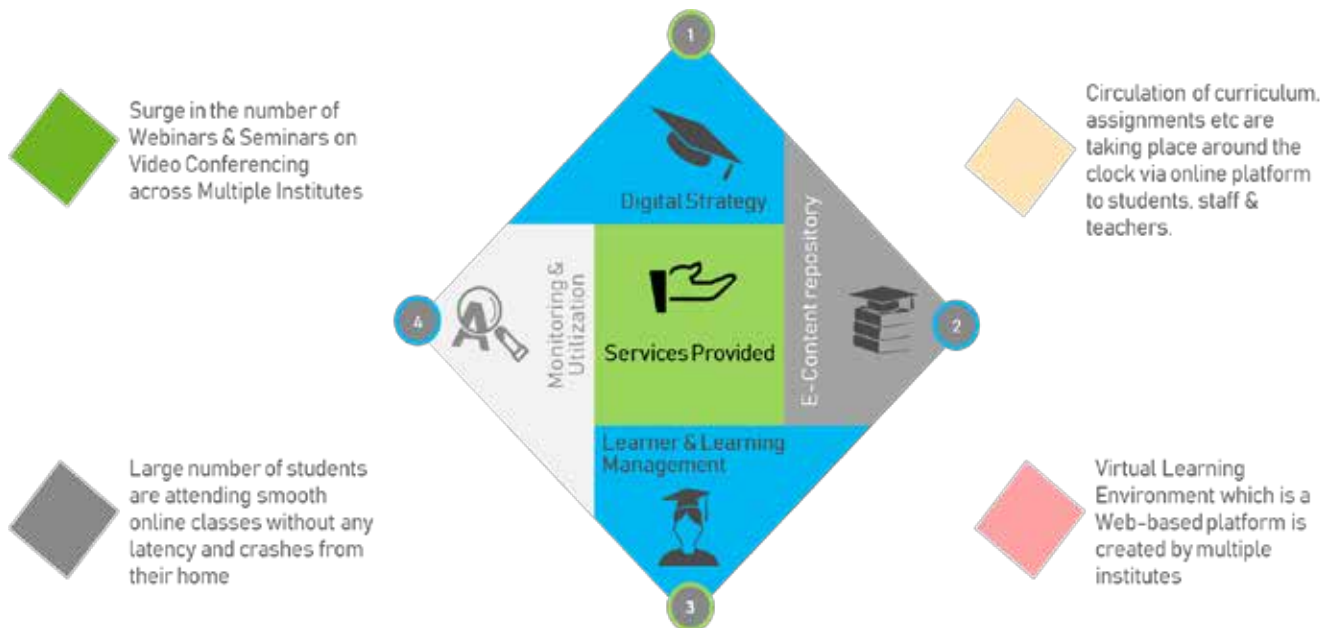
ROLE IN CHANDRAYAAN-3

NKN's connectivity has played a vital role in transmission of Real-time data from Tower Transmission Centre (TTC) stations- ISDN Bylalu to the satellite control centre. This was critical as this was mission critical for transferring Chandrayaan-3's data in real-time. NKN had supported the Chandrayaan-3 through following modes:

- **LVM3-M4 Launch Vehicle**: NKN backbone is being used for the launch vehicle VPN (VRF) for trajectory tracking via ISTRAC ground stations. NKN launch vehicle VPN provided connectivity between ISTRAC and SHAR for higher bandwidth connectivity.

- **NKN VRF for satellite tracking**: NKN VRF for satellite tracking provides reliable

connectivity with 7 ISRO establishments for critical operation of the satellite. During the landing of the satellite, ESA (European Space Agency) station and ISTRAC Bylalu Deep Space Network provided crucial data. In both the sections, NKN-GEANT and NKN-IRS-VRF provided support.

- **SPACE-VPN:** It is a Closed User Group (CUG) formed for the ISRO Institutes to collaborate on space exploration activities with high-speed data transfer with low latency for enabling missions like Chandrayaan-3, where it served as a platform on which the complete event was exclusively webcasted across the ISRO's centres.

2.4.4 MyGov

(i) Hon'ble PM launched MyGov on July 26, 2014. MyGov now has more than 3.61 Crore registered users. Owing to its interactive engagement with citizens, almost every government department uses the MyGov platform for citizen involvement, policy consultations, and dissemination of information to citizens about various government schemes and programs. MyGov has adopted multiple engagement methodologies like discussions, tasks, polls, surveys, blogs, talks, quizzes, innovate activities and on-ground activities by innovatively using internet, mobile apps, IVRS, SMS, outbound dialing (OBD) technologies, AI Chatbot etc.

User count of MyGov as on April 2023	User count of MyGov as on November 2023	Increase in count	% Increase in count
3,05,04,557	3,61,90,379	56,85,822	18.69

Count of Activities conducted and citizen participation during period April 2023 to November 2023 is given below:

Activity	Count	Submissions
Discuss / Task	16	38,909
Do / Group Issue	158	96,007
Innovate	22	10,34,064
Quiz	129	68,34,989
Poll/Survey	13	1,18,952

(Citizen's participation on MyGov during April 2023 to November 2023)

(ii) Apart from this MyGov has significant achievements on social media. With the username @MyGovIndia, MyGov is one of the most active profiles on social media, including Twitter, Facebook, Instagram, YouTube, and LinkedIn. There are around 910.05+ Lakh followers on WhatsApp, 14.39+ Lakh followers on Facebook, 32.47+ Lakh followers on Twitter, 24.76+ Lakh followers on Instagram, 7.37+ Lakh followers on Telegram, 6.76+ Lakh followers on YouTube, 1.43+ Lakh followers on LinkedIn, 19.80K+ followers on Pinterest, 14.47 Lakh+ followers on Roposo, 4.90 Lakh+ followers on Chingari, 81.18K+ followers on ShareChat etc.

(iii) To mitigate language as a barrier and encourage regional outreach, MyGov has taken initiative for Content Localization through software in 11 regional languages including Assamese, Gujarati, Hindi, Punjabi, Marathi, Bangla, Telugu, Tamil, Kannada, Malayalam, and Odia. MyGov website was made live in 11 languages on 22nd March 2023. Next, other microsites and app will also be made live in other languages very soon. MyGov has its presence in regional social media in 7 regional languages i.e., in Punjabi, Telugu, Marathi, Malayalam, Assamese, Bengali & Odia.

(iv) During this tenure, Quiz as an engagement activity received the highest participation. Chandrayaan 3 Mahaquiz was organized honoring India's amazing space exploration journey. Chandrayaan Quiz currently has 40.53+ Lakh participations. MyGov has also launched Sardar Unity Trinity Quiz, Hack Proof Digital Nagrik Quiz, Naturopathy Wisdom Quiz, Ayurveda Quiz, Cyber Security Awareness Quiz recently.

(v) Along with these initiatives, MyGov has been actively celebrating various events such as National Handloom Day, National Tourism Day, 9 years of Seva, Sushasan and Garib Kalyan, Har Ghar Tiranga, Jal Jeevan Mission, Digital India Week 2023, Pariksha Pe Charcha 2023, Padma Awards 2023 and International Year of Millets 2023. MyGov is also inviting ideas from citizens for Mann Ki Baat for monthly episodes. LiFE (Lifestyle for Environment) and Stay Safe Online have been the most engaging campaigns.

(vi) MyGov has launched Campus Ambassador Program, Saathi 2.0 and YUVA Pratibha Talent Hunts. A microsite campus.mygov. in for connecting with youth and students at colleges and universities. MyGov Saathi 2.0 is MyGov India's initiative to make citizens an active part of nation-building by creating a network of Saathis that can spread awareness about government schemes, policies, and initiatives in Rural, Semi-urban and Urban areas. The Objectives are to engage with the community, gather feedback, participate in events/activities, engage in online discussions & campaign and communicate with Citizens. MyGov has also established a Citizen Response center which is now live and operational to connect with citizens and close the feedback loop.

(vii) MyGov has also launched State instances in 23 States and UTs, namely Himachal Pradesh, Haryana, Maharashtra, Madhya Pradesh, Arunachal Pradesh, Assam, Manipur, Tripura, Chhattisgarh, Jharkhand, Nagaland, Uttarakhand, Goa, Tamil Nadu, Uttar Pradesh, Mizoram, Rajasthan, Jammu & Kashmir, Ladakh, Karnataka, Gujarat, Dadra and Nagar Haveli and Daman, Diu & Andaman and Nicobar Islands.

(viii) MyGov Helpdesk on WhatsApp number of 9013151515 is integrated with DigiLocker APIs which allows users to access their documents like Aadhaar, Driving License, Pan Card, Vehicle Registration Certificate, Class X and XII marksheets and Insurance documents.

(ix) Given below are the glimpses of MyGov's activities hosted on the platform:

Suggestions for G20 presidency 2023

YUVA Pratibha Talent Hunt

Chandrayaan-3 Mahaquiz

Ideas for 100 episodes of Mann Ki Baat

2.4.5 Digital India Bhashini

Bhashini

MeitY under it's DIP has undertaken a unique initiative, National Language Translation Mission, called as Mission Digital India Bhashini, to bridge the language diversity in India. Mission Digital India Bhashini was launched by Hon'ble PM on 4th July 2022 during Digital India Week 2022 in Gandhinagar, Gujarat.

Vision of Bhashini is to "Harness natural language technologies to enable a diverse ecosystem of contributors, partnering entities and citizens for the purpose of transcending language barriers, thereby ensuring digital inclusion and digital empowerment in an AatmaNirbhar Bharat."

Technology

- Bhashini works with some of the premier academic institutes, including IITs and IIITs in India. These institutes are developing state-of-the-art language AI models for various Indian languages. Bhashini platform already hosts 290+ AI based language models in various technologies.
- Automatic Speech Recognition (ASR): ASR technology processes human speech into readable text.
- Machine Translation (MT): Machine Translation (MT) is an automated translation of text performed by a computer.
- Text to Speech (TTS): TTS converts text into natural-sounding speech.
- Optical Character Recognition (OCR): It is used to turn scanned images and other visuals into text.
- Transliteration: Transliteration is a type of conversion of a text from one script to another.
- Textual Language Detection models: This model can detect English and 15 Indian languages from the written text.

Bhashini Platform (https://bhashini.gov.in/) has a repository of models where anyone can submit the model, benchmark the model and can make the model available for wider use.

The Bhashini open APIs for language translation in text and voice have been listed on API Setu (https://apisetu.gov.in).

Applications

Under the Mission, the following key user centric applications have been developed:

a) Speech-to-speech translation App, and

b) Anuvaad web Application (https://anuvaad bhashini.gov.in/) has also been developed.The Bhashini Mobile App can be downloaded from the Android play store and iOS App store.

c) Bhashini Live Speech-to-Speech application offers real-time cross-language communication by instantly translating spoken words.

Users can select their preferred source and target languages from dropdown menus, and the application utilizes Bhashini's ASR and Translation APIs to enable seamless conversations in 11 Indian languages The supported Indian languages include Hindi, Marathi, Gujarati, Kannada, Tamil, Telugu, Malayalam, Bengali, Assamese and Punjabi.

d) Jugalbandi, an AI-powered chatbot powered by BHASHINI, is an open-source solution capable of processing knowledge-base to provide real-time responses to human inquiries.

G20 Participation

BHASHINI participated in the recent G20 Summit held in Delhi, solidifying its commitment to technological innovation and accessibility. At the G20 Summit's Digital Experience Zone exhibits, BHASHINI showcased two noteworthy use cases:

(i) A real-time Speech to Speech translation application for effortless multilingual communication.

(ii) The BHASHINI-powered Jugalbandi AI Chatbot.

Bhashini Use Cases and Partnerships

Voice Based Payment: Bilingual (Currently Hindi and English) option in Conversational UPI Payments and Conversational Bill Payments.

Grievance Redressal (Multilingual): DARPG has integrated the AI based language tool, Bhashini with the CPGRAMS portal. This integration facilitates the Grievance Redressal Officers (GROs) to translate the regional language grievance texts into English and the complainants have the option to view the final reply in both English and the translated native language, ensuring better understanding and communication between the citizen and the concerned authorities.

Ticket Booking System: AskDISHA on the IRCTC OFFICIAL website and mobile app, Train Ticket booking or Asking Queries by voice or text can now be done in Gujarati as well.

Multilingual Chatbot - Farmer Chatbot: PM Kisan is a Central Sector scheme with 100% funding from Government of India. Powered by BHASHINI, an AI CHATBOT is made that responds to farmers queries in regional language. The bot solves queries related to payment and KYC matters.

2.4.6 Direct Benefit Transfer (DBT) 2.0

DBT Bharat portal (www.dbtbharatgov.in) has been designed and developed for capturing DBT related information and monitoring progress in the country. This Portal functions as an aggregator for transactional level data and related progress of all DBT applicable schemes implemented by Government of India and respective State/UT. The portal aggregates the scheme-wise Monthly Progress, which is received preferably through web-service and with district level granularity strictly complying with Local Government Directory. Based on data received from the Ministries/ Departments, various reports are prepared for the public at large to ascertain overall progress on DBT implementation in the country. In addition, it also ranks Schemes, Ministries/ Departments and States/ UTs on various DBT related parameter to promote a healthy competition among the stakeholders and to fast track the DBT implementation in the country.

2.4.7 Common Services Centres (CSC-2.0: A Way Forword)

CSCs have been set up under an initiative of the Electronics and Information Technology. CSC e-Governance Services India Limited, a special purpose vehicle (SPV), is the implementing agency. The CSC initiative aims to deliver e-services to rural citizens through CSCs and expand the

CSC network till the Gram Panchayat level. Over 400 services are being delivered through CSCs, including government services, financial services and services related to Aadhaar, various social welfare schemes, education, telemedicine, travel bookings, utility payments.

Approved on: August, 2015 for 4 years (Extended till March 2024)

Outlay: ₹475.11 Crore

Achievements:

- As per information furnished by CSC e-Governance Services India Limited, as on 31st March, 2024, 5.85 lakh CSCs are functional across the country in rural and urban areas, out of which 4.72 lakh CSCs are functional at the Gram Panchayat/village level (rural).

2.4.8 Capacity Building Schemes

Details are available at Para 9.6.7

2.4.9 eGreeting Portal and Sampark 2.0

Enabling bi-directional Government and citizen engagement in governance leveraging various e-channels [like emails, SMS, Miss-Call, OBD (Out Bound Dialling)] along with enhanced services and offerings of the project.

Approved on: 23rd April, 2020 for a period of 5 years i.e. till 31st March, 2025

Outlay: ₹54.042 Crore

Achievements:

As on March – 24 the following is achieved

- 213.80 Crore Bulk SMS pushed
- 226.86 Crore second of OBD
- 3,273.69 Crore emails
- 7,052 Templates designed through crowd sourcing
- 6.38 Lakh e-Greetings shared

2.4.10 Awareness and Communication Plan for Digital India

Awareness and Communication (A&C) is an integral component of the DIP. A&C performs the crucial role of generating and raising the level of awareness about Digital India, its schemes, initiatives and services amongst diverse stakeholders across the country.

The main objectives of A&C activities are:

(a) **Expand visibility of Digital India**: Expand visibility of DIP & its projects and services, with emphasis on outreach to Tier-3 & 4 towns and rural pockets of the country for welfare of citizens including their social, economic & education empowerment.

(b) Create Awareness and wide publicity including event-based publicity etc., through various media- social media, radio, TV, print, outdoor media & activities around Government of India Schemes and Digital India services.

(c) Inform, Educate, Communicate & Sensitize citizens about usage & benefits of services & schemes.

(d) Expand reach of DIP globally

    i) Leave a footprint in the global sphere

ii) Recognition of India as a hub for Emerging Technologies (RAISE, Global Conference on Emerging Tech etc.)

(e) Establish the brand "Digital India" by way of effective branding exercise across various platforms- Mass Media, Social Media, Rural Outreach etc.

i) Facilitate demand creation for various services leading to more adoption of services

ii) Increase in downloads of App based services

iii) Increase in likes on Social Media platforms

Achievements of the Scheme :

(a) **G20 Digital Economy Working Group (DEWG) meetings:** Delegates from G20 member countries, and international organizations, top officials from the Ministry of Foreign Affairs, the Department of Transportation, state governments, and their organizations were invited to attend the summit. The 1st ,2nd, 3rd and 4th DEWG meetings were held in Lucknow, Hyderabad, Pune and Bangalore respectively.

- 1st G20 DEWG Meeting in Lucknow (February, 13- 15, 2023)

- 2nd G20 DEWG Meeting in Hyderabad (April 17 - 19, 2023)

- 3rd G20 DEWG Meeting in Pune (June 12 -14, 2023)

- 4th G20 DEWG Meeting in Bangalore (August 16 - 19, 2023)

(b) **Organisation of Global DPI Summit and Exhibition in Pune (June 13-14, 2023)**: The DPI Summit, inaugurated by Shri Rajeev Chandrasekhar, Union Minister of State for MeitY and MSDE. The summit was attended by 150 foreign delegates from 50 countries, over 250 in-person delegates, and over 2000 persons attended the summit live. India signed an MoU with four countries namely Armenia, Sierra Leone, Suriname, and Antigua and Barbuda on sharing INDIA STACK. 14 Experiential exhibits were showcased comprising successfully implemented DPIs related to Digital Identity such as Aadhaar, Fast Payment-UPI, DigiLocker, UMANG, ONDC (Open Network for Digital Commerce), BHASHINI (language translation solutions), DIKSHA (learning solution), eSanjeevani, Soil Health Card, e-National Agriculture Market, and Digital India Journey and DIGI YATRA (seamless travel experience at the airport).

(c) **Inter-Ministerial Conference on Cyber Security (17th July, 2023):** In order to enhance awareness of cyber security, how to protect and safeguard our ICT infrastructure from cyber threats, deliberate upon appropriate counter measures, and share best practices, an Inter-ministerial Conference was conducted by MeitY on July 17, 2023.

(d) **SemiconIndia 2023 Conference in Gandhinagar (25th-30th July):** The SemiconIndia 2023 exhibition was inaugurated at Gandhinagar by Chief Minister of Gujarat,

Shri Bhupendrabhai Patel, in the presence of Union Minister of State for Skill Development & Entrepreneurship and Electronics & IT, Shri Rajeev Chandrasekhar.

(e) Digital India Awareness University Campaign- Digital India Talkshow-cum-Interactive Sessions (21st August): A Digital India Awareness campaign was organized by NeGD at various colleges/universities in Delhi to promote awareness about citizen-centric apps and services provided under the DIP such as DigiLocker, UMANG, MyScheme, Rapid Assessment System, OpenForge, API Setu, Poshan Tracker, Academic Bank of Credits, National Academic Depositories, National AI Portal, India Stack Global, Meri Pehchaan etc. The aim of the program is to create awareness about the government platforms/ services that are useful for common citizens.

(f) Digital India Awareness Campaign at 25 Delhi Metro Railway Corporation (DMRC) Stations (May 25 – June 25, 2023): An awareness campaign was conducted across 25 DMRC Stations for a month. Digital Public Goods/Services such as DigiLocker, UMANG, myScheme, DIKSHA, MeriPehchaan, API Setu, and Open Forge were promoted to spread awareness amongst the citizens using Delhi Metro Service. Banners, standees, and canopies were put up in all the selected metro stations. The entire campaign was organized by A&C.

(g) Digital India Experience Zone at G20 Summit in New Delhi (September 9-10, 2023): The Digital India Experience Zone was established as a prominent attraction at the 18th G20 Summit in New Delhi. It provided G20 participants with hands-on experience on DPI implementation in India. It showcased initiatives like Aadhaar, DigiLocker, UPI, eSanjeevani, DIKSHA, Bhashini, and ONDC. The expo aimed to highlight world-class digital initiatives promoting Ease of Living, Ease of Doing Business, and Governance.

(h) Digital India Dialogues on the DPDP Act, 2023 (September 20, 2023): A key Industry Stakeholders' consultation meeting on DPDP Act Compliance chaired by Shri Rajeev Chandrasekhar, Union Minister of State for Skill Development & Entrepreneurship and Electronics & IT was conducted on September 20, 2023. The event was attended by a variety of technology ecosystem stakeholders, including industry groups, startups, IT experts, think tanks, and lawyers, attended the discussion.

(i) Activities on Social Media:
- Mann Ki Baat
- Digital Skilling Initiatives
- DPI Initiatives
- Labour Day - PM Byte, Highlights on eShram & DigiBunai
- Save The Paper with DigiLocker
- Testimonials of Digital Payments
- UMANG stats
- National Technology Day
- Mission LIFE
- 9 Years of Seva
- World Bicycle Day
- Know your IT Rules
- World Environment Day
- Stay Safe Online
- G20 Digital Innovation Alliance 2023 - Promotions

- World Wide Web Day Celebration
- Angdaan Mahotsav Celebration (Pledge Event)
- DigiShagun
- DPDP Bill 2023
- National Handloom Day
- Posts on AI in India
- Promotion of Har Ghar Tiranga campaign
- Coverage of PM address on Independece Day'23
- PM's address for G20 DEWG Minister's Meet, Bangaluru
- Academic Bank of Credits
- GPAI
- Aditiya L1
- G20 Flashback
- ASEAN-India Summit
- Information Security Awareness
- One Earth
- YuWaah India
- Hindi Diwas
- Rashtriya Poshan Maah 2023
- 10 Billion Transactions on UPI
- API Setu

(j) Global Partnership on Artificial Intelligence (GPAI) (12th -14th December 2023): GPAI is a multi-stakeholder initiative of global experts bridging AI theory and practice, promoting research and practical efforts across science, industry, civil society, and governments. The GPAI Summit 2023 was inaugurated by the Hon'ble PM of India, Shri Narendra Modi on 12th December 2023 at Bharat Mandapam, Pragati Maidan, New Delhi. 29 nations participated in the Summit. An extensive exhibition was also set up simultaneously exhibiting AI initiatives. The A&C team made necessary arrangements for extending social media outreach by making Speaker Videos, Posts on Speakers, Sessions, and Side Events and printing ads for GPAI in leading National and International Newspapers and outdoor campaign.

2.4.11 GOV.IN Appstore

MeitY has initiated a massive countrywide initiative on mobile governance to provide government services to the people through mobile phones and tablets. As a part of this initiative, GOV.IN Appstore/ GOV.IN Appstore (https://apps.mgov.gov.in) was developed as India's indigenous Government AppStore under AatmaNirbhar Bharat mission for the hosting of mobile apps for the citizen-centric services.

It enables all government departments/ agencies (central, state as well as local levels) and the private sector entities in the country to host their mobile applications providing citizen centric services. Hosting and downloading of apps on the Appstore is convenient and free of cost. Only verified and signed APK files can be hosted on the Appstore.

On this platform, the developers would get the security testing of their mobile apps done as a measure to **safeguard the data and privacy of users and to prevent them from any potential threats**. Besides, the following benefits of the platform can also be availed:

- **Indigenous and Government Appstore:** GOV.IN AppStore is India's indigenously developed AppStore and is managed and governed by the government. Only the verified and authentic apps are available on the platform which eliminates the chance of downloading look-alike fraudulent apps by users.

- **User-Friendly Interface:** The user-friendly interface of the AppStore makes it easy for citizens to discover and access various applications, thereby enhancing the overall user experience.

- **In-House Testing:** GOV.IN AppStore provides two levels of in-house rigorous security testing and is compliant with OWASP Mobile

Application Security standards.

- **Multilingual Support:** The language support is expanding to accommodate the linguistic diversity of our nation, making the AppStore accessible to a wider audience.

- **Developer Support:** A direct support team available to provide technical support to developers with best practices, and help in creating a secure application, documents, and codes.

- **Awareness Campaigns**: As per the requirement of the departments, C-DAC Mumbai may conduct awareness workshops to educate the app development industry as well as citizens about the AppStore and the services it offers.

Achievements:

- Total **1,925** m-apps developed and hosted live on GOV.IN Appstore for different platforms.

More than **9.07** Crore apps downloaded till now.

- Most popular apps like UMANG, Aarogya Setu, BHIM, DigiLocker, and many more are available on GOV.IN Appstore.

2.5 Digital India Initiatives by NIC

Technology has significantly contributed to improving good governance by facilitating the efficient implementation of public policies throughout the country. This has been achieved while prioritizing transparency, accountability, and building trust among citizens. NIC offers various platforms and services in key sectors such as Agriculture, Education, Health and Family Welfare, Transport, Finance, Law and Justice, Social Welfare & Skill Development, Home Affairs, and Food & Public Distribution. These services are accessible through multiple channels, promoting the advantages of enterprise mobility and easy access for the benefit of all.

Digitizing Core Sectors for Sustainable National Development

2.5.1 Agriculture & Food Processing

2.5.1.1 PM KISAN- Pradhan Mantri Kisan SAmman Nidhi (https://pmkisan.gov.in/)

PM-KISAN portal by NIC provides an end-to-end technology solution for transferring the funds directly into the accounts of the farmers identified by States/UTs. Under PM-KISAN Scheme, a direct payment of ₹6,000 per year is being transferred in three equal installments of ₹2,000 every four months into the bank accounts of eligible land holding farmers' families using technology solution PM-KISAN portal.

PM KISAN Mobile App

PM-KISAN mobile app was launched on 24th February 2020 by Hon'ble Minister of Agriculture. This has been developed with an emphasis on greater transparency and to reach more farmers. The PM-KISAN mobile app servers a simple and efficient extension to the PM-KISAN web portal.
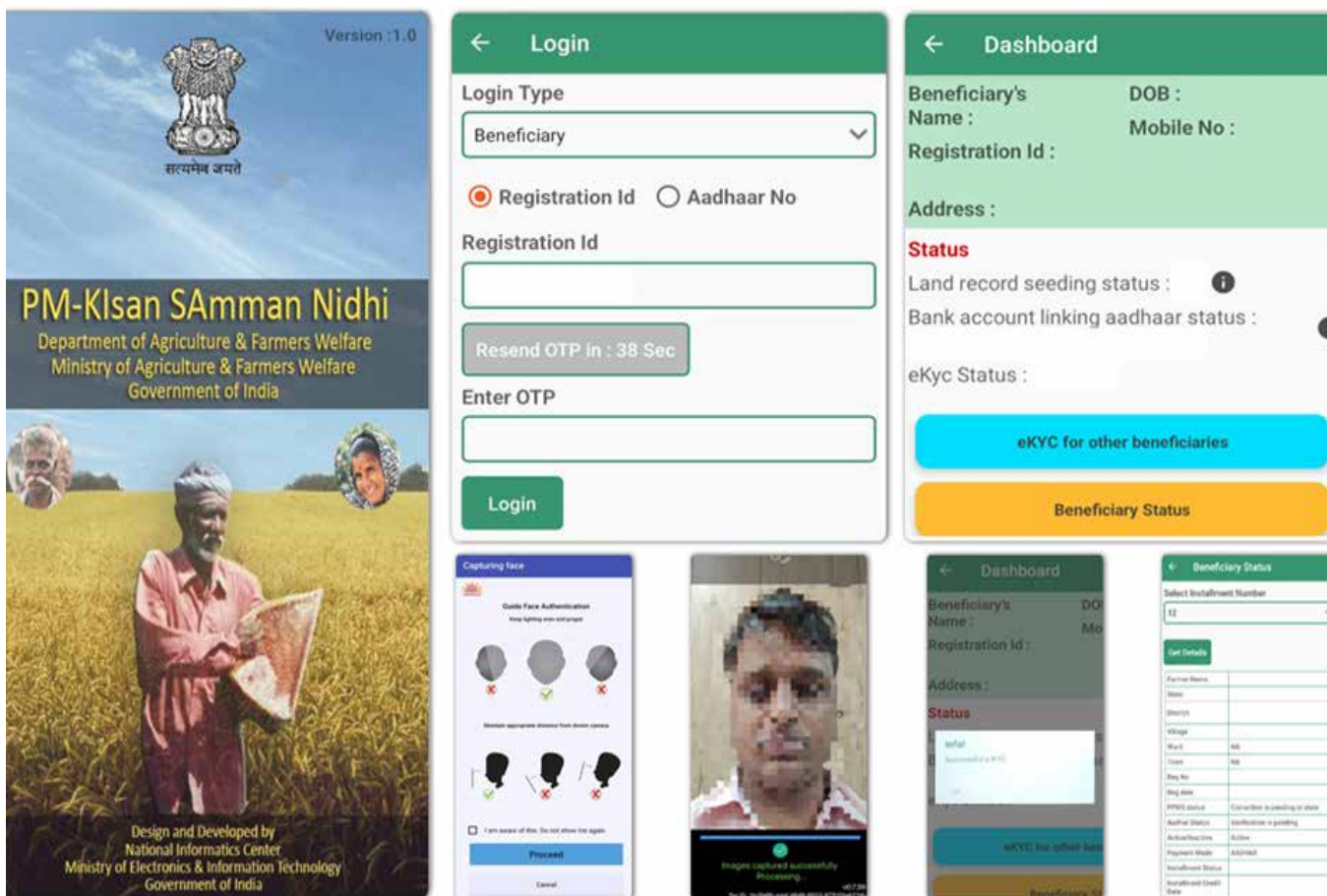
PM Kisan Samman Nidhi Mobile App Dashboard

2.5.1.2 Seed Authentication Traceability and Holistic Inventory (SATHI) (https://seedtrace.gov.in)

SATHI is a national portal envisioned and created by the Ministry of Agriculture and Farmers' Welfare, Govt. of India, in partnership with NIC with the vision "To build a Digital Ecosystem to effectively monitor the seed production and distribution chain and provide complete traceability of the seeds from point of origin till sale".

The Key Objective of SATHI portal is **"उत्तम बीज समृद्ध किसान"**

Phase-1 of SATHI was launched by the Honorable Minister of Agriculture, Shri Narendra Singh Tomar, on April 19, 2023, which includes Nucleus to Breeder and Breeder to Certified Seed workflow automation.

2.5.1.3 FARMAP 2.0 (Farm Analysis Package) (https://farmap.dac.gov.in)

Cost of Cultivation Scheme is implemented to evaluate the expenditure incurred by the cultivators on various inputs for the crops under study. The cost of cultivation / production of agriculture crops are the most important components in the fixation of the Minimum Support prices of various agricultural commodities which form the basis of Agriculture Price Policy in India. The cost estimates are provided to Commission of Agriculture Cost and Prices (CACP) for fixing Minimum Support prices (MSP) of principal crops.

FARMAP is a web-based system developed by NIC to facilitate capturing of data from 9,720 sample farmers from 19 states in 22 Record Types, validation of data through a workflow-based system and processing of data to generate Crop wise state level cost estimates.

Impact of the project

- State level estimates for major Kharif and Rabi Crops provided to CACP as a major input in declaring MSP of principal crops.

- These estimates and related statistics are also used for a wide variety of other important purposes like compilation of National Accounts Statistics, computation of Wholesale Price Indices, research studies on cost of cultivation and farm income etc.

2.5.1.4 Agmark Quality Control Management System (AQCMS)

AQCMS is a digital platform overseeing the certification and quality control processes essential for Agmark conformity in India. Introduced in 2018 to optimize Agmark functions, AQCMS replaces the manual handling of the Agriculture Produce (Grading & Marketing) Act, 1937, by the Directorate of Marketing and Inspection, Department of Agriculture Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare. Comprising three modules — Certification Management, Laboratory Management, and CMS (Content Management System) — AQCMS offers online application processing, Aadhaar-based e-signed documents, online payments, and transparency in processing. The Laboratory Management System enables online sample submission, result processing, tracking, and data analytics for

AGMARK Laboratory, contributing to research and standardization. The system has helped in revolutionizing user convenience and eliminating manual intervention in certification processes.

Currently, AQCMS has more than 8,602 primary users and more than 8,777 Firms registered with more than ₹4 Crore as total revenue.
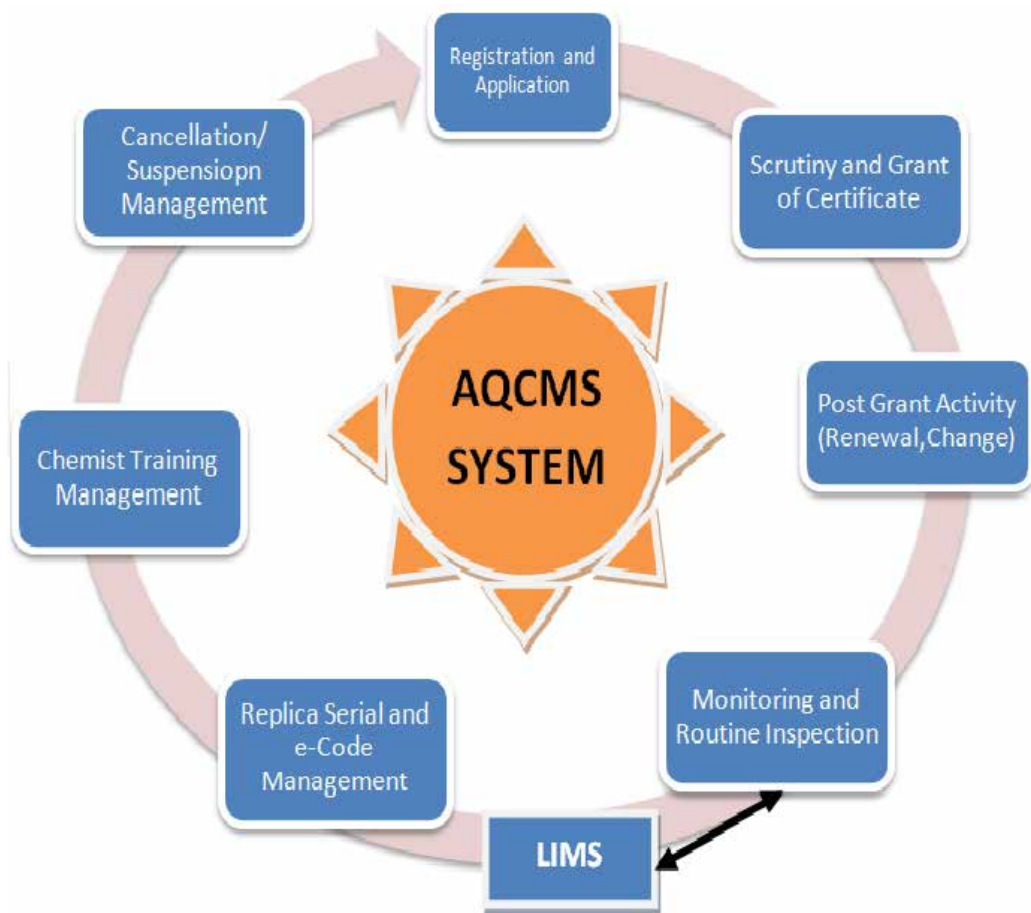
AQMS workflow

2.5.1.5 Integrated Fertilizer Management System (iFMS)

iFMS has been a comprehensive and all-inclusive technology solution designed to enhance the control and monitoring of fertilizer movement within the supply chain. At present, with more than 3.5 Lakh system users and enabling Sale of fertilizers to almost 13 Crore buyers across the country, iFMS represents a quantum leap in managing fertilizer supplies, processing subsidy claims amounting to ₹2.5 Lakh Crore annually

and above all, ensuring seamless provisioning of subsidized fertilizer to meet requirements across the country optimally.

NIC has been the technological partner of the Department of Fertilizers in providing extensive strategic control over the entire fertilizer supply chain, including:

A. PoS-based solution which enables the Sale of fertilizers from more than 3 Lakh devices to almost 13 Crore buyers across the country using Aadhaar-based authentication. NIC has

developed its own Android PoS software for iFMS in addition to enabling Third-Party PoS applications via API services.

B. Enabling Real Time Stock Management across all stock points like Fertilizer Plants, Ports, Rake points, District Warehouses, Wholesalers and Retailers.

C. Systemizing the most critical aspect of iFMS through the Timely generation of Weekly DBT Claims by Fertilizer Companies, multi-level processing by DOF and easy fulfillment via PFMS.

NIC has leveraged the latest open-source platforms and frameworks across the POS client, Central Application, Databases, Network, Security, and Infrastructure to ensure the uninterrupted functioning of iFMS services, which support and enable over 20 Crore fertilizer purchases across the country annually.

AI and Machine Learning interventions have been introduced to facilitate DOF in decision-making processing by analyzing vast amounts of data, recognizing patterns, and aiding optimal solutions.

2.5.1.6 SAMPADA Suite

NIC has developed a web-based application suite named **"Sampada Portal" (https://sampada-mofpi.gov.in)** for various schemes under which the Ministry of Food Processing Industries (MOFPI) provides grants to various promoters desirous of setting up different types of Food Processing Facilities. The different modules of the suite, based on different schemes of the Ministry provide an online system for submitting application for setting up food processing facilities, evaluation of the same by the different divisions of the Ministry and Project Management Agencies engaged by the ministry, approval/rejection of applications, monitoring of grant release instalments and final closure of a

project. The **Operation Greens module** and its **AtmaNirbhar Bharat** functionality help farmers/ cooperatives etc. to transport their produce from farm gate and sell it to any market or store it to any cold storage/warehouse of their choice in India. This facility has enabled the farmers to get the best price for their produce. The detail workflow of the Ministry for these activities has been automated in the **Sampada** suite. The suite has helped the Ministry to simplify the process of grant allocation to promoters and manage the schemes more efficiently helping timely completion of projects. Currently there are 12 modules in the suite.

2.5.1.7 PMFME Portal
(https://pmfme.mofpi.gov.in)

A national level portal has been developed under NIC's supervision which has automated the complete workflow starting from registration, generating a DPR and submission of application for grant by various micro food processing enterprises, evaluation of the applications by the District Level Committee/ Ministry, forwarding application to bank for sanction of loan, sanction

of loan by bank, sanction of grant by the Ministry, providing training and handholding support for upgradation of skills and technical knowhow, providing branding and marketing support, getting financial support from other such schemes of the Central/ State Government etc. In addition, the portal also generates MIS reports of various kinds for all these activities, maintains accounting and budget information, integrates with a Learning Management System and a GIS based system showing **One District One Product** data on the geographical map of India and individual districts.
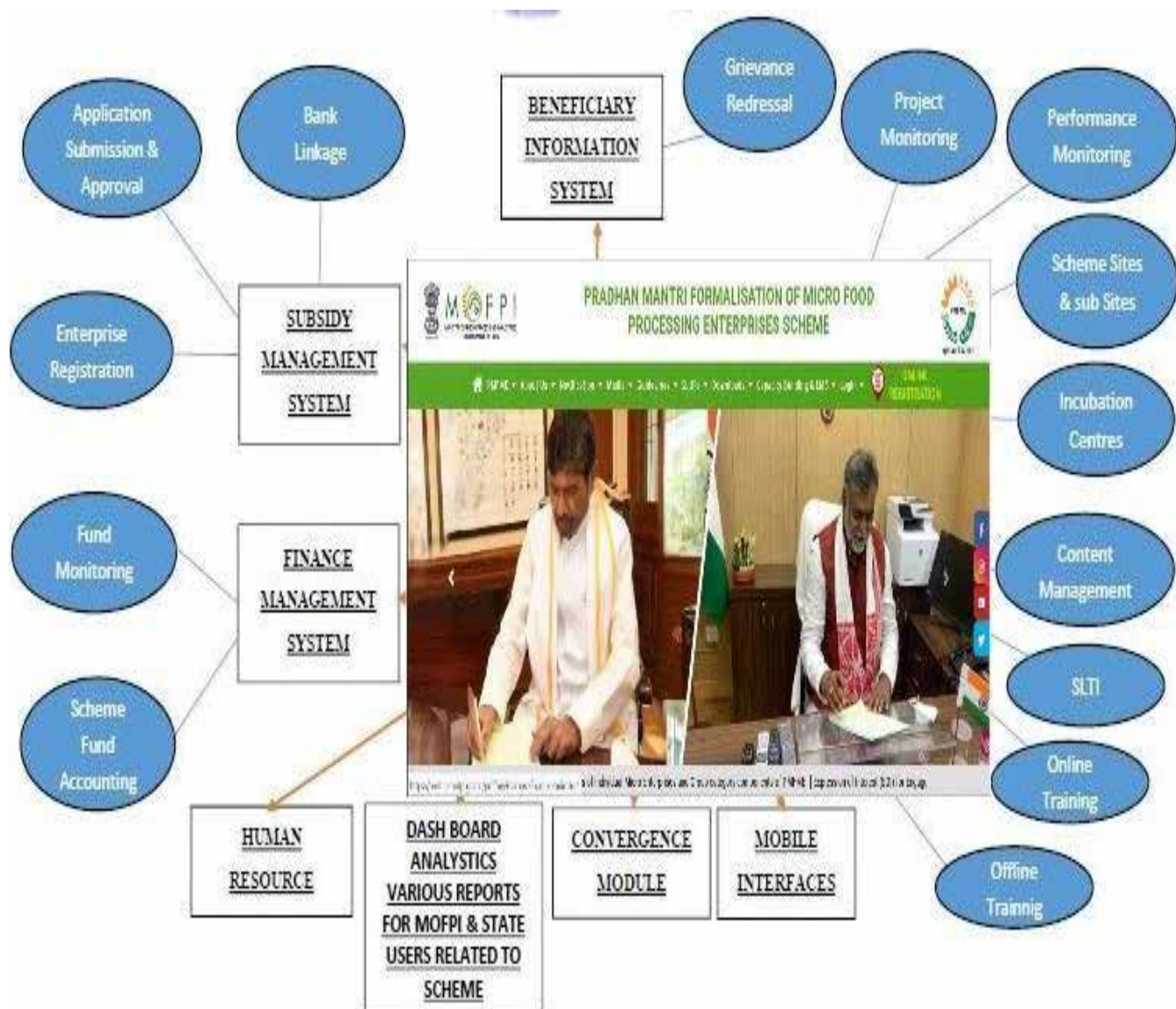
PMFME Software Modules

2.5.1.8 Farmer Registration and Unified beneficiary Information System (FRUITS)
(http://fruits.karnataka.gov.in)

FRUITS is an e-Governance project for managing and maintaining farmer registry which can be used by all agriculture and allied departments for providing benefits under various govt. Schemes to eligible farmers. FRUITS is evolving as a soft infrastructure project in Agriculture sector acting as inventory of farmers, land owned by them, and benefits extended.
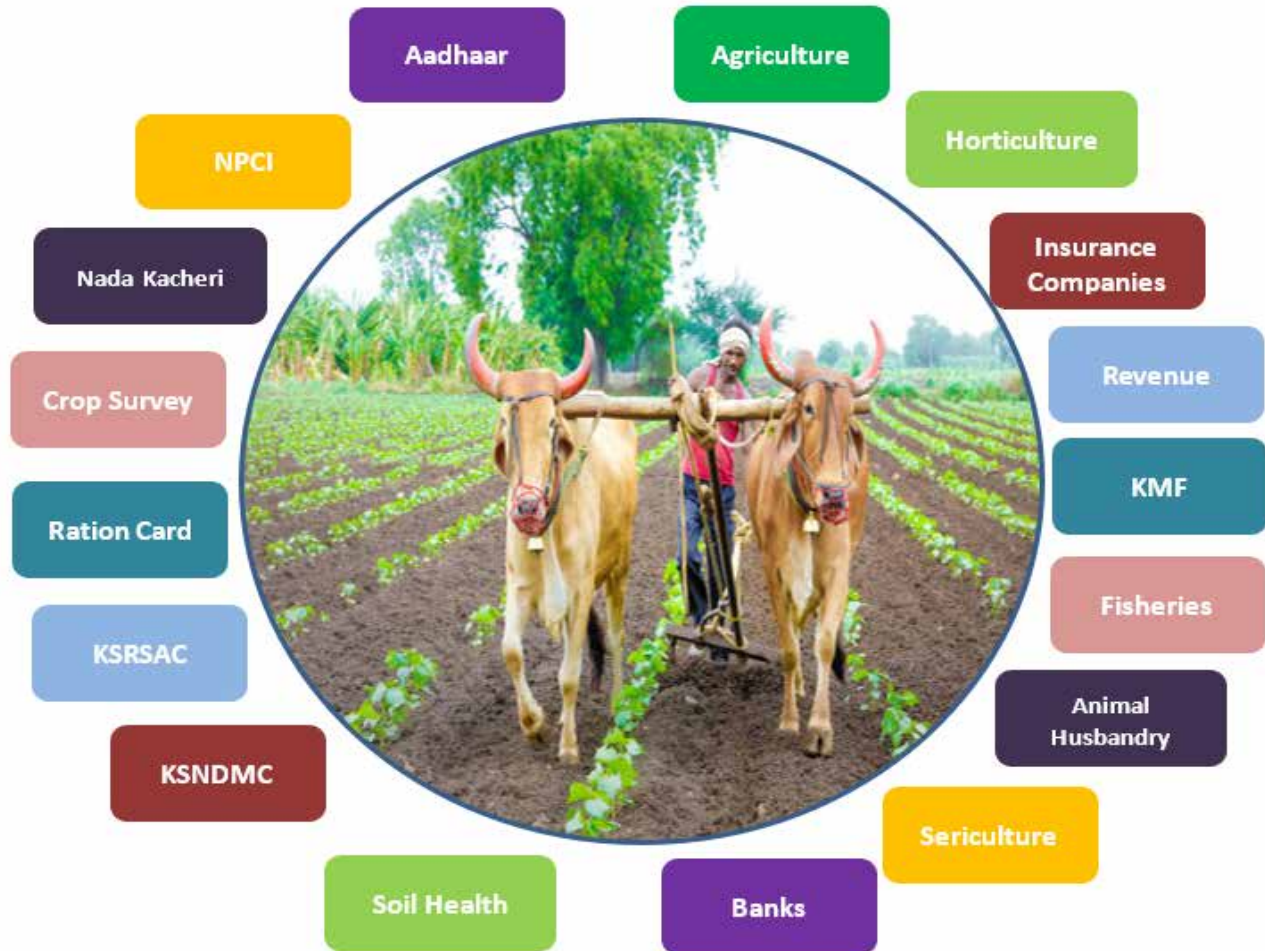
Farmers in the state can register themselves in FRUITS portal (https://fruits.karnataka.gov.in) or they can go to Agriculture or other allied department offices at Taluka/sub-taluk level for getting registered. The data entered in the FRUITS is scrutinized and verified by respective department officials of Government of Karnataka. Then a unique farmer-id gets generated. Here, land owned by the Farmer is fetched from ROR/ RTC database of the state. The FRUITS has integration with Crop Survey data so that one can know the crop being grown by any farmer. The FRUITS also has integration with state DBT for facilitating direct benefit/ incentive transfer to Farmer's Bank Accounts.

In Karnataka, the FRUITS is being used for implementation of various schemes such as PM-

KISAN (State Contribution), Raitha Siri Scheme, Milk Subsidy, Minimum Support Price (MSP) for various Crops, RKVY, JanSamarth, Banks for Agriculture Lending, K-KISAN, HARIRU, Samrakshane, Karavali Package for Paddy growers in Coastal Karnataka districts, Incentive for Maize Growers, Raitha Shakthi Scheme, Silk Samagra of Sericulture Department (State Contribution), etc.

Current Statistics:

- Farmers Registred: 96 Lakh
- Schemes Covered: 49
- No. of Farmers Availed Benefits: 78 Lakh
- Amount Assistance Provided: ₹23,800 Crore
- No. of DBT Transactions: 8.03 Crore

With success of the project FRUITS in Karnataka state, now it is being replicated across the country as AGRISTACK. NIC Karnataka is working with Ministry of Agriculture, Govt. Of India, for development of the AGRISTACK. As part of it, Crop Survey reference application has been rolled out in Orissa, UP, Gujarat and Assam. Farmer Registry reference application is being rolled out in Manipur as pilot implementation. One more reference application named Agristack Consent Manager (ACM) is being developed as part of the AGRISTACK which involves obtaining consent from Farmer or Data Principal to share his/her consented data with AIU (Agricultural Inputs Provider).

2.5.2 Health & Family Welfare

2.5.2.1 Oxycare – Integrated Portal for Managing Oxygen Devices
(https://oxycare.gov.in)

The MIS has been developed to keep track of the shipment and functionality of the supplied oxygen device which includes Oxygen Concentrators (OCs), Oxygen Cylinders, Ventilators and PSA Oxygen Plants. More than 1.13 Lakh Oxygen Concentrators, 52 thousand Ventilators and 5 thousand PSA Oxygen Plants have been allocated to different health facilities across the nation by MoHFW to enhance the capacity of oxygen production and supply at the health facility level.

Each Oxygen device is pasted with a Secure QR Code which is used for reading various details like type of equipment, manufacturer, and device Serial number etc. through the Oxycare Mobile App which is used by the end user at the health facility, where the device reaches. The Installation and functioning of the device are reported through the Oxycare mobile app and is available to decision makers at District/ State/ National level through the Oxycare Portal.

The operation and maintenance of PSA oxygen generation Plants have been ensured with an embedded IoT device for real time monitoring of their functionalities and performance through a web portal and through a Mobile App.

2.5.2.2 e-Hospital and NextGen e-Hospital
(https://nextgen.ehospital.gov.in/)

The **e-Hospital application** is being offered as an as-is product to the government hospitals across the country through SaaS (Software as a service) model. The modules of e-Hospital application which are currently available on cloud are Patient Registration (OPD & Casualty), IPD (Admission, Discharge & Transfer), Billing, Lab Information System, Radiology Information System, Clinic, Dietary, Laundry, Store & Pharmacy and OT Management.

Online Registration System (ORS) is an online patient portal for citizens to book online appointments for the hospitals and for providing patient centric services like viewing lab reports, checking blood availability status, and making online payment.

The **NextGen e-Hospital application** has been developed based on the National Digital Health Blueprint and is compliant with various standards like EHR Standards, Meta Data & Data Standards – Health etc. It has been developed using Master Code Directories and Registries to ensure standardization of data across the system. All the modules and functions of the NextGen e-Hospital have been architected by adopting the Open API policy notified by MeitY, incorporating data security and privacy into design and development of the APIs. The identified components and functions of NextGen e-Hospital have been designed and developed using workflow-based modules and they exchange data with other modules using Open APIs.

eHospital, ORS and NextGen eHospital has been integrated with ABDM building blocks like Ayushman Bharat Account (ABHA) creation, linkage with Health Record and its sharing. QR Code based Queue Management System has been introduced with its integration with ABHA using Personal Health Record (PHR) App.

2.5.2.3 Collaborative Digital Diagnosis System

eCollab DDS is provides web based TeleRadiology and TelePathology Services integrated with AI model which predicts the lung abnormalities specific to Tuberculosis in a Chest X-Ray which will aid the Radiologist for reaching a better diagnosis. eCollab DDS has been enabled with AI for Chest X-Ray images. The AI will predict the presence/absence of 11 Radiological Detection features and Tuberculosis which will aid the Radiologist for reaching a better diagnosis.

eCollab DDS has been integrated with eSanjeevani and NextGen e-Hospital for TeleRadiology consultation for better reach. It has also been integrated with Ayushman Bharat Digital Health (ABDM) building blocks like ABHA creation.

eCollab DDS has been implemented in the state of Harayana with PGI Chandigarh as Centre of Excellence (CoE) for TelePathology.

2.5.2.4 Central Government Health Scheme (CGHS) (https://cghs.nic.in)

CGHS caters to the healthcare needs of eligible beneficiaries enrolled under the scheme. Beneficiaries are covered from all four pillars of democratic set up in India, i.e., Legislature, Judiciary, Executive and Press. CGHS provides health care through Allopathic, Homoeopathic, and Indian system of medicine (Ayurveda, Unani, Siddha, and Yoga). Almost 45.05 Lakh beneficiaries are enrolled for CGHS health services. 475 Wellness Centers (Dispensaries) across 74 cities cater health and wellness services under supervision of 24 Additional Director Offices. The beneficiaries can book appointments, download CGHS Card, search Dispensaries, empaneled Hospital/Labs through Mobile App. DigiLocker may also be used to download CGHS plastic card.

Services

Parameter	Counts
Total Beneficiaries	45.05 Lakh
Serving Employees	26.58 Lakh
Pensioners	18.25 Lakh
Total Web Appointments taken	62.94 Lakh
Total Walk-in Appointments	5.80 Crore
CGHS Cards downloaded (Self Printed)	26.92 Lakh
Online Referrals Generated	1.95 Lakh

2.5.2.5 Reproductive & Child Health (RCH)

RCH is an innovative name-based system to capture information on all RCH related services including family planning, maternal health, Child health and immunization and to monitor performance at all levels (National, State, District, Block, PHC and Sub Centre level).

ANMOL (ANM online) is a tablet based android application for RCH, which allows ANMs to enter and update service records of beneficiaries (Eligible Couple, Pregnant Women and Children).

RCH/ANMOL have been integrated with ABDM.

More than 15.76 Lakh beneficiaries registered in RCH/ANMOL have been linked with ABHA. Out of this, more than 8.13 Lakh ABHA have been created using RCH/ANMOL platform.

Health records (care contexts) of RCH beneficiaries are being shared with PHR app of ABDM as per FHIR standards. Currently, more than 1.02 Crore Lakh Care contexts have been successfully linked with ABDM. RCH has been integrated with POSHAN app for sharing beneficiaries on the basis of ABHA.

2.5.2.6 NHM-PMS (National Health Mission - Progress Monitoring System) (https://nhmpms.gov.in)

NHM-PMS is an application developed for allocating, managing, monitoring, and updating the physical and financial progress for various health schemes from top to grassroot level. The main objective of this portal is to bring all health schemes into same place and minimize the development of separate applications for each scheme and reducing the time of users. It's a SSO, two factor Authentication, user friendly and 24*7 available portal with inbuilt informative dashboard,

various reporting format and user-based query reporting tool. Through this umbrella structured application, currently four schemes are onboarded and running smoothly PAN India.

The focus of the application is to monitor the progress in timely manner and maximize the output and performance. The portal is having both physical and financial progress. The end users need to update physical progress by uploading the pictures which is having geotagging features. The key stake holders of this application are Health Ministry, State Health agency, District health agency and Health facilities in-charges.

2.5.2.7 Sickle Cell Anaemia Elimination Mission

The National Sickle Cell Anaemia Elimination Mission was announced in the Union Budget 2023 and the program is currently being implemented in 17 identified states, including Gujarat, Maharashtra, Rajasthan, Madhya Pradesh, Jharkhand, Chhattisgarh, West Bengal, Odisha, Tamil Nadu, Telangana, Andhra Pradesh, Karnataka, Assam, Uttar Pradesh, Kerala, Bihar, and Uttarakhand. Sickle Cell Disease is a group of blood disorders genetically inherited and specially found in tribal population of India. Government of India has launched a mission mode project for enrolment, testing, identification, and maintenance of electronics health records of citizens screened for Sickle cell and Thalassemia disease. Target population of nearly 7 Crore is to be covered. For screening and monitoring one mobile app (available both in android and iOS) and web portal has been developed. Some of the important features of the sickle cell mobile app and web app is given below:

(i) Generic mobile application that can run both offline (without network coverage) and online real time data capturing features.

(ii) Collection of minimal required fields from citizens as per FHIR standard rather than complex form.

(iii) ABDM compliant application for creating and linking health records with ABHA.

(iv) Data sharing with external applications like AyushmanBhav and NPHO.

2.5.3 Finance

2.5.3.1 Public Financial Management System (PFMS)

PFMS aims to develop integrated digital finance network of Central, State Governments and the agencies of State Governments. It plans to provide financial management platform for all plan schemes, a database of all recipient agencies, integration with core banking solution of banks handling plan funds, integration with State Treasuries and efficient and effective tracking of fund flow to the lowest level of implementation for plan scheme of the Government.

(i) **Centrally Sponsored Schemes:** As on date, 3,924 CSS (including State linked Schemes) schemes have been on-boarded on PFMS. Total 37.48 Lakh agencies are enrolled in PFMS for CSS schemes out of which 13.80 Lakh have been on-boarded for SNA scheme. Further, 155 external systems are integrated with PFMS for DBT payments or for sharing DBT MIS data of payments made by them. 93 external systems are integrated with PFMS for REAT payments or for sharing REAT MIS data of payments made by them.

(ii) **Central Sector Schemes:** As on date, 250 CS schemes have been on-boarded on PFMS for EAT and 2 for DBT.

For CS and CSS schemes, provision for settlement of interest credited in SNA and CNA accounts by banks depending on Centre and State share has been developed in PFMS. For centre share of interest value, the settlement can be initiated through Bharat Kosh in PFMS.

(iii) **Treasury Single Account (TSA)** module has been successfully implemented in PFMS last year to avoid parking of funds in the bank accounts of Autonomous bodies and to implement just in time payment of grants to autonomous bodies by Government of India having bank account with RBI. This year, TSA 2.0 has been implemented for 2,702 autonomous/sub-autonomous bodies (221 first level agencies and 2,481 below level agencies). Total number of Assignment transactions from Ministry to First Level agencies done through PFMS are 28,537 amounting to ₹6,25,753.45 Crore. Total number of Assignment transactions from First Level agencies to below level agencies done through PFMS are 1,10,485 amounting to ₹3,26,488.08 Crore. Total Cash outflow by AB/Sub AB amounting to ₹17,84,020.33 Crore.

(iv) **eBill Module** has been developed in PFMS to handle processing of paperless bills. Digitally signed paperless bills will be generated online in PFMS by DDOs. eBill module has the facility for Employees and claimants to submit their invoices/claims details on PFMS and upload the scanned copy of the supporting documents on PFMS portal. Till now total number of PAOs onboarded for eBill module are 448 and total number of DDOs generating eBill are 6,922. Total number of sanctions processed using eBill are 1,59,176 amounts to total of ₹34,906.87 Crore.

2.5.3.2 e-Way Bill

GST e-Way Bill mechanism is put in place to ensure that goods are transported in accordance with GST laws and tax is paid for the supply of goods. e-Way Bill is an electronic document which gives details regarding the movement of goods and needs to be carried by transporters for any consignment exceeding ₹50,000.

e-Invoice system is seamlessly integrated with e-Way bills system for generating e-Invoice along with e-Way bill. It has been interfaced with Fastag-RFID and Vahan system to verify/monitor the movement of vehicles updated in e-Way Bill. In the last 5½ years, more than 430 Crore e-Way bills have been generated by the taxpayers.

Average no. of EWBs per month 900 Lakhs

Average no. of EWB Verifications per month 15 Lakhs

Average no. of Fastag transactions per month 1353 Lakhs

Average no. of Taxpayers using EWB per month 48 Lakhs

Average no. of Consignors per month 17 Lakhs

Average no. of Consignees per month 41 Lakhs
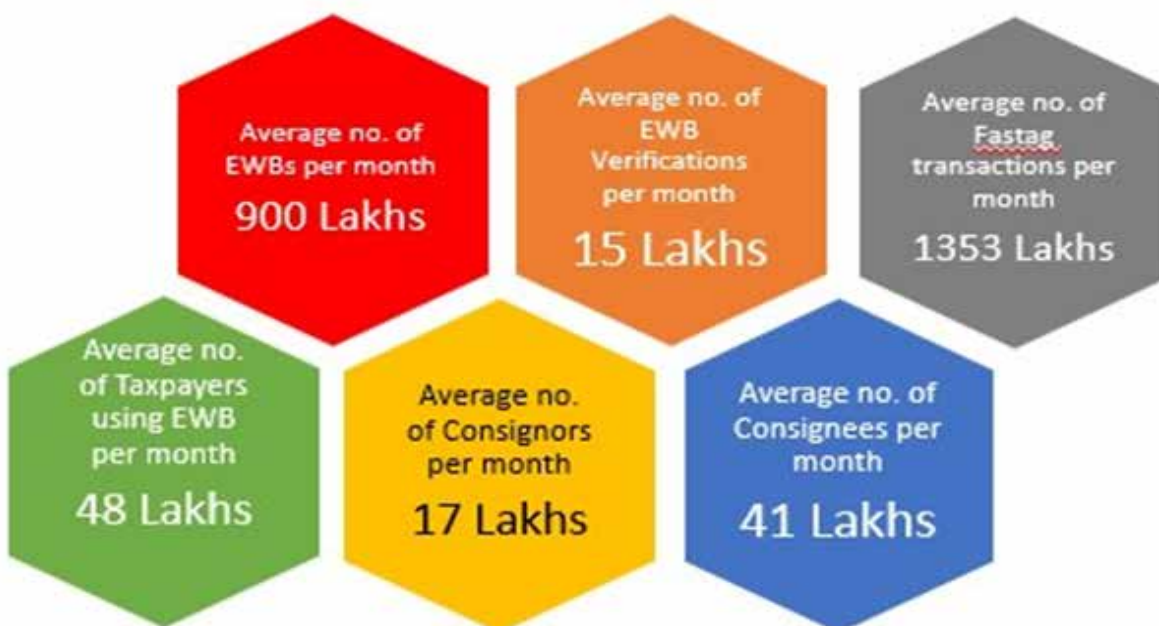
2.5.3.3 GST Prime

GST Prime is an Analytical tool, developed by NIC, Karnataka for the GST officers. This has played an important role in improving the indirect tax collection of the State as well as of the Central GST. The officers of the Commercial Taxes department have been dependent on the application for their day-to-day activities in terms of monitoring the tax compliance, to identify and initiate appropriate actions against the non-filers of returns, identifying and highlighting the possible fraudulent activities carried out by taxpayers in order to evade taxes, establishing relations / possible links with other stakeholders in case of frauds, identifying and reversal of ineligible Input Tax Credit claims and having complete information on the taxpayers through the taxpayer profile etc.

GST Prime is being rolled out for all the States and CBIC offices across the country based on the direction from Department of Revenue. At present, migrated 18 States and their respective Central offices to a central infrastructure and enabled. Work is in progress to implement for rest of the States and respective CBIC offices. GST Prime 4 with new features and GST Prime Lite - a mobile app are going to be released shortly.

2.5.3.4 e-Invoicing System

GST e-invoicing system is a system of reporting the invoices being issued by the taxpayers to their customers, on the Government portal on near real time basis and obtaining a unique Invoice Reference Number (IRN). e-invoicing system is game changer in GST implementation. It has many advantages for businesses such as standardized & digitally verifiable e-Invoices, enhanced inter operability between various stakeholders- suppliers, recipient, transporters, Government and financial institutions, auto-population of invoice details in GST returns and e-way bill. It has also controlled the issuance of fake invoices or claiming excess input tax credit and at the same time facilitating quick ITC credit to the genuine recipients. The e-invoicing system facilitates the taxpayers to integrate their ERP systems with e-invoicing portal for exchange of information between machines using APIs.

In the last 3.5 years, 567 Crore of e-invoices have been generated involving 10 lakh total suppliers and 128 lakh total recipients.

Total Invoices	Total Suppliers	Total Recipients
567 Crores	10 Lakhs	128 Lakhs
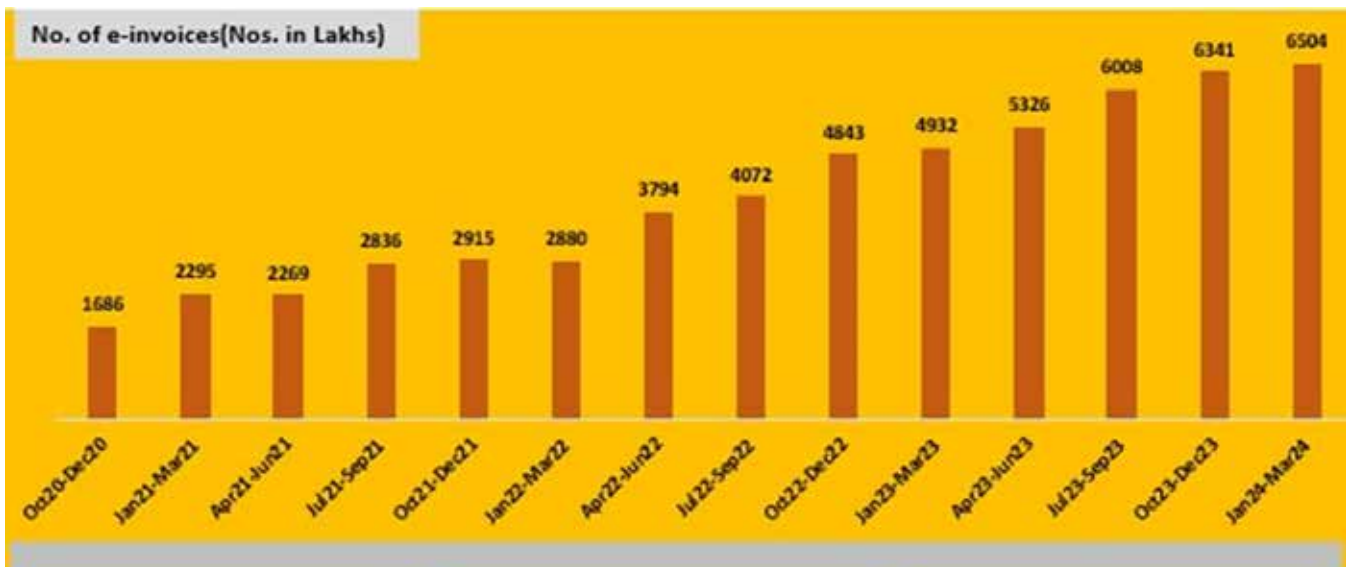
2.5.3.5 e-Abgari

e-Abgari project is end-to-end supply chain management system of Beverage Alcohol, Medicinal Alcohol, Industrial Alcohol & Life Saving Narcotic Drugs in state excise sector enabling better regulation to minimize the social and public health import while safeguarding the revenue collection from excisable articles.

Presently, 68 e-Services are being rendered in workflow-based manner for Grant & Renewal of Licenses, Packaged Liquor Brand Registration, Issuance of NOC/ Permit/ Passes for Import/ Export/ Transport, Real-time management of Spirit/Packaged Liquor Inventory and Excise Revenue, e-Chemical Examination Laboratory and management of Excise Offender Cases, Enforcement Activity. All Distilleries, Manufactories, Distributors, Retail Shops and Hospitals, Educational Institutes & Industrial Units connect eAbgari for Production / Procurement / Sale of alcohol.

Minimum consumption maximum revenue ensured - while consumption of intoxicants in West Bengal have risen by only about 5-6% annually since 2014-15, the collection of Excise revenue has gone up from ₹3,581 Crore during 2014-15 to ₹16,272.06 Crore in the year 2022-23 registering a CAGR of over 25%. During last 4 years, WBSBCL – using eBevco under eAbgari - has seen a business of over ₹64,000 Crore with a wholesale margin of over ₹1,350 Crore.

2.5.3.6 Indian Customs Electronic Data Interchange System (ICES)

ICES Application covers around 99% of India's International Trade taking in its ambit 276 locations spread across the country. During the past one year, the NIC ICES team has designed, developed, and implemented Phase-I of Special Economic Zone Export document and Alert on the passport module for Unaccompanied Baggage. The implementation of India-Australia EPT Agreement and module for sending SMS and e-Mail to Customs Officers whenever Importers raise issues in Anonymous Escalation Mechanism was also carried out. Design and Development for National Time Release Study 2023 module was performed. ICES provided scripts for extraction of data for Investigation agencies like CBI, ED, DRI etc.

In addition to this, development of API based Data Exchange Platform for Indo - Korea Country of Origin certificate data exchange was completed.

Major benefits of ICES include, inter alia, consolidation of data for National Level MIS – A facilitator for Future Trade Policy, Standardization of Customs Clearance methodology across the country, Contactless, Paperless and Faceless implementation of Customs procedures.

The ICES Application is live at 276 locations (Air, Land and Sea).

In terms of annual numbers, a brief graphical representation is provided below:
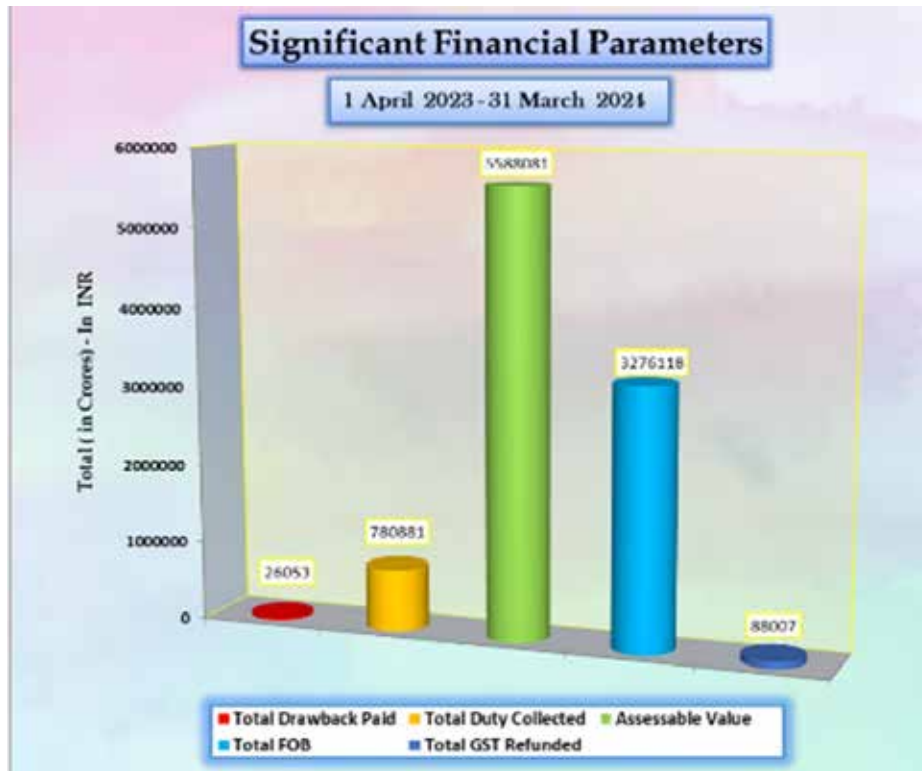
In the above SB refers to Shipping Bill (Export Document), BE refers to Bill of Entry (Import Document) and Drawback to a major Export incentive.

2.5.3.7 e-Auction India (https://coaleauction.co.in)

eAuction India is a platform for Government Departments to conduct online auctions for sale and purchase. It removes barriers of geography, presence, time, space, and a small target audience.

Implemented by 22 States/ UTs and 32 Central Government organizations. 51,553 auctions worth 16,829 Crore have been processed in 2023-2024. New feature of Coal Auction has been implemented for Coal India and its subsidiaries.

Launch of Coal eAuction Portal:

The eProcurement team of NIC adds another feather in its suite of electronic tendering tools with the launch of a robust, transparent, and secure platform for conducting Coal eAuction of Coal India Ltd. (CIL) and its subsidiaries in October 2023. This platform is to be widely used for conducting coal auctions by various subsidiaries of CIL.

5th Round of eAuction of PM Mementos:

Auctions of mementos gifted to Hon'ble PM Shri Narendra Modi are being conducted since 2nd October 2023 for the 5th consecutive year using eAuction India platform developed by NIC. The platform has the composite feature of image as well as video display of various items. It also has sections for highlighted items, Be the first to Bid, Most Participated etc.

2.5.3.8 TRADESTAT – India's Foreign Trade Statistics (https://tradestat.commerce.gov.in)

The system offers monthly and annual time series analysis of India's foreign trade for the past 25

years. It provides insights into country-wise, commodity-wise, and region-wise trade, utilizing an enhanced classification system based on the 8-digit ITC code, exceeding the World Customs Organization's (WCO) 6-digit HS code. With over 12,500 commodities classified, the system, maintained by DGCI&S, Kolkata, presents data in both Rupees and US Dollars. Accessible to the public it facilitates analysis on a financial and calendar year basis.

2.5.3.9 Internal and Public Dashboards of Department of Commerce (https://intradashboard.commerce.gov.in/, https://dashboard.commerce.gov.in)

Monitoring dashboards, namely the Public Dashboard and Internal Dashboard for the Department of Commerce, have been developed, implemented, and operationalized on the cloud. The Public Dashboard offers options for India's Trade, Territory-wise trade (including country profiles), Commodity-wise trade, Trade promotion schemes, India at WTO, Trade Agreements, Plantations, Special Economic Zones (SEZ), Directorate General of Trade Remedies (DGTR), Logistics, GeM, Market Access Initiatives (MAI) Scheme, Trade Infrastructure for Export scheme (TIES), Budget, and Public Grievances. The Internal Dashboard, with restricted access to only department officials, provides features such as Parliament Assurance, Audit Para, VIP references, and includes the options available on the public dashboard as well.

2.5.3.10 GRAS (Government Receipt Accounting System) (https://gras.mahakosh.gov.in)

GRAS is a secure web-based portal enabling citizens and businesses to electronically pay taxes and non-tax receipts to the Government of Maharashtra. Accessible 24/7, GRAS serves as a G2C, G2B, G2G, and G2E application, allowing anytime, anywhere payments through participating banks' internet payment gateways. Integrated with independent payment gateways, GRAS facilitates an alternative channel for receiving government receipts, offering instant online payment receipts. The system ensures the users can deface the receipts post-service, electronic accounting, reconciliation, and provides a significant strength in predicting cash flows and adjusting liquidity positions for the State Government Funds on a T+1 basis. The end-to-end solution has been successfully replicated in other states, including Kerala, Meghalaya, Puducherry, Assam, Rajasthan, Haryana, Chandigarh, J&K, and Manipur. NIC's contribution includes design, development, implementation, knowledge transfer, and replication in other states, with notable impacts on savings in stamp duty commission and efficient receipt processing credited to RBI on T+1 basis.

2.5.3.11 Price Monitoring System for Wholesale Price Index (WPI)

The Office of the Economic Adviser, DPIIT in the Ministry of Commerce & Industry releases the Wholesale Price Index (WPI) on the 14th of each month. WPI is a crucial measure for monitoring price dynamics, and the inflation rate is calculated based on its movement.

Designed and developed by NIC, the portal is used for collecting and monitoring monthly wholesale price data nationwide. It is accessed by over 5900 factories and more than 50 institutional sources for online submission of wholesale price data. The National Statistical Office and its offices across India use the portal for timely data collection. The impact of the WPI includes its role as a determinant in formulating trade, fiscal, and economic policies for the Government of India. WPI indices are utilized for escalation clauses in the supply of raw materials, machinery, and construction work. Furthermore, the indices serve as deflators for the Index of Industrial Production (IIP).

2.5.4 Education

2.5.4.1 School Learning and Management Platforms

School education is crucial as it provides the foundation for a student's knowledge, preparing them for future academic and professional endeavors. NIC's School Education Solutions have a broad-reaching impact, ensuring that basic education is accessible to students from diverse backgrounds and all corners of society, thus benefiting a wide range of individuals.

NCF (National Curriculum Framework) is a centralized solution for smooth and hassle-free development of State and Nation level curriculum frameworks in accordance with National Education Policy 2020. NCF Tech Platform comprehensive solution for development of Curriculum Frameworks in four areas which are Early Childhood Care and Education (ECCE), School Education (SE), Teachers Education (TE) and Adult Education (AE). Recommendations are collected from grass root level stakeholders.

Online Teaching, Learning and Assessment System (OTLAS) under NILP (New India Literacy Programme) aims to cover all the aspects of Education for All or Adult Education in India by digital means. A Central Portal has been developed by NIC for aggregated data capturing equipped with a Mobile App, Online Survey Module, Physical and financial Modules and Monitoring Framework, etc. Platform addresses the issue of Education for All in India through digital platform for Identification of above 15+ years non-literate & Volunteers, online courses for learning and teaching through DIKSHA, Learner Assessment and Certification and transition from non-literate to literate.

Vidyanjali solution is based on a volunteer program to strengthen the schools across the country through community and private sector involvement in services/ activities, assets/ material/ equipment etc. Over 62,38,546 children have benefited through this program.

The PM Shri Platform is based on the PM SHRI School, it aims to develop a centralized platform for information of Benchmarked schools, their selection, and Assessments. This new initiative is intended to prepare approximately 14,500 schools for a safe and stimulating learning environment. The Platform facilitates identification and selection of schools for PM SHRI. It will also help in Monitoring PM SHRI Schools on Regular Basis and Quality assessment of schools.

Integrated ShalaDarpan, developed and implemented by NIC Rajasthan, serves as a comprehensive information management system encompassing various aspects of school education, from academic performance and staff management to beneficiary schemes. It covers 72,000+ schools, 85+ Lakh students, 4.5+ Lakh staff, and 500+ offices, facilitating smoother operations, scholarship distribution, and enhanced decision-making in the education department, garnering recognition through awards and commendations.

NIC Chhattisgarh's NICler is an innovative tool for capturing student responses to multiple-choice questions in classrooms without electronic devices, benefiting over 1,00,000 students and earning recognition through prestigious awards like the Digital Technology Sabha Award 2022, CSI SIG e-Governance Award of Excellence 2022, and m-Billionth Award South Asia 2022-23.

School Education Uttarakhand Portal: is an integrated platform for the students, teachers, and administration and decision makers of school education. The portal is a huge repository of 61,225 teachers, 18,374 number of total Govt. Schools and 8.5 lakh (approx.) students. It offers various office automation services related to school education and SCERT. Over the years, this platform has won multiple awards such as "Award of Appreciation" in CSI-Nihilent in 2017, SKOCH award in 2021, and "Award of Recognition" in 20th CSI SIG eGovernance Awards 2022.

NIC Assam's Teachers Award Portal and "ShikshakBota" ("শিক্ষকবঁটা") Mobile Apprewards around 2,000 teachers with Assam State Level Award to Teachers of School Education Department.

Kendriya Vidyalaya Sangathan a Digital Platform is developed to cater for the KVS, employees transfer nationwide maintain equitable distribution of its employees across all locations to ensure efficient functioning of the organization and optimize job satisfaction amongst employees.

SARAL (Systematic administrative reforms for achieving learning by students), designed, and developed by NIC Maharashtra is an implementation of ICT in School Education. It is an integration of online platform for schools (more than 1,17,000), students (more than 2.14 Crore) and teachers (more than 5.70 Lakh). The project comprises crucial modules such as student and school databases, staff approval (Sanchmanyata), Mid-Day Meal (MDM), RTE 25% admission, eMarksheets, and a sports initiative with a 5% reservation, collectively enhancing administrative efficiency and educational access.

2.5.4.2 Examination and Admission Services

Examination Management and Counselling and Admission Services are some of the longest-standing services by NIC. These services cater to all the stakeholders namely, aspirants, examination boards, counselling board, participating institutions and reporting cum document verification centers for examination management, counselling, and Admissions.

Examination Management System is a pre and post examination activities conducted across all domains in the country. Examination management services have been designed to undertake the registration process for an examination along with accompanying activities. It provides single point access to citizen centric services for examinations, admissions, result and recruitment. Easily configurable Examination Management services application makes academic examinations conducted by various Central and State Boards, Universities to entrance examinations results for engineering, medical and other professional courses conducted by Central and State agencies, and results all are made accessible through one single window in the Examination Management System. NIC has been successfully partnering with many national and state level examination bodies like NTA, CBSE, OJEE, WBJEE etc. to provide pre and post examination services for entrance examinations such as JEE (Main), JEE(Advanced), NEET etc. It also provides support for recruitment examinations such as in Allahabad High court, NHAI, DU, etc. Starting from Registrations, Form filling, payment, Answer Key Challenge, to Score/Rank Card Publishing; all activities that are required in the examination process have been made simple and accessible to all with the Examination Management Services Platform.

e-Counselling system provides end-to-end admissions and counselling services starting from registrations to selecting colleges and their respective courses till generating the admission letter. The e-counselling system offers a vast range of services essential for the admission process not just for the candidates but also for the admission providers. Starting from registration, to choose filling, fee payment and up till admission letter generation, complete cycle of admission services is provided by the solution. It facilitates the admission providers with services through which they can easily manage seat matrix and master data as well as monitor the number of registrations, fee payments, choices filled etc. to realize the accurate amount of admissions processed. The system also helps the candidates with the historical data available about opening and closing ranks in multiple rounds. In addition to this, assistance is provided through emails, helpdesk numbers and FAQs. The e-Counselling division within NIC has been instrumental in partnering with 35+ examination and counselling bodies/agencies like JoSAA, MCC, CSAB, NCHM, IIMC, OJEE, WBJEEB etc. Counselling services are provided to national/state boards like JoSAA, CSAB, MCC, CCMT, BCECEB, GGSIPU, NEET(UG), AYUSH etc. for admission to 3,000+ academic institutions including IITs, NITs, and Central/State funded universities/institutions in various domains like engineering, medical, architecture, pharmacy, agriculture, management etc. catering to over 80 Lakh candidates from 8th/10th pass to Postgraduates.

States have also implemented exceptional examinations and counselling and admissions management systems. NIC Haryana's online admission system for 8 AICTE-approved technical courses utilizes automated verification of marks, certificates, and pre-filled data from the Parivar Pehchan Patra (PPP) API, with significant metrics including 4,837 registrations, 3,778 admit cards issued, and 2,701 candidates appearing for OCET admissions. The E-Counselling solution also support the Telangana state council for admissions to Engineering, pharmacy, management, and polytechnic courses. **HsCap** and **VhsCAP** (Higher Secondary and Vocational Higher Secondary Admission) and IexaMS-HSE iExaMS-VHSE in Kerala takes over 4 Lakh students for over 200 institutions for Higher secondary and vocational higher secondary courses through online counselling.

NIC Lakshadweep and NIC Tripura has also implemented the e-counselling solution. Tripura is using the system for Medical UG and PG aspirants. NIC Tamil Nadu has successfully implemented the **Exam Monitoring System** for

multiple universities, including Anna University, Thiruvalluvar University etc. The NKN extends its connectivity to 43 state/ deemed universities, linking 48 educational institutions, including medical colleges, IIMs, IITs. Additionally, the Tamil Nadu Government's initiative to establish 6,000 Smart Classrooms at government schools receives technical consultation from NIC.

NIC Madhya Pradesh **Common Entrance Examination (CEE)** process for 6 RIEs (Regional Institutes of Education) in India, offering efficient examination services. Additionally, a mobile app developed by NIC-MP streamlines activities for admissions across these institutes.

NIC Assam's Examination Results Portal publishes results of over 5 Lakh students publishing results of Class X and XII conducted by the Govt. of Assam.

2.5.4.3 National Scholarship Portal (NSP)

NSP is a vital platform for students seeking financial support to excel academically. It offers numerous benefits, including streamlined helpdesk services, coordinated management, multiple scholarship schemes, uniform eligibility criteria, and integration with eGovernance systems through APIs, making it a comprehensive solution for students. It empowers scholars to thrive in India's academic landscape.

Managing over 28 ministries and 140+ active schemes, the system handles applications for more than 1.08 Crore recipients, with a scholarship value of ₹5,200 Crore. NIC has designed the application architecture of NSP application which is capable of handling load of more than one Crore applications every year and processing them for verification and scholarship disbursement through PFMS. Dashboards and Reports are designed for each onboarded stakeholder.
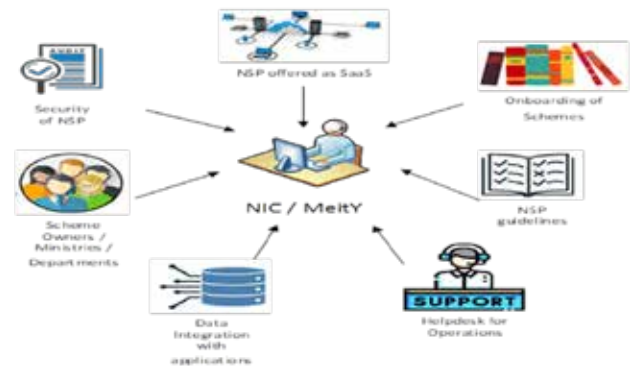
2.5.4.4 Scheme and Welfare Program Management

PM POSHAN designed and developed by NIC Himachal Pradesh State Centre for automated Reporting & Management System (MDM-ARMS) is a Centrally Sponsored scheme for providing one hot cooked meal to all school children in Government and Government-aided schools. This multiple award-winning solution in Himachal Pradesh has been implemented in 18 States/ UTs of the country and has come on board covering 3.1 Lakh and 9.3 Lakh teachers as respondents. It has been enhanced for data collection of other services such as Student Health Record, Deworming Status and Teacher/ Student attendance and Random School Inspections. It is a multilingual solution which provides multiple modes for data collection such as Web, Mobile Application and SMS. NIC teams in MHRD and Headquarters manage for online data transfer to National portal and synchronization of data. The

system comprises of a graphical dashboard which provides helpful insights and makes it easy to track and monitor data in the solution.

The **Digital Gujarat portal** developed by NIC Gujarat has been instrumental in disbursing around ₹11,883 Crore in scholarships to approximately since 2017, offering a comprehensive platform for online services and scholarship disbursement, with 24 pre-matric and 33 post-matric schemes benefiting students in Gujarat.

NIC Chandigarh's DBT services, processed approximately 1 Lakh scholarship applications and disbursed around ₹10 Crore in scholarships directly to beneficiaries' accounts in the financial year 2022-23, emphasize transparency and efficiency, with user-friendly online access and tracking

2.5.4.5 Educational Institutes Information Management

Effective information management in educational institutes is paramount for facilitating data-driven decision-making, ensuring the security and accessibility of valuable educational data.

UDISE+ (Unified District Information on School Education plus) is the official Education Management Information Systems platform from the Department of School Education. It is the largest database of school education in India, covering approx. 14.89 Lakh schools, 26.52 Crore children and 95 Lakh teachers with over 7.25 Lakh registered users which is still expanding. Schools in UDISE are given a unique identifier: UDISE code. UDISE+ ecosystem consists of multiple applications namely, School Directory Management, Annual Data Capture, Know your School, Data Sharing Platform, API platform, School GIS, and Dashboard etc. UDISE+ has won multiple awards for its exceptional performance such as the Gems of Digital India Award (Analyst's

Choice) in the e-governance category, the Second position in the National Award for e-Governance 2020-21, and 19th CSI SIG eGovernance awards in 2021.

School GIS provides exact geographic location of schools with latitude & longitude. It provides base map services like street maps and high-resolution satellite images. It is integrated with UDISE+ data for displaying and locating the school, Map Viewer & Navigation, Directions and Distance, Multiple Base Map (NIC Street, NIC Base, ESRI, Google and Bing) and online Switcher, Buffer, Area of Interest, Layer List, Bookmark, Thematic Mapping. The analysis related information like Spatial Search and Pre-defined Query, Proximity Analysis based on location type and category for insights for planning and monitoring purposes.

The **Performance Grading Index** (PGI) provides insights on the status of school education in States and UTs including key levers that drive their performance and identify critical areas for improvement. PGI assesses states' performance in school education based on data drawn from UDISE+, NAS, Mid-Day Meal, etc. District PGI reports scored on 80+ parameters and their respective dashboard have been released for each district.

All India Survey on Higher Education (AISHE) covers information about over 56,000 higher education institutions (universities, colleges, and standalone institutions) with more than 4 Crore enrolments and over 15 Lakh teachers. The system has been enhanced to capture the information online.

2.5.4.6 Educational Products and Solutions

The Chancellor Portal, a common portal initiated by NIC Jharkhand for the Higher Education Department, Govt of Jharkhand, streamlines the application, admission, and registration processes

for nine state universities and over 200 affiliated colleges for admission to UG, PG, Certificate Courses, Diploma and PG Diploma. In academic year 2023, it successfully handled 3,83,163 online applications and facilitated 2,39,360 admissions in UG, PG, and vocational courses, serving as an efficient platform for all stakeholders to engage in these activities seamlessly with an efficient redressal mechanism.

CollabGEO is an indigenous web-based collaborative 2D geometry tool that enriches the teaching and learning of geometry concepts in Indian schools, aligning with NCERT curricula for classes 6th to 10th, with features like geometry creation, annotations, measurements, real-time collaboration, and more, aiming to improve math education. NIC also provides a cost-effective 3D/2D Engineering Drawing Software system, CollabCAD (https://collabcad.gov.in) for education sector available on desktop and collaborative network enabled systems benefiting over 140 CBSE affiliated schools and around 1,500 students every year studying engineering graphics in class XI-XII. More than 1400 new users registered and 1500 downloads of CollabCAD desktop-based software with 400 plus downloads of CollabCAD e-book took place in 2023-24. A web-based 3D viewer platform is also available for students and academicians to visualize 3D digital models directly over modern web-browsers without installing any software or plugins.

Council of Higher Secondary Education (COHSEM) by NIC Manipur, is a comprehensive enrolment solution that offers streamlined student enrolments in Class XI and XII, ensuring online fee payments, data submission, etc. especially in remote regions, while hosted on the NIC cloud infrastructure.

TelePractice is an innovative oral assessment tool developed by NIC Chhattisgarh, benefiting 1,00,000 students, and it has received recognition through awards such as the Digital Technology Sabha Award 2022 and CSI SIG e-Governance Award of Excellence 2021, offering a unique and personalized approach to oral quizzes and feedback in education.

2.5.5 e-Transport

2.5.5.1 About eTransport Mission Mode Project (MMP)

One of the most important IT initiatives undertaken by MoRTH to modernize the management and operations of the transport sector is the eTransport MMP, which is a comprehensive digital platform created and executed with technical support from the NIC, facilitating all transport-related services through a centralized, web-based system operational across the country. It has successfully transformed the service delivery mechanism of various transport-related activities (vehicle registration, driving license, taxation, fitness, permit, enforcement, etc.).

2.5.5.2 eTransport Ecosystem

As on date, the project is an extensive array of G2G, G2B and G2C services, benefitting citizens, transporters, vehicle dealers, manufacturers, police and security agencies, banks/ financial institutions, insurance companies, along with various Government Departments at the State and Central levels.

Some of the key applications developed and implemented under this project include Vahan (for vehicle registration), Sarathi (for driving license), mParivahan (mobile app), e-Challan (enforcement solution), PUCC (pollution compliance system). eTransport also empowers multiple stakeholders by ensuring improved delivery of services.

The entire vehicle life cycle (manufacturing, sale, registration, insurance, finance, testing/fitness, and scrapping) has been integrated in the project.

Integration of data and services has been made with all stakeholders in the allied sectors e.g., vehicle manufacturers, dealers, banks, FASTag, eWay Bill, Smart Cities, Pollution Checking Centres, Fitness Centres, Driving Schools, GST, police, and security agencies (NATGRID, NCRB, CCTNS) etc.

2.5.5.3 Integration of e-CHALLAN with Intelligent Traffic Management System (ITMS)

e-Challan is a software application comprising Android based mobile app and web interface, developed for the purpose of providing a comprehensive solution for Transport Enforcement Officers and Traffic Policemen. The solution has digital interfaces for all the stakeholders in ecosystem viz. MoRTH, State Departments, Police, Citizen, Court, etc. This application is integrated with Vahan and Sarathi applications and provides a number of user-friendly features while covering all major functionalities of Traffic Enforcement System.

As on 31st March 2024, total 23,97,01,802 challans (including ITMS) have been issued and the amount 12,879.40 Cr has been recovered.

2.5.5.4 Integrated Road Accident Database (iRAD)

The iRAD project of MoRTH has been envisioned to work in the direction of promoting and enhancing Road Safety. The project is sponsored by the World Bank, and is being executed by NIC, in collaboration with IIT Madras.

The project operates in an integrated ecosystem of various stakeholders – comprising data producers/ data consumers viz. Police, Hospitals, Ambulance Services (particularly the 108 ambulances), Blood Banks, Medical Records, State and National Transport departments, Insurance companies, Courts, etc. and facilitate timely exchange of information among them for timely and effective response/ support.

eDAR project is implemented in entire country and Live accident entries are in-progress in all 36 states.

2.5.5.5 Trade Certificate

Trade Certificate Application provides a mechanism to facilitate regulatory control over Automobile Dealers. The online system facilitates the unhindered movement of unregistered, unsold vehicles in Public Places. That is, vehicles in possession of vehicle dealers, manufacturers, manufacturer/dealer of automobile ancillary, test agency specified in Rule 126 of CMVR, approved repairer of vehicles and agency for building vehicle bodies, can move on roads for necessary purposes.

2.5.5.6 NextGen mParivahan App

mParivahan mobile app is a citizen-centric transport solution. It is available in both Android and iOS versions. It is one of the most popular Government applications with more than 10 Crore downloads.

Transport services like online payment of tax, reporting of traffic violation, etc. have also been incorporated in the app for state-specific implementation. 75 online services can be availed through this App.

2.5.5.7 Sale and Purchase of Pre-Owned Vehicles

As a regulatory measure, the maintenance of an electronic vehicle trip register in Form 29F has been mandated, which would contain details of the trip undertaken, such as the trip purpose, driver, time, mileage, etc.

This application will aid in recognizing and empowering intermediaries/dealers of registered vehicles, as well as provide adequate safeguards against fraudulent activities related to the selling or purchasing of such vehicles.

2.5.5.8 Faceless Service Delivery

Faceless services have been introduced to ensure an efficient and fully digital approach in delivering transport-related services to citizens through Vahan and Sarathi. Both MoRTH and NIC have transitioned the existing transport services to a faceless mode, employing advanced technologies such as Aadhaar authentication, eKYC, AI-based face recognition, e-Sign, and other business process transformations.

Currently, over 70 transport services are fully faceless, with variations in implementation observed from state to state.

2.5.5.9 National Permit and All India Tourist Permit (AITP)

The National Permit system has automated the process of obtaining National Permit Authorization, thereby facilitating transporters in enabling the unhindered movement of goods across states. The application is fully integrated with Vahan and provides features such as online payment for a National Permit, as well as the ability to check the status of transactions, vehicle numbers, and bank reference numbers, among others. The validity of a National Permit can be verified through various modes, including mParivahan, eChallan, and Vahan (Know your RC details).

Recently, MoRTH issued a Gazette notification GSR 166(E) concerning the AITP for passenger vehicles. A new module has been developed and implemented nationwide to provide online services to all stakeholders. This module includes functionalities such as AITP issuance, authorization, payment, and printing, among others.

2.5.5.10 Data Analytics

Significant progress has been accomplished within the e-Transport MMP project, specifically concerning the digitized data concerning vehicles and driving licenses. The substantial scale of this data is evident, encompassing records for approximately 35 Crore vehicles and 37 Crore driving and learner licenses in digital format. This reservoir of data stands as a valuable asset, prompting the deployment of sophisticated analytical methodologies and tools to extract comprehensive insights, spanning from historical retrospection to future-oriented planning. Such data analysis serves to elevate service quality, expedite effective planning and monitoring, and fortify diverse governance facets.

2.5.5.11 Pollution Under Control Certificate (PUCC)

PUCC, web application is accessible to all stakeholders i.e., RTOs, PUC stations, citizens etc. It connects all vehicle pollution checking stations which issues pollution under control certificates. As per Supreme Court guidelines, application facilitates the mandatory linking of PUCC status of vehicles with the centralized Vahan database. Now any vehicle can get the PUC check done anywhere in the country and uniform PUC Certificate (Form 29) issued throughout the country. PUCC mobile application has also been developed. Total 26,63,20,991 PUC certificates have been issued till 31st March 2024.

2.5.6 Inclusive Development

2.5.6.1 Pradhan Mantri Adarsh Gram Yojana (PMAGY)

To fulfill the Government's commitment and address rural housing gaps, PMAY-G, launched in 2016 by Hon'ble PM aims to provide a pucca house with basic amenities to all rural houseless

households and households living in kutcha and dilapidated house with an overall target to construct 2.95 Crore pucca houses. For each house physical progress during construction is being monitored at 3 level (i.e., Plinth Level, Roof Cast and Completed level).

As per the framework of implementation of PMAY-G, to ensure successful implementation of the scheme at the ground level, quality of houses must be assured. NIC has developed an AI/ML based recommendation system which assists the Block level officers in approving the house inspection by recommending only the inspection images of completed houses for approval based on the identification of Pakka Wall, Pakka Roof, Logo, beneficiary, window, and door. This has also helped to improve the monitoring and assisting the inspection of the houses for better data capture and progress reporting.

AI/ML based PMAY-G house quality review based on objects present and absent.
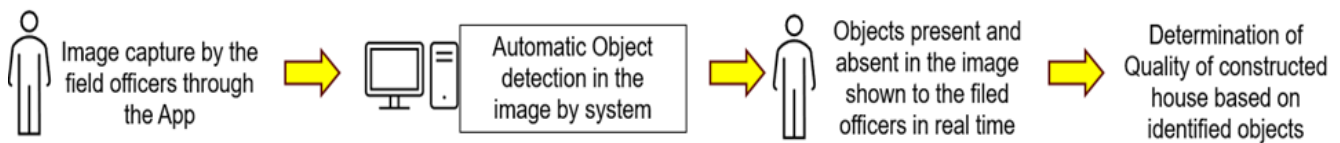
Fig: AI based recommendation system for PMAY-G constructed house quality review.

2.5.6.2 Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

NREGA Mobile Monitoring System (NMMS App) in MGNREGA: To ensure more transparency in the implementation of MGNREGA in the States/UTs, a provision for capturing of worker's attendance at worksite through NMMS App with geo-tagged, real-time stamped photographs of the worker twice in a day has become mandatory from January 2023. This app operates in both online and offline modes and eliminates connectivity issues at village. This has also enabled faster processing of payments for workers. NMMS app is being used by Gram Rojgar Sahayak (GRS) and MATE/ Group Leader, responsible for capturing demand and submit to Panchayats in group for work allocation.

MGNREGA has approx. 25.01 Crore registered workers and around 14.26 Crore Workers are active. On an average more than 75 Lakh workers are giving attendances through NMMS Mobile App on a daily basis.

2.5.6.3 Jal Jeevan Mission (JJM) (https://ejalshakti.gov.in/WQMIS/.)

JJM aims that every rural household has drinking water supply in adequate quantity of prescribed quality on regular and long-term basis at affordable service delivery charges leading to improvement

in living standards of rural communities. Key ICT initiatives taken during the year are:

JJM IMIS: brings together all data, i.e., tap connection provided at households, Village Action Plans, District Action Plans, State Action Plans, Village level Water & Sanitation Committees details, scheme planning, progress (physical & financial) and completion data, financing and funding details, the progress of support activities, progress in priority areas etc.

A new Mobile friendly **Progressive Web App** has been designed and developed for on-the-spot tagging of beneficiaries with Aadhaar and geo-tagging of all the assets of water supply schemes and Certification of village as Har Ghar Jal, after saturation of the village with Tap connections for each household. **Aadhaar tagging of beneficiaries with Face recognition is under development**.

JJM Dashboard: It captures all essential monitoring parameters i.e., number of FHTCs provided, changes after launch of mission, up to village level details, grievance redressal system, real time sensor-based measurement and monitoring, availability of funding. Map view of coverage of all the priority areas like Aspirational blocks and districts, Quality affected places.

JJM WQMIS: To get rid of water-borne diseases, Government's emphasis is to maximize sample testing of drinking water across the country. In order to achieve this, WQMIS was expanded and Central Water Commission and Central Ground Water Board have been onboarded on the WQMIS, and onboarding of Water quality labs of urban areas under AMRUT of MoHUA is ongoing. T**his project won the National Award for e-Governance 2023-Silver (by DARPG, Govt. of India) under category "Application of Emerging Technologies for providing Citizen Centric services."**

2.5.6.4 Swachh Bharat Mission-Grameen (SBM-G)

SBM-G in Phase-1 had achieved the objective of Open Defecation Free (ODF) rural country in October 2019. Further to sustain ODF status and to have arrangements to manage solid and liquid waste in rural villages by 2025 SBM Phase-2 was launched on 1st April 2020.

The SBM Phase-2 programme focuses to transform all ODF villages to ODF- Plus which sustains ODF status and have arrangements to manage solid and liquid waste, display of IEC wall paintings & visual cleanliness in the village.

SBM-G Dashboard: Displays all the monitoring parameters of achievement and progress related to ODF Plus villages (Aspiring, Rising, Model), villages having arrangement of solid and liquid waste management arrangements, visual cleanliness, SLWM assets reported (like community compost pits, soak pits, segregation sheds, HH assets etc.), community sanitary complexes up to village level. It also displays the state wise/district-wise progress of relevant parameters. Also, village report card is visible to view the ODF Plus status of village.

SBM Portal: Portal is updated for documents/ circulars and enhanced for Swachhata Samachar published by SBM-G.

SBM-G MIS: Used for Data entry in relevant modules (declaration of ODF Plus villages, marking of Solid and liquid waste management arrangement) and displays all the reports related to captured information in MIS.

Swachh Survekshan Grameen (SSG)-2023: SSG in 2023, an independent survey to assess status of implementation of Swachh Bharat Mission Grameen [SBM(G)] on sanitation (swachhata) parameters for rural India. Dashboard for displaying star-based ranking of districts on based on progress

reported by states on parameters like reporting and verification of ODF Plus status of a village.

Village Assessment and Peer Review

Village wise self-assessment is being done by GPs based on questionnaire, that calculates individual village scores, which will be aggregated further to generate Panchayat and District scores.

The Verification of solid and liquid waste management assets by Gram Sarpanches (already reported in SBM-G MIS by states)

Swachhata Hi Seva 2023: A portal with dashboard is developed to capture and display the progress during the campaign of SHS.

Retrofitting Campaign: Portal for capturing baseline of toilet type technology (twin pits, soak pits, septic tank etc.) for all rural households is being developed.

MIS to capture the progress of retrofitted toilets during campaign (single to twin pit, septic tank to soak pit).

Sujalam 2.0 and Sujalam 3.0: Module to report construction of progress of soak / leach / magic pits / kitchen garden during the campaign.

Swachh Sujal Shakti Samaan Event based portal to facilitate women achievers.

Unified portal of GOBARdhan: Registration of GOBARdhan plants all over India reported by different stakeholders, agencies with functional status of each plant.

Water Sanitation Learning: Capacity building dashboard to plan and monitor rural initiatives.

Citizen Portal: Any rural citizen can apply for IHHL through the SBM portal. By facilitating single window access to Sanitation related information at village level, using a smartphone.

Mobile apps: SBM 2.0 and mSBM mobile apps enables geotagged data of IHHL, village basic information, institutional details, solid and liquid waste management arrangement assets, community sanitary complexes, IEC wall paintings, MHM at village level.

Generic API for states:

A generic API is developed for state governments to consume data related to ODF Plus progress and display it in relevant platforms (CM dashboard etc.).

Integration of Data through different sources for solid and liquid waste management assets (MNREGA and MOPR) through API. The aggregated assets will be reflected on the dashboard.

Data Sharing to PRAYAS, DBT, NITI Aayog for Aspirational Districts and Aspirational Blocks, others for Vibrant, Sambhav, Namami Gange related to ODF Plus.

2.5.7 Consumer Affairs and Food & Public Distribution

2.5.7.1 Computerization and Computer Networking of Consumer Fora (CONFONET)

The scheme of CONFONET in the country aims to digitalize the functioning of the Consumer Commissions at all the three tiers throughout the country. The registration of complaints, recording of court proceedings, issue of notices, generation of cause lists, recording of judgements, record-keeping, and generation of statistical reports etc. are carried out through Online Case Monitoring application software. More than 26 Lakh cases have been updated, various services for consumers / public like case status, case history, cause lists, judgements, display board, pull SMS have been developed. Dashboards have been developed for administrators

and the public. IVRS and CHATBOT facilities have been introduced to know the Case Status.

2.5.7.2 eDaakhil

As an initiative of Department of Consumer Affairs, a web-based application software named "eDaakhil (https:// edaakhil.nic.in)" has been developed by NIC. The portal empowers the consumers (who has any grievance w.r.t any deficiency in services or quality of Goods)
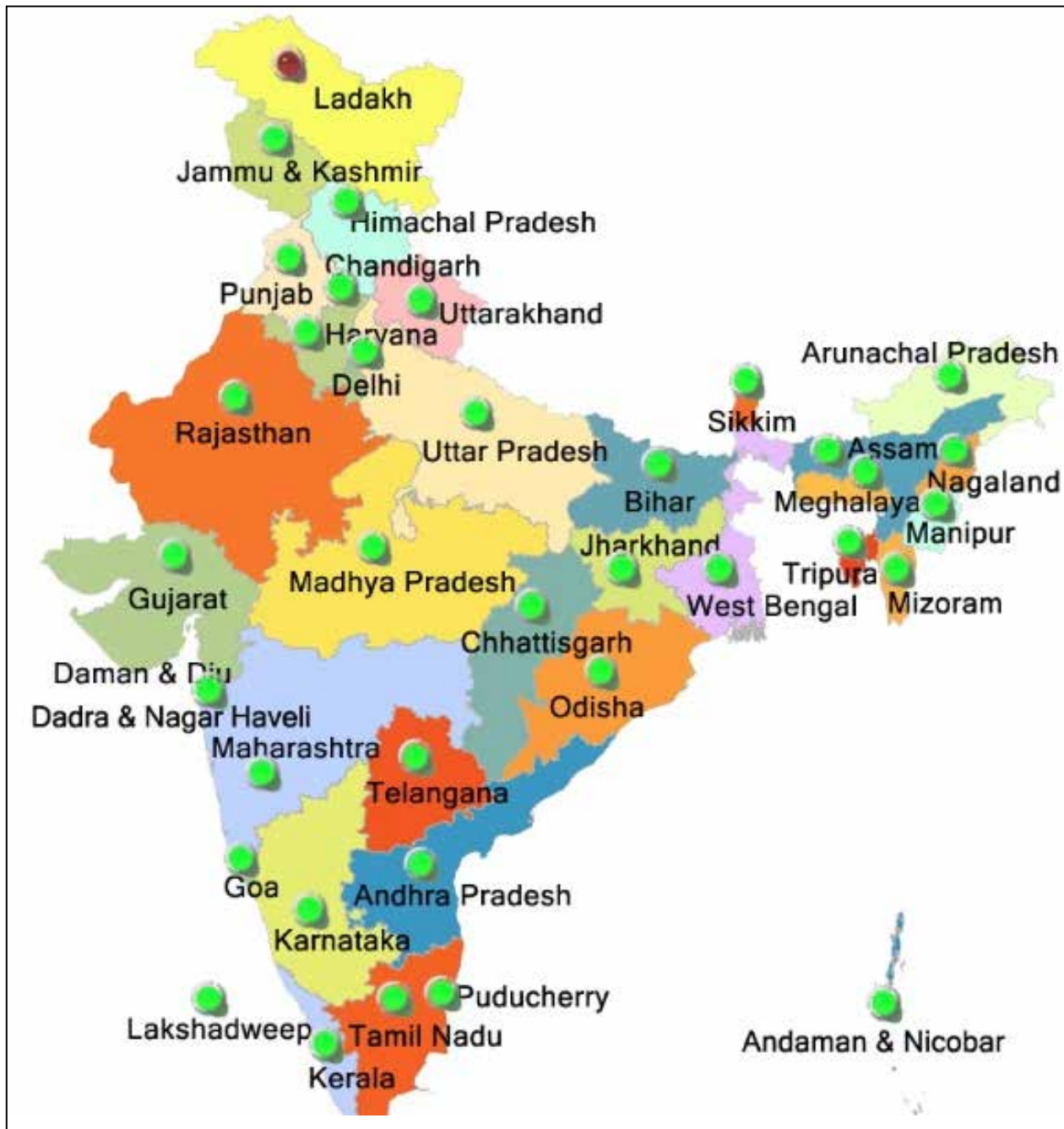
Fig-Consumer Commissions in States/UTs where eDaakhil launched (in green)

2.5.7.3 Targeted Public Distribution System (TPDS)

The Government of India launched the scheme "End-to-End Computerisation of TPDS Operations" in 2013 to modernise the TPDS operations and to bring transparency in the distribution of highly subsidised food grains across the country. The System is operated under the shared responsibility of the Central and the State Governments. NIC is the Technical Partner for the key initiatives and outcomes of TPDS.

Key Achievements:

- Digitization of ration cards/beneficiary database for correct identification of beneficiaries; removal of bogus cards and better targeting of food subsidies.

- Online allocation of food grains for system-generated allocation orders to bring transparency in allocation of food grains, up to the Fair Price Shops (FPS) level.

- Computerisation of Supply Chain Management to ensure timely availability of food grains at all FPSs for delivery to the targeted beneficiaries and to check leakage/ diversion of food grains.

- Online Grievance Redressal / Toll-Free Helplines and Transparency Portals to introduce transparency and public accountability in the implementation of TPDS.

- Aadhaar seeding of about 99.8% ration cards and almost 97.8% beneficiaries at the national level have been achieved so far.

- Almost 5.41 (99.6%) lakh of the total 5.43 Lakh FPSs in the country are automated by installing electronic Point of Sale (ePoS) devices.

- About approx. 98% average foodgrains are distributed through Aadhaar-authenticated electronic transactions on a monthly basis.

- RCMS applications have been integrated with DIGILOCKER, UMANG App, NHA – PMJAY, CSC, States Citizen Services Portals, etc.

The End-to-End Computerisation of TPDS Operations has had a significant impact on the efficiency, transparency, and accountability of the system. It has helped to reduce leakages and diversion of food grains and to ensure that the benefits of the system reach the intended beneficiaries. The system has also made it easier for beneficiaries to access their food grains, as they can now collect them from any FPS in the country using their ration card and Aadhaar number.

2.5.7.4 One Nation One Ration Card (ONORC)

India has the largest Public Distribution network in the world. To address various challenges such as leakages and diversion of food grains and create a Smart Public Distribution System, IM-PDS scheme was launched in 2018. The Key components of the IM-PDS scheme are National Portability, Deduplication, creation of Central Repository and Data Analytics. The ONORC plan is one-of-its-kind beneficiary centric, and technology driven portability system of ration cards, empowering all National Food Security Act NFSA beneficiaries, particularly migrant beneficiaries, to access the TPDS and their entitled NFSA food grains from any FPS of their choice, anywhere in India, by using their same/ existing ration card (number) or Aadhaar (number) with Aadhaar (biometric/OTP) authentication on an ePoS device installed at FPS. Starting with inter-state portability in just 4 States in August 2019, the ONORC plan has been enabled in all 36 States/UTs (across the country) covering around 80 Crore NFSA beneficiaries, i.e., almost 100% NFSA population in the country.

2.5.7.5 Common Registration Facility of Ration Cards (CRF) "Mera Ration Mera Adhikar" (https://nfsa.gov.in)

A Web based application to enable States/UTs to collect data of persons desirous of registering themselves for inclusion under NFSA, including migrants residing in other states.

The year 2023 marked a significant milestone in our ongoing efforts to enhance the efficiency and inclusivity of the NFSA distribution system. The Common Registration Facility of Ration Cards (CRF), titled "Mera Ration Mera Adhikar," was introduced as a web-based application designed to empower States/UTs to collect crucial data from individuals seeking registration under the NFSA. This inclusive approach aimed to include migrants residing in other states, ensuring that deserving beneficiaries receive their rightful entitlements.

Under the framework of the NFSA 2013, NIC has been working towards the end-to-end computerization of NFSA schemes, streamlining the distribution of subsidized food grains across all states. This initiative encompassed various activities, including the real-time online Ration Cards Management System, FPS licensing, godown profiling, Allocation and Supply Chain Management of commodities, and Aadhaar-based distribution to beneficiaries.

Furthermore, NFSA mandated the provision of an online platform for beneficiaries to apply for ration cards, facilitating a flow-based approval process. Most of the States have already adopted online Ration Card Management Systems for this purpose. To expand the reach and inclusivity, the Central Ministry introduced a dedicated platform for marginalized communities such as rag-pickers, homeless individuals, beggars,

helpless populations, migrants, domestic helpers, and more. This platform, accessible through the National Food Security Portal, enabled both new applicants and already registered beneficiaries to apply and access Ration Cards.

To ensure a seamless process, the Central Ministry designed a mechanism for routing Ration Card applications received on the NFSA portal to the respective state-specific portals. The approval of these applications adhered to the Service Level Agreements (SLA) defined by the respective state food departments. Beneficiaries received notifications regarding the status of their applications, and they could easily check the progress on the NFSA Portal. Once the ration card is approved, the beneficiary receives the Ration Card in his e-mail.

The introduction of the Common Registration Facility has been a significant step towards making the NFSA more inclusive, efficient, and transparent. This initiative has not only streamlined the application process but also helped reach out to marginalized communities, thereby bringing us closer to the goal of food security for all.

The objective is to achieve "Mera Ration Mera Adhikar" - My Ration, My Right in coming years.

2.5.7.6 Fortification of Rice and its Distribution under PDS (https://annavitran.nic.in/FR/avFortifiedRice)

In pursuant to the announcement during Independence Day, Govt. of India has approved supply of fortified rice under TPDS, ICDS and other welfare schemes, by March 2024, in phased manner. The following 3 phases are envisaged for full implementation of the scheme:

Phase 1: To cover ICDS and PM-POSHAN in all States/ UTs. Phase-1 has been completed in March 2022.

Phase 2: To cover 112 aspirational districts and 250 high burden districts (total 291 districts) under TPDS and other welfare schemes, plus ICDS and PM-POSHAN. It has been completed in March 2023**.**

Phase 3: To cover entire TPDS and other welfare schemes, plus ICDS, PM-POSHAN by March 2024.

NIC has developed the dashboard for Rice Fortification which was launched by Hon'ble Minister in December 2021. The dashboard provides information on fortified rice allocation, distribution, beneficiaries, procurement of fortified rice by Food Corporation of India, procurement of fortified rice by States, details of the fortified rice suppliers, rice mills with blending capacity, etc. Apart from MIS related information, the dashboard also provides the various standards pertaining to rice fortification.

2.5.7.7 Central Food grains Procurement Portal (CFPP) (https://cfpp.nic.in)

Government of India and State Governments procure food grains i.e., Paddy and Wheat during the two procurement seasons namely Kharif Marketing System (KMS) and Rabi Marketing System (RMS). State procurement portals have few threshold parameters (MTPs) to ensure that procurement operations are carried out with complete transparency and efficiency like Online Registration of Farmers, Farmer Land Record, Digitized Mandi/Procurement Centre operations, MSP Payments to farmers, CMR/Wheat Delivery Management and API Based Integration. NIC has

developed the APIs for integration of Central Food Grain Procurement Portal (Central Server) with respective procurement application of States.

2.5.7.8 Subsidy Claims Application for NFSA (SCAN) (https://nfsa.gov.in)
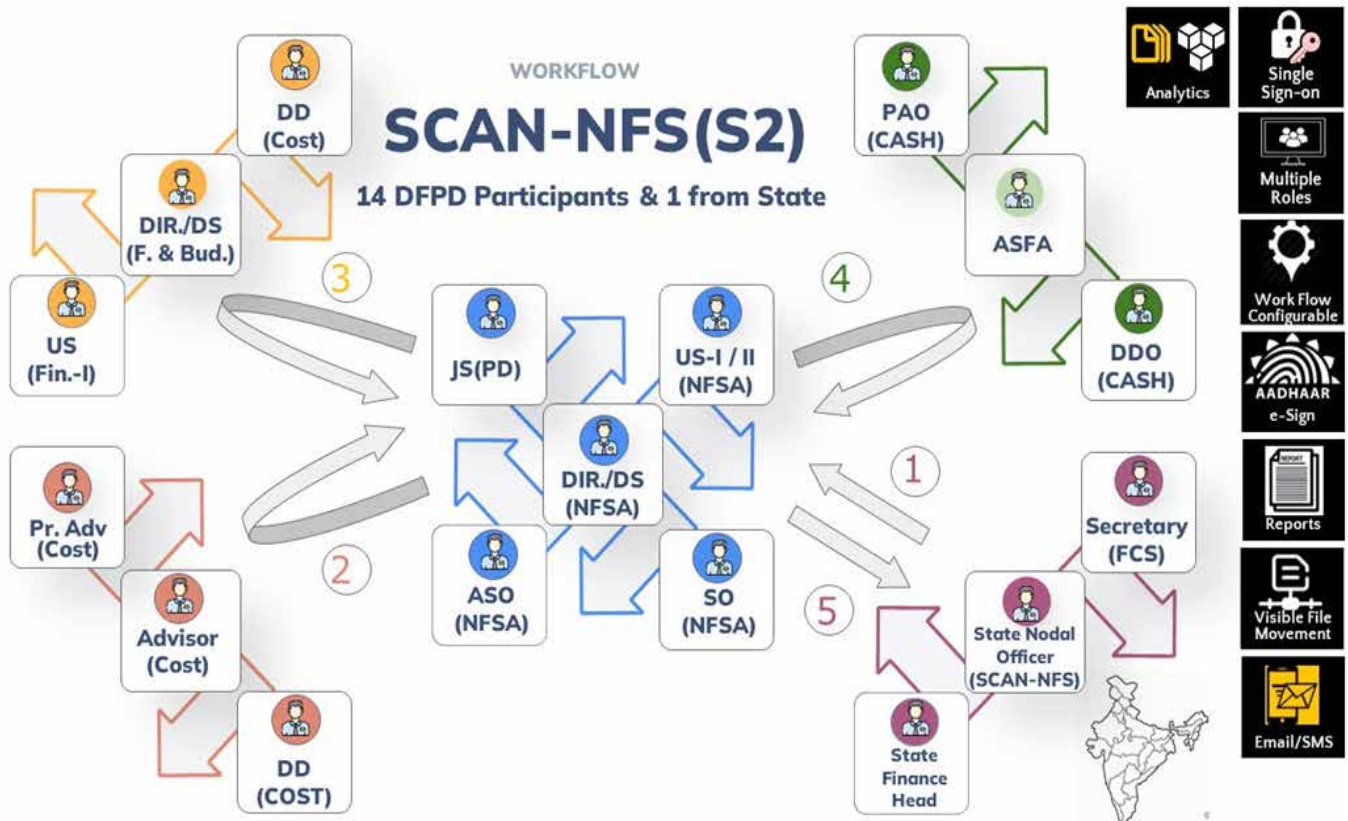
NIC played a pivotal role in supporting the government's critical operations related to the subsidy bills settlement of approximately ₹2 Lakh Crore provisioned for the procurement and distribution of food grains. NIC's contributions to this essential sector, include:

- Modernizing Food Grain Procurement and Distribution

- SCAN application (Subsidy Claims Application for NFSA and OWS Schemes) and Release of Food Subsidy to DCP States and Food Corporation of India

- Implementation of DBT

- Online Software Solution to Supporting NFSA Schemes

- Incidental Cost Sheets (SCAN-ICS) Portal

2.5.7.9 Wheat and Sugar Stock Monitor Portal

A web application has been developed to monitor sugar and wheat stock management for entities like retailers, wholesalers, processors, and big chain retailers. The system allows entities to register themselves on the portal and then enter their store and storage details. Once the store and storage details are entered, entities can enter their stock on a weekly basis. The system also has a module for State Nodal Offices (SNOs)

to capture the details of physical inspections of entity stores/storages and the action taken by the SNO. Dashboards and reports are available to all stakeholders to view Entity Details, Inspection reports, Entity Stock Violations, SNO Login reports etc. The system helps entities to comply with government regulations by providing them with the tools to track and manage their sugar and wheat stocks.

2.5.8 Law & Justice

2.5.8.1 eGovernance Support to Supreme Court (https://sci.gov.in)

Hosting of official website i.e., https://sci.gov.in on NIC Cloud for citizen-litigants centric services like Cause List, Case status, Daily orders, Judgements, Vernacular Judgements, e-Copying for providing benefits of scalability and extensibility.

The **e-filing 2.0** aimed at providing ease in the business of electronic filing, defects notification, curing of defects, processing the documents for scrutiny to all the stakeholders, namely, Advocates-on-Record, Party-in-Person, and the registry.

Fast and Secure Transmission of Electronic Records (FASTER), courts can send e-authenticated copies of bail orders, stay orders, interim orders, and proceedings through secured electronic communication to duty officers at prisons, for releasing prisoners expeditiously.

Work from Anywhere module called the **e-office** has shifted the day-to-day work mode of Registry away from paper-dependency and confines of work-station space besides increasing ease and speed of performance.

e-SCR (Supreme Court Reporter) system, an online repository of reported judgments of the Supreme Court made available to citizens, free of cost, at the click of a button.

Neutral Citation System allows decisions of the Supreme Court to be identified and cited through a unique number.

SuSwagatam, a citizen centric, web-based, and mobile-friendly app, facilitates visitors to the Supreme Court to now request an e-Pass to enter the Court premises rather than waiting in long and tedious queues.

An **automatic transcribing of arguments** and exchanges in matters before the Constitutional Benches by use of AI and is available in respective cases on the website.

Hybrid hearing system combines the best of video meeting tools and conferencing technology to ensure that advocates and parties-in-person have the convenience to choose to appear either in virtual mode or physical mode.

2.5.8.2 Tribunals, Regulatory Bodies and Commercial Courts

Online Tribunals System of NIC is an ICT enabled initiative towards digital transformation of processes, workflows followed in tribunals through process re-engineering and providing a configurable automated system to cater needs of all its direct and in-direct stakeholders.

The list of Tribunals/Commercial Courts include RCT, CGIT, NCLT, NCLAT, NGT, UPRE, ATAPTEL, and Commercial Courts.

Objectives

- Implement decision support systems in Tribunals.
- Automate the processes to provide transparency in accessibility of information to its stakeholders
- To enhance judicial productivity, both qualitatively & quantitatively, to make the justice delivery system affordable, accessible, cost effective, predictable, reliable and transparent
- To bring tribunals on board with online court system under common framework with minimal customizations

Dimensions

- **e-Filing:** Caters online filing of Petition /Application /Caveat by Litigants including requisite payments, document submission etc.
- **Case Information System (CIS):** Covers and facilitates end to end electronic processing of e-filed case by Tribunal
- **Document Management System (DMS):** Online repository for accessing documents pertaining to cases.
- **e-Hearing (Through VC):** Facilitates online appearance/ hearing of Litigants before benches in the cases. In hybrid mode, litigants can present in person physically or Video Conferencing.

Features

- 24*7 availability of e-filing : Anywhere, Anytime
- Court fee calculation, online payment and unique filing number generation
- Online scrutiny check and defect notification via email
- Case Type based unique registration number allotment and sms/email notification
- E-Causelist generation and publishing, orders generation and publishing
- Digitized and digitally signed case documents/ Cause lists / Summon/ Notice / Orders/ Judgements
- Business rules based case allocation to different courts

On-board Tribunals (Jurisdiction)
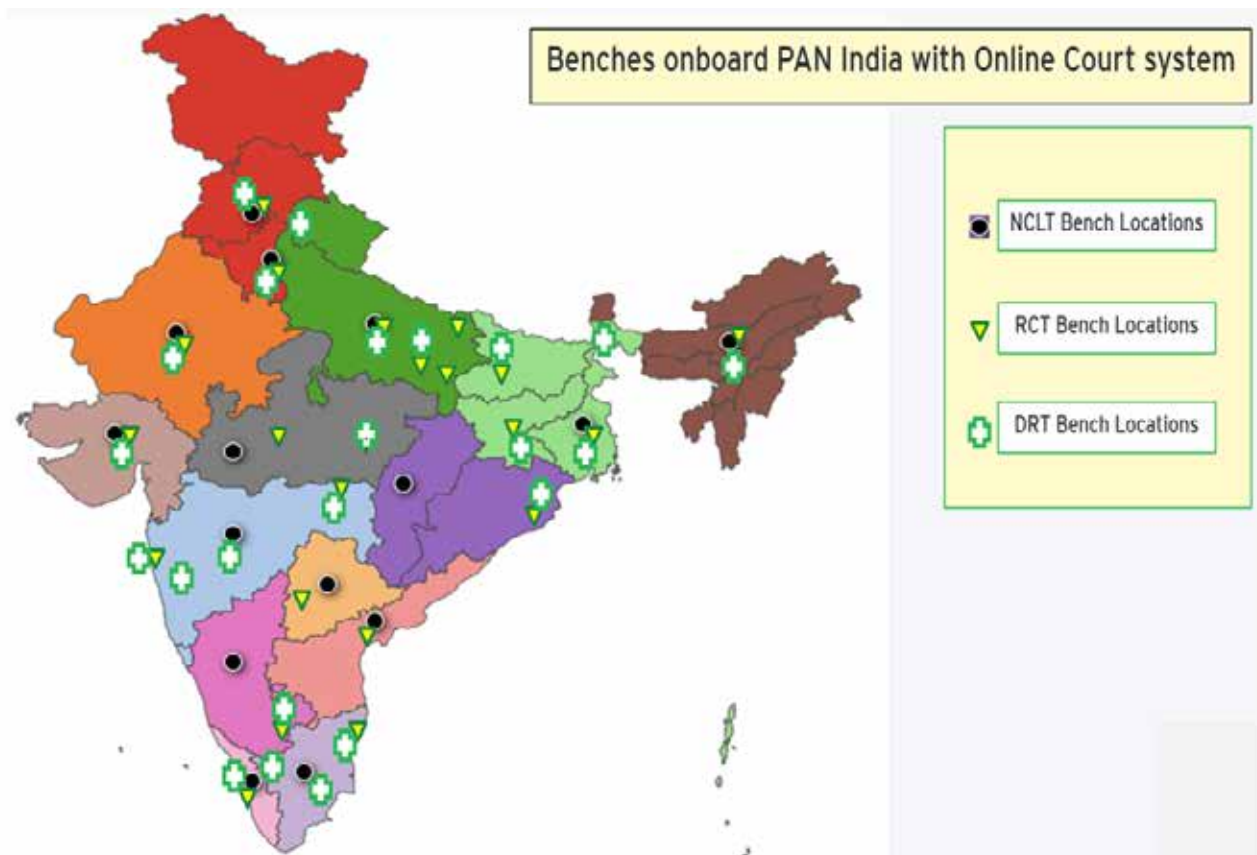
Fig: Benches onboard PAN India with Online Court System

2.5.8.3 eCourts

e-Courts project has been planned by the eCommittee, Supreme Court of India by submitting National Policy and Action Plan for Implementation of ICT in the Indian Judiciary – 2005. The project lays great emphasis on service delivery to litigants, lawyers, and other stakeholders. It involves the creation of improved ICT infrastructure in Courts, Video conferencing etc., and ensures optimum automation of judicial and administrative processes. The project has set up a consolidated nationwide judicial data warehouse with real time updates and availability, which is being used to provide citizen-centric services and inputs for policy making and decision support to the management.

2.5.8.4 Case Information System (CIS), Application for Indian Judiciary (https://ecourts.gov.in)

CIS is an application designed and developed by NIC for Indian Judiciary. It is implemented in High Courts and District & Subordinate courts of the country. Currently, CIS version 3.2 is implemented in District & Subordinate courts and CIS HC Version 1.0 is implemented in 23 High Courts in the country. Automated SMS and emails are triggered to Advocate/Litigants on case events. Single unified portal and eCourts services mobile app provides citizen centric services like case status, cause lists and orders/judgements to stakeholders like litigants, advocates, police etc.

Current Statistics are -

- Services portal : Around 50 Lakh hits daily

- eCourts Services Mobile App Downloads : 2.72 Crore

- SMS - Push/Pull : Around 3.5 Lakh sent daily

- Automated eMails : Around 2.5 Lakh sent daily

2.5.8.5 National Judicial Data Grid (NJDG) (http://njdg.ecourts.gov.in)

NJDG is a consolidated nationwide judicial data warehouse which was set up with real time updates. It provides statistics of pending and disposed cases in the country and works as a monitoring tool to identify and manage the pendency of cases.

NJDG statistics

High Courts		
i.	Number of High Courts	25
ii.	Pending cases available on NJDG	61,77,670
iii.	Disposed cases available on NJDG	3,84,81,686
District courts		
i.	Number of Districts	698
ii.	Number of Court Complexes	3,524
iii.	Number of Establishments	7,933
iv.	Pending Cases available on NJDG	4,44,90,618
v.	Disposed Cases available on NJDG	16,62,95,669
vi.	Total Cases available on NJDG	21,07,86,287
vii.	Total Orders (Interim and Final) available on NJDG	25,73,35,512

2.5.8.6 Virtual Courts

The concept of Virtual Courts is aimed at reducing footfalls in the courts by eliminating the physical presence of violator or advocate in the court. A virtual judge can preside over a Virtual Court whose jurisdiction can be extended to entire state and working hours may be 24×7. Neither litigant need to visit the court nor judge will have to physically preside over the court, thus saving precious judicial time.

Statistics		
> 421 Lakh	> 394 Lakh	> 486 Crore
Challans received in eCourts	Challans in which proceedings over	Fine Collected

2.5.8.7 eFiling

eFiling 3.0 system is a complete end-to-end solution developed for online filing of plaints, written statements, replies, and various applications related to cases. Both Civil and Criminal cases can be filed before any High Court or District Court of the country. The system is designed in Bilingual (English and local language) to reach wider group covering advocates/ litigants.

Entire filing can be done in asynchronous mode without Advocate and clients meeting each other. Submission of pleadings in the courts and video recording of Oath are now possible even when Client, Advocate and Court are at different locations.

Current Statistics	
Implemented in	23 States
Total Cases Submitted	> 19 Lakh
Total Document Uploaded	> 94 Lakh
Total Oath Recorded	> 4 Lakh

2.5.9   Home Affairs

2.5.9.1 Interoperable Criminal Justice System (ICJS)

ICJS is a national platform for enabling integration of the main IT system used for delivery of Criminal Justice in the country by five pillars namely: -

- Police (Crime and Criminal Tracking and Network Systems)
- e-Forensics for Forensic Labs
- e-Courts for Courts
- e-Prosecution for Public Prosecutors
- e-Prisons for Prisons

The system is being built on the principle of 'one data one entry' whereby data is entered only once in one pillar and the same is then available in all other pillars without the need to re-enter the data in each pillar. It was mainly intended to make the Justice delivery system speedy and transparent. This is intended with the following objectives:

- PAN India Search in all the Criminal Justice System stakeholders, namely Investigating Agencies (State Police, CBI, NIA, NCB, RPF etc.), Court, Prisons, Forensic and Prosecution.

- Workflow based data exchange among the stakeholders based on the Data Sharing Matrix approved by the e-Committee of Supreme Court of India.

- Access to other government big databases like ALIS, CBI/NIA/ RPF, IVFRT/ Passport, Vahan/ Sarathi.

- Analytics over the big data repository of the criminal justice system.

- To provide comprehensive tool to the investigating agencies for effective policing.

- To empower the stakeholders by using advanced ICT tools.

The Crime Data spectrum available with ICJS

CCTNS	Police domain is working at 17,860 Police stations of 37 states. It has 8.51 Crore FIRs as on date.
CIS (e-Courts)	Court domain is working at District and Taluka Courts of 37 States / UTs. It has 16.33 Crore criminal cases of 3,526 court complexes.
e-Prisons	Prison domain is working at 1,349 prisons out of 1,379 prisons covering 36 states with 1.94 Crore of Prisoner records, 2.45 Crore cases along with 4.33 Crore their visitors.
e-Prosecu-tion	Prosecution domain is working at 635 Districts of 33 states with 2.9 Crore Case Proceedings,11.5 Lakh Legal opinions, 1.67 Crore Court Affairs and 1.19 Crore DUTR entries.
e-Forensics	Forensic domain is working at 117 FSL labs in the country spreading across the country with a database of 21.57 Lakh records.

2.5.9.2 National Cyber Crime Reporting Portal

(https://cybercrime.gov.in)

This portal is an initiative of Government of India to facilitate victims/complainants to report cybercrime complaints online. It caters to complaints pertaining to cybercrimes only with special focus on cybercrimes against women and children. Complaints reported on this portal are dealt by law enforcement agencies/ police based on the information available in the complaints. It is imperative to provide correct and accurate details while filing complaint for prompt action.

This portal facilitates a person to report:
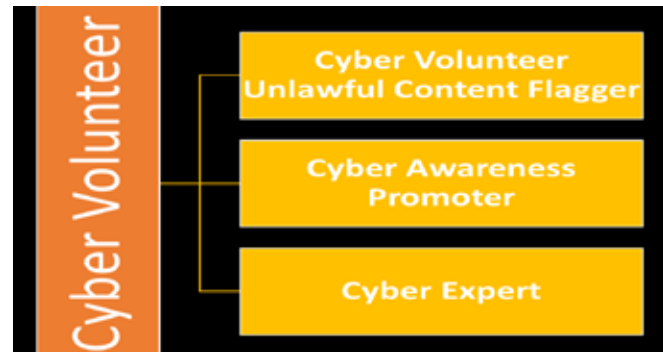
- Cybercrime against women and children related to Child Pornography (CP), Child Sexual Abuse Material (CSAM), Rape Gang Rape (RGR), Sexually Abusive Content and Sexually Explicit Content.

- Any kind of cybercrime under various available category and sub-category, including cybercrimes affecting women and children.

- The incident on National Cybercrime Reporting Portal (NCRP) or any victim of financial cyber fraud can dial helpline number 1930.

Types of Portals:

- NCRP– For Citizen to report and track their Cybercrime complaints.

- National Cyberpolice Portal (NCPP) – Backend portal for LEAs and financial intermediaries to process the complaints. (https://cyberpolice.nic.in)

Integrated with the services of:

- Crime and Criminal Tracking Network & Systems **(CCTNS)** – Police IT system, which processes the complaints after converting to FIR.

- Interoperable Criminal Justice System **(ICJS)** – A platform which facilitates roll-based sharing of data among Police, Prosecution, Court, Forensic, Prison, Arms License & International passenger movement details (IVFRT) etc. Access to Cyber Police portal is provided through ICJS.

- National Centre for Missing and Exploited Children **(NCMEC)** – A USA based organization which sends Cyber Tipline Reports (CTRs) related to India, are being uploaded in NCRP for action at concerned States/ UTs. The SoP is available in Cyberpolice portal.

Features of online Portal:

Total 38 Lakh+ complaints have been registered and 1,605 Crore+ money has been saved through this online portal.

2.5.9.3 ePrisons

ePrisons is a comprehensive application which has developed over time by studying the working process of various prisons across the country and it covers the entire lifecycle of the prisoner. It is an internationally acclaimed product implemented not only in all states of India but also internationally.

This product is highly configurable as per the needs of the state prison department and caters not only to the entire lifecycle of the prisoner but also caters to various needs of the prison authorities. There are around 65 modules under the umbrella of 7 Major applications in the application for serving the purpose at various levels of the government. New modules are also integrated into the application as per the best practices requested from states and available to any state which desires to roll out such features.

Total Statistics	On Average Daily basis
i. Coverage States: 36	i. Admissions: 1,781
ii. Prison Inmates: 1,92,91,773	ii. Release: 1,950
iii. Visitors: 4,33,70,814	iii. Visitors all: 24,329
iv. Cases/ FIRs Cases 2,15,34,616	iv. Visitors online: 13,578
	v. Court Hearing: 2,874
	vi. Parole: 167
v. Population: 5,35,968	vii. Bailed out: 1,868

2.5.9.4 Citizen Portal

ePrison has extended the services to the Citizens, whose relatives are lodged inside the Jail and Prison Authority can provide the data in digital way without manual intervention. This service can be accessible only by the Relatives of Registered Prisoners inside the jail. The Prison department is required to update the Mobile number of each Prisoner' relative. Following are the services which will be available to the Prisoner's Relative through ePrison Citizen Service:

- Profile Details of Prisoner
- Meeting with Prisoners
- Application for Parole
- Grievance

2.5.9.5 Private Security Agency-License (PSA-License) Portal (https://psara.gov.in)

PSA-Licence portal is single window Portal for new/ renew of PSA license to run their businesses, required under the Private Security Agencies Regulation Act, 2005 for all the States/ UTs of India. The main objective of the system is to enable 'ease of doing business' through facilitating the PSA with the electronic based transparent system to fill license application online, upload necessary documents, pay fees via e-transaction, online clarify

query raised by Controlling Authorities, get the Signed copy of the license in the registered account on the portal, thereby eliminating security agency directors and owners to visit the offices of the Controlling Authorities for submissions/ follow ups of their application for grant/renewal of their PSA license. Portal facilitates PSA to apply online for a license in any State of India from any part of India.

MHA Monitoring Dashboard

2.5.10 Social Welfare

2.5.10.1 NGO Grants-in-Aid Proposal and Tracking System (e-Anudaan)

The portal, developed by NIC in-house, facilitates online submission of NGOs proposals and automates the complete process for release of Grant-in-Aid. Various Back-office users have privileges for application processing as per the role defined at District, State Secretariat and at the Central Ministry. The process involves application verification, checklist filling, inspection report, scrutinizing, screening, recommendation, financial approval, and GIA sanction. It is integrated with NGO Darpan portal for Registration of VOs at e-Anudaan, DBT Bharat Portal for DBT data of the schemes, UMANG Mobile App and UDID Portal. Total 26,260 verified NGOs are presently registered on eAnudaan portal.

The following schemes have been covered in e-Anudaan:

- National Action Plan for Drug Demand Reduction (NAPDDR)

- Support for Marginalized Individual for Livelihood and Enterprise (SMILE) - Garima Greh Shelter Home for Transgender Persons

- SMILE- Beggary project under NAPDDR scheme

- Atal Vayo Abhyuday Yojna (AVYAY) / NAPSrC/ IPOP

- Scheme of Grant-in-Aid to Voluntary Organizations working for SCs

- Free Coaching Scheme for SC and OBC Students

- Scheme for Residential Education for Students in High Schools in Targeted Areas (SHRESHTA) for SC Welfare

2.5.10.2 Development Action Plan for Scheduled Castes (DAPSC)

Government allocates funds across Ministries/ Departments for different schemes where targeted financial and physical benefits can accrue to the SCs. The allocation under the scheme of welfare of SCs deals with this matter across Ministries through earmarking of a certain percentage of funds exclusively for welfare of SCs. The portal facilitates online monitoring of physical and financial progress of schemes as per statement 10A. The financial releases are received from PFMS on a daily basis. The physical progress of the respective scheme is submitted by the concerned department.

2.5.10.3 National Helpdesk Against Atrocities

Working closely with the Ministry of Social Justice

and Empowerment, NIC had initiated a project to provide a 24x7 helpline and web portal for members of SC/ST communities to register any atrocities under PCR Act 1955 and POA Act 1998. Under this Act, there is provision of providing financial relief at 3 stages such as on registration of FIR, on submission of Chargesheet, and after final conviction.

A national toll free number 18002021989 and Short Code 14566 have been released and can be accessed from anywhere in India. There is a 24x7 multi-lingual and multi-location call centre established. The centralized system can recognize the state of origination calls and forward to the operator who can speak in the local language of that state.

It also has a Web portal, where complaints can get information about the Acts/ Scheme, register complaints, and also track the status of their complaints.

Once the complaint is registered, the user will get email notification and the complaint will be forwarded to SHO Police station / District Magistrate/ Welfare Officer of the respective location mentioned in the complaint for taking appropriate action. Resolution officers as SHO, SP, DM, WO, Nodal and Admins can login to the officer module and act on the complaints registered under their area.

2.5.11 Culture and Tourism

2.5.11.1 Tourism

Key ICT activities initiated by the collaborative efforts of NIC and Ministry of Tourism:

(i) National Digital Tourism Mission-

A Unified Tourism Interface, aligning with the Honorable PM's vision and for a seamless exchange of information among tourism stakeholders, fostering an open and interoperable network for search, discovery, and digital transactions enabling the next generation of tourism services. The National Digital Tourism Mission seeks to bridge information gaps within the tourism ecosystem through digital highways.

(ii) Incredible India-

The "Incredible India 2.0" Campaign signifies a transition from global generic promotions to targeted marketing strategies and content creation. The vision for the Incredible India Digital Platform is to become one of the world's premier tourism portals. The Campaign strategically addresses key source markets for Indian tourism and emerging markets with substantial potential.

(iii) National Integrated Database of Hospitality Industry (NIDHI)-

NIDHI, aligning with AatmaNirbhar Bharat, leverages technology to empower businesses, particularly in the Hospitality & Tourism Industry. It serves as a gateway for stakeholders like Accommodation Units, Travel Agents, Tour Operators, Independent Restaurants, etc., allowing them to register and access services electronically through a Unique NIDHI ID (NID). Beyond electronic service delivery, NIDHI functions as a platform for Hospitality organizations to ideate, share best practices, and engage with the Government for streamlined business operations.

2.5.11.2 Culture Informatics

(i) Azadi Ka Amrit Mahotsav (AKAM) (https://amritmahotsav.nic.in)

NIC is providing necessary ICT support and technically driving the project in collaboration with NICSI and the Ministry of Culture. The portal is hosted on NIC Cloud. AKAM, a Government of India initiative, commemorates 75 years of Independence, celebrating India's history and achievements. The project initially focused on five AKAM themes. viz. Freedom Struggle, Ideas@75, Resolve@75, Action@75 and Achievements@75. On August 15, 2023, the Mahotsav expanded its scope to concentrate on cultural and social development, introducing new themes aligned with the 'Panch Pran' vision of Hon'ble PM, covering areas such as Women and Children, Tribal Empowerment, Water, Cultural Pride, LIFE, Health and Wellness, Inclusive Development, AatmaNirbhar Bharat, and Unity. Various campaigns and events are launched under these themes and uploaded on the portal.

(ii) Bhartia Kriti Sampada Portal (Pandulipi Patala) (https://www.pandulipipatala.nic.in/)

National Mission on Manuscripts (NMM) aims to locate, document, preserve and render the Manuscripts, which constitute the memory and cultural heritage of India. It connects India's past with its future. A web-based workflow application has been developed for NMM for Bhartiya Kriti Sampada where Lakh of manuscript data files are uploaded. The application is developed in collaboration with NICSI, NMM and NIC.

(iii) Online Processing of NOCs for National Monuments Authority (NMA)
(https://nmanoc.nic.in/)

NMA under the Ministry of Culture is responsible for recommending permission for repair, renovation, and construction within the prohibited area (100 meters) and the regulated area (100 to 300 meters) of ASI-protected monuments. To enhance transparency in the approval process for construction-related permissions, a workflow application called NOAPS has been developed by NIC and made publicly available. NOAPS automates the issuance of No Objection Certificates (NOCs) for construction work in the prohibited and regulated areas.

2.5.12 Labour, Employment & Skill Development

2.5.12.1 SANKALP (Skill Acquisition and Knowledge Awareness for Livelihood Promotion) (https://sankalp.msde.gov.in)

The web portal of SANKALP under Ministry of skill Development & Entrepreneurship aims to improve short term skill training qualitatively and quantitatively through strengthening institutions, bringing in better market connectivity and inclusion of marginalized sections of the society.

Through SANKALP, a stringent system of accreditation can be followed where Vocational Training Partners (VTPs) are given a final level of accreditation only if a certain number of courses have been successfully completed with students meeting reasonable attendance targets both at the individual and aggregate levels. The portal provides the facility to allow states and districts to prepare and upload their annual work plans which are monitored and tracked by the SANKALP team.

2.5.12.2 National Database of Unorganized Workers (NDUW) (eShram Portal)

NIC has developed an e-Shram portal for creating Aadhaar authenticated comprehensive NDUW. The portal has details of the Unorganized workers such as Name, Mobile Number, Occupation, Address, Aadhaar seeded Bank name, Educational Qualification, Skill types etc. It is the first-ever national database of Unorganized workers. The Hon'ble Minister of Labour & Employment launched the portal on 26 August 2021 across India. More than 29.53 Crore eShram cards have been issued since the launch of the portal. Each registrant is allocated a Universal Account Number (UAN) and can download a UAN card instantly. Integration of eShram Portal with DigiLocker, National Career Service (NCS), Pradhan Mantri Shram Yogi Maandhan Yojana (PMSYSM), My Scheme, Digi Saksham has been completed and integration with Skill India Portal is in progress. eShram registration is also available on UMANG platform. Data sharing portal has been developed for sharing unorganized worker's data with states, central ministries and BOCW boards as per data sharing guidelines. API integration has been completed with Haryana, Andhra Pradesh, and Gujarat for sharing unorganized worker's data. Ex-gratia module has been launched to provide accidental risk cover of ₹2 Lakh in case of death/ permanent total disability due to accident or ₹1 Lakh in case of permanent partial disability due to accident to the unorganized workers registered on eShram portal.

2.5.12.3 Unified Shram Suvidha Platform (USSP)

USSP portal facilitates the Ministry of Labour & Employment and its Labour Law Enforcement Agencies like EPFO, ESIC, CLC(C) and DGMS to monitor the implementation of Labour laws in various establishments in the central sphere. It facilitates the employer/establishment to file common registration, filing of annual returns under 8 Labour Laws along with online common Return under Mines Act of DGMS. Unique Labour Identification Number (LIN) is allotted to each establishment registered under any Labour law after de-duplication of data coming from various enforcement agencies. Till date more than 42 Lakh LIN have been issued through USSP. Nine State Governments are also on-boarded with Shram Suvidha Portal. LIN Only Regime is being established within various agencies in Labour sector. The USSP Platform provided a transparent Labour Inspection Scheme through a computerized system on Risk based criteria and uploading of the inspection reports within 48 hours by the Labour inspectors. USSP made easy Sharing of Inspection Reports, Annual Returns among various Labour enforcement agencies. Till date more than 8,11,000 Inspection reports are uploaded through USSP. Integration with the National Single Window System (NSWS) of the DPIIT is also being enabled. The facility for Registration under five acts and issuing of License under two acts of CLC (C) is made operational. Further renewal of Licenses and Amendment of Licenses and registration is also developed and implemented on USSP. Till date, more than 96,000 licenses under two acts have been issued through USSP. Digitally signed show-cause-cum inspection report is sent through mail to employer through USSP and Employers subsequently upload compliance report against irregularities on USSP portal through their Login. Module for notice of opening and closure of establishments has also

been developed. Refund of Security Deposit of Licenses under CLC (C) Acts is also developed and made operational.

2.5.12.4 Platform for Effective Enforcement for No Child Labour (PENCiL)

PENCiL portal connects the Ministry of Labour & Employment with 21 States, 280 Districts Project Societies with 3,400 (approx.) Special Training Centers (STCs) for effective enforcement for "No Child Labour". It sets baselines based on KPIs at the levels to monitor physical and financial progress reports. The platform captures children identified and rehabilitated through STCs and skill development depending on age group and nature of industry from where the children have been rescued. The portal facilitates reporting of child Labour incidents through Complaint Corner. District Nodal Officers take action through First Action Report (FAR) within 48 hours and subsequently Second Action Report (SAR) within 21 days, if required. Afterwards, a Legal Action Report (LAR) is recorded. At present, more than 3573 complaints are closed out of 4,575 (approx.) registered complaints. The portal has been enhanced to capture daily attendance along with group photographs of children attending the school. The portal is also integrated with PFMS for DBT of stipend.

2.5.12.5 Software Application for Monitoring and Disposal, Handling of Apprehended/ Existing Industrial Dispute/ Claims/ General Complaints (SAMADHAN) Portal

SAMADHAN portal facilitates workman, trade union or management to raise an industrial dispute, Claims and General Complaints before Conciliation Officer (CO) of the area.

SAMADHAN portal is also integrated with Sandes App for receiving the notification of the filed case. SAMADHAN portal is made available to 4 Lakh CSCs across the country for the workman to

raise the claims or complaints. This portal is also available on UMANG platform.

2.5.12.6 National Career Service Centre (NCSC) for SC/STs Portal

NCSC for SCs and STs (erstwhile NCSC) comes under Directorate General of Employment (DGE) operate three courses, namely Special Coaching Scheme, Computer O Level Training, Computer Hardware Maintenance Training. The scheme aims at providing Occupational Information, Individual Guidance and organizing Confidence Building Programs for the benefit of the job seekers belonging to SCs and STs. The website developed for this scheme contains the process flow from filling up the application form by beneficiaries till the monthly stipend being disbursed from the PFMS based on eligibility criteria.

2.5.12.7 Skill India Digital (SID) Platform

SID is the DPI for Skilling, Education, Employment, and Entrepreneurship ecosystem of India. It is also a comprehensive information gateway for all Government Skilling and Entrepreneurship initiatives in India – a go-to hub for citizens in pursuit of career advancement and lifelong learning.

SID is a student centric platform, which ensures students are at the centre of all the services available at the platform. This portal is a single source of information for all the skill programmes running under 23 ministries of Govt. of India. It allows the students to search and explore the available skilling – re-skilling/ multi-skilling/ upskilling opportunities based on the interest and preference (Sectors, Job roles, modes of training, course fees (if applicable), course duration, location, etc.).

2.5.13 Power and Energy

2.5.13.1 National Power Portal (NPP)

NPP, an integrated suite of various energy applications for the Indian Power Sector facilitates online data capture at various frequencies (daily, monthly, annually). The data is provided by generation, transmission, and distribution utilities in the country through various automated sub-systems which validate and process the collected data and disseminates the same through various analyzed reports, graphs, statistics at all India, region, state level for central, state, and private sector. NPP monitors around 62,531 urban distribution feeders, their power supply position, and AT&C losses and 1,31,261 rural feeders, their power supply position. The All India Installed Capacity and Generation data is captured from around 499 stations comprising 1629 units, besides monthly progress of around 1229 Transmission Lines and 1041 Sub-Stations from 182 transmission utilities.

2.5.13.2 National Portal for PM – Suryaghar: Muft Bijli Yojna (https://pmsuryaghar.gov.in)

National Portal for PM – Suryaghar: Muft Bijli Yojna aimed at installing rooftop solar plants in 1 crore households. The scheme was launched by Govt of India on 13.02.2024. The earlier scheme of Phase-II of the Grid connected Rooftop Solar programme is subsumed under this scheme.

The scheme is implemented through National Portal with main stakeholders as MNRE Solar Division, DISCOMs, SNAs, SECI, PSUs, Government Agencies, Vendor, and Beneficiary. This portal facilitates beneficiaries for registration followed by submitting application for installation. The beneficiary is being verified from the concerned DISCOM while initiating the registration process. Once registered, DISCOMs in turn initiates the process of installation through their registered vendors and take necessary actions accordingly. The portal has also been integrated with PFMS, DBT, PRAYAS, NGO DARPAN. Till March 16th, 2024 around 1.07 Crore beneficiaries have registered themselves on portal and 3.51 Lakh applications have been received through the portal.

2.5.13.3 Biogas & BioUrja Portals (https:// biogas.mnre.gov.in), (https:// biourja.mnre.gov.in)

The Ministry of New & Renewable Energy (MNRE) launched **Biogas** and **BioUrja** portals under the Umbrella scheme of the National Bioenergy Programme for the duration of FY 2021-22 to 2025-26(Phase-I). **Biogas** Portal is a central platform for beneficiaries to install small and medium biogas plants ranging from 1 cubic meter to 2,500 cubic meter.

- Total Registered Users (New Scheme) - 5,217
- Submitted Applications (New Scheme) - 2,691
- Approved Applications (New Scheme) - 60
- Submitted Applications (Old Scheme) - 38,879

- Approved Applications (Old Scheme) - 2

BioUrja Portal is an online platform developed to assist project developers in submitting applications for plant installation and commissioning. This Portal is integrated with **Gobardhan** Portal of **M/o Jal Shakti** for fetching BioCNG applications.

Waste to Energy & Biomass

I. New Scheme
- Total Registered Users (New Scheme) - 849
- Total Application Submitted(New Scheme) - 353
- Approved Applications (New Scheme) - 47

II. Old scheme
- Total Registered Users (Old Scheme) - 196
- Total Application Submitted(New Scheme) - 114
- Approved Applications (Old Scheme) – 57

2.5.14 Good Governance & Enforcement

2.5.14.1 Immigration, Visa, and Foreigners Registration & Tracking (IVFRT)

The Ministry of Home has embarked on a Mission Mode Project known as IVFRT. Its primary goal is to create and put into action a secure and unified service delivery system that streamlines the entry process for genuine travelers while enhancing

security measures. This initiative has been rolled out in 185 out of 195 Indian Missions abroad, spanning over 750+ districts and encompassing 110 Integrated Check Posts (ICPs) across the nation.

2.5.14.2 Indian Citizenship Portal

An online application system for Indian Citizenship, based on established rules, has been created for foreign individuals who lost their Indian Citizenship due to their parents' renunciation. This process is entirely digital, devoid of cash transactions, and operates without direct face-to-face interactions, aligning with the Indian Citizenship Act.

Furthermore, it allows other stakeholders to securely offer their feedback on each application before a final determination is made. This end-to-end automated procedure has significantly decreased the time required for processing applications.

The application system has also been linked to the IVFRT database, facilitating the retrieval of data regarding Indian citizens who have renounced their citizenship.

2.5.14.3 e-Visa

e-Visa scheme facilitates international travelers in seeking Indian Visa on short notice for business visits, medical patients, and tourists. This service is characterized by its convenience, as it is entirely digital, cashless, and paperless, resulting in a significant reduction in visa application processing times. Applicants receive their Electronic Travel Authorization via email within 72 hours of submitting their online application. Currently, the e-Visa service is available to citizens of 172 countries and can be accessed at 29 Indian Airports and 5 Sea ports. Additionally, Visa-on-Arrival services have also been expanded to include citizens of Japan, South Korea, and the UAE.

2.5.14.4 PARIVESH (Pro-Active and Responsive facilitation by Interactive and Virtuous Environmental Single window Hub)

PARIVESH, launched by Hon'ble PM Narendra Modi in August 2018, is a Single- Window Integrated Environmental Management System, developed in pursuance of the spirit of Digital India' and capturing the essence of Minimum Government and Maximum Governance. It has four clearances namely Forest Clearance, Environment Clearance, Wildlife Clearance, and Coastal Regulatory Clearance.

2.5.14.5 Indian Virtual Herbarium (IVH) of Botanical Survey of India (BSI)

The IVH is the biggest virtual database of flora in the country. Each record in the digital herbarium includes an image of the preserved plant specimen, scientific name, collection locality, and collection date, collector name, and barcode number. The digital herbarium includes features to extract the data state-wise, and users can search plants of their own states, which will help them identify regional plants and in building regional checklists.

2.5.14.6 National eVidhan Application (NeVA)
(http://neva.gov.in)

NeVA aims to bring all the legislatures of the country together, in one platform thereby creating a massive data repository without having the complexity of multiple applications. The objective of National e-Vidhan Application is electronic flow of information, electronic laying of documents on the Table of the House and electronic information exchange among all the stakeholders to create a paperless legislature in the country. This will also provide Data analytics, Information processing and comparative analysis of the data of all the State Legislatures. The electronic delivery of services to its key stakeholder i.e., the Members of the concerned Legislatures is one of the key missions of National e-Vidhan Application.

NeVA is a complete suite of application consists of

- Public Portal -- Web Application
- Content Management System (CMS) -- Web Application
- Digital House Application (eBook) – Web Application
- Mobile Applications -- IOS & Android

- **On-boarded NeVA 13 Houses**

  i. Punjab ii. Bihar Council iii. Nagaland, iv. Tamil Nadu, v. Sikkim, vi. Tripura, vii. Haryana, viii. Meghalaya, ix. Mizoram, x. UP Assembly, xi. UP council, xii. Gujarat, xiii. Odisha (except House Proceeding which is in pipeline)

- **In pipeline**

  i. Jharkhand ii. Puducherry, ii. Himachal Pradesh (Tapovan), iv. Uttarakhand.

Bringing this electronic platform accounts for huge savings on papers (Approx. 340 Crore annually), thereby leading to reduction of carbon footprints and moving a step forward in the achievement of UN's SDGs (15)- 'Life on Earth'**.** Keeping in view Government's 'Vision Mission 2024'.

Hon'ble President of Bharat, Smt. Droupadi Murmu inaugurated NeVA at Gujarat Legislative Assembly on 13-09-2023.

2.5.14.7 Digital Sansad (https://www.sansad.in/)

Digital Sansad (Temple of Democracy at a click) Project for Parliament is an integrated platform for all stakeholders including Members of Parliament, Citizens, Lok Sabha Secretariat and Government Ministries/ Departments. It aims to provide various online facilities in a collaborative and transparent manner through integrated technology platforms to all stakeholders.

The key features of Digital Sansad are:

(i) The integration of 16 separate portals into a single web portal with a uniform theme and improved design focuses on user experience, with a pyramid structure-based navigation system. This integrated site features single sign-on, role-based access, and prioritizes ease of use for MPs and Ministry Users.

(ii) Citizens benefit from enhanced access to parliament proceedings, information about their representatives, and constituency connect features.

(iii) Additionally, there's an integrated Digital Sansad Citizen Mobile App for the public and a personalized mobile app for Hon'ble MPs, supporting both English and Hindi.
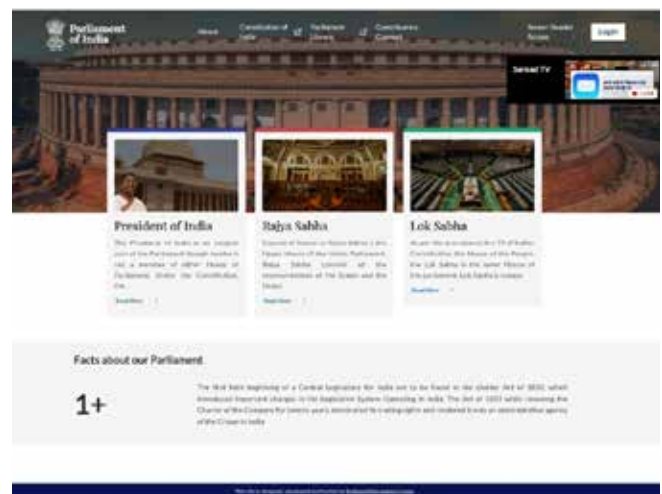
Digital Sansad Web Portal Home Page

2.5.14.8 Service Plus

Service Plus is an innovative and adaptable Service Delivery Framework that empowers government

entities to offer their services and scheme benefits in an efficient and user-friendly manner. It caters to the modernization of public service delivery and embraces a Low Code-No Code approach, making it accessible to both technologically advanced and less technologically equipped government departments. ServicePlus has made significant strides in the realm of government services, with more than 3,300 services on offer, facilitating a diverse range of public needs.

2.5.14.9 NGDRS (National Generic Document Registration System) (https://ngdrs.gov.in)

NGDRS visions at providing 'One Nation One Software' for registration of documents & properties under the aegis of Digital India Land Records Modernization Programme (DILRMP).

NGDRS has contributed towards:

- Ease of Doing Business (EoDB) and Ease of Living (EoL).
- Implementation of Business Reform Action Plans (BRAP).
- 18 States have on-boarded NGDRS, and 12 States are connected through API/ UI integration.

2.5.14.10 Unique Land Parcel Identifier Number (ULPIN)

ULPIN objective is to identify departments dealing with land & rendering multi-dimensional land related services to the citizens such as Revenue department, panchayat, forest, registration, survey & to provide comprehensive information on land & properties & maintain consistency of core data across all departments & agencies of the government nationwide. Unique ID of each Land Parcel of States has been helping the Unified system to track the Land, its reconciliation etc. and has been providing higher values to all stakeholders. As on date, it has

been rolled out in **26 States/UTs** & pilot testing done in 8 States/ UTs.

2.5.14.11 Aadhaar Authentication Services

NIC has signed an agreement with UIDAI to set up Aadhaar Authentication Services i.e., AUA and ASA service for eGovernance projects. Some of the important projects which are using NIC's Aadhaar Authentication service are: Biometric Attendance System, Ayushman Bharat, CoWIN, e-Shram, PDS for Various states and UTs, PM KISAN, MGNREGA, Scholarship, Jeevan Pramaan, Pradhan Mantri Awas Yojana (PMAY), National Urban Livelihood Mission etc. Types of Aadhaar Authentication services offered for applications are Demographic Authentication, Biometric Authentication, OTP Authentication and eKYC based on Biometric, OTP.

The average response time for authentication is around 1(one) second, and 95% of transactions are served within 1 (one) second. Average number of transactions served by NIC platform are 2 (two) crore per day, and maximum transactions served through this platform in a day are about 5 (five) crore. The Services are available round the clock with 99.99% uptime. NIC is the highest transaction requester for Aadhaar services of UIDAI.

2.5.14.12 Aadhaar Data Vault Services

NIC has set up a centralized facility for storing Aadhaar numbers in a secure dedicated storage. The Aadhaar numbers are encrypted using keys specifically created for the purpose. The keys are created and stored in intrusion resistant FIPS 140-2 Level 3 HSM devices. Each encrypted Aadhaar number is mapped to a unique but random Reference Key which is returned to the requesting (user) application for storing in place of the Aadhaar number. This key is used to access the Aadhaar number as and when required. The Reference Key

and encrypted Aadhaar Numbers are stored in a secure dedicated database called the 'Aadhaar Data Vault'. State-of-the-art Hyperconverged Infrastructure powering the entire setup at both DC and DR sites.

Performance statistics for 2023-24

- Total number of requests serviced: Over 146 Crore

- New Aadhaar added during the year: Over 36 Crore

- Total number of Aadhaar tokenized till March 2024: Over 106 Crore

- On average over 50 Lakh requests are handled per day.

- Dashboard created in responsive mode for easy round-the-clock monitoring of critical components of the ADV setup from any device including mobile.

2.5.14.13 Aadhaar Enabled Biometric Attendance System (AEBAS)

Digital India's AEBAS Project was established and rolled out during September' 2014. The system of its own kind was introduced for the first time in India. The Government employees are facilitated to mark attendance conveniently from anywhere across India. Any Government Employee who has an Aadhaar number can successfully register himself/ herself on the portal and become a part of the system.

The attendance marking, by government employees, is facilitated through three modes – (1) Tablets, (2) Desktop PC devices, and (3) Iris scan machines. It ensures the ease of marking the attendance. Biometric data is captured, authenticated from UIDAI via AUA/ASA within a few microseconds.

2.5.14.14 e-Sign Gateway

The NIC e-Sign Gateway acts as an interface between the Application Service Provider (ASP) and e-Sign Service Provider (ESP). The Gateway receives signed XML from ASP, verifies them and upon successful verification the XML is forwarded to ESP. The response received from ESP is sent back to the ASP.

Salient Features of E-Sign Gateway

- Robust setup servicing over 250 applications.

- Secure transactions using SSL.

- Secure authentication of client applications consuming the service using PKI

- Single Point of Contact for consuming E-Sign service of C-DAC.

- Deployments at various SDC and PSUs.

Performance statistics for 2023-24

- Total number of requests serviced: Over 50 Lakh

- Successful E-Sign facilitated during the year: Over 47 Lakh

- E-Sign services through the gateway being provided for over 250 applications of various Ministries and Departments including Supreme Court of India, Ministry of Home Affairs, Ministry of External Affairs, Ministry of Finance, Ministry of Science & Technology, Department of Personnel & Training (DoPT), Delhi Police, Government of NCT of Delhi, Ministry Of Agriculture, MeitY, TRAI, Ministry of Environment, Forest and Climate Change.

- In-house mobile (Android) application developed for real-time monitoring of E-Sign Gateway performance.

2.5.14.15 Jeevan Pramaan

Jeevan Pramaan is a biometric enabled digital service for pensioners to submit the life certificate. Digital Life Certificate (DLC) for Pensioners aims to streamline the process of getting this certificate and making it hassle free and much easier for the pensioners. Jeevan Pramaan has provided relief to old, aged persons by eliminating the need of physical visit to submit a life certificate to Pension Disbursing Agencies. Cloud and Mobile enablement have enhanced the scalability & accessibility, and digitization has cut down unnecessary logistic hurdles.

Period	Year-wise DLC's Generated (Lakh)	Cumulative DLC's Generated (Lakh)
2014-15	6.01	6.01
2015-16	11.21	17.22
2016-17	76.26	93.48
2017-18	80.30	173.78
2018-19	88.76	262.54
2019-20	96.64	359.18
2020-21	104.15	463.33
2021-22	126.21	589.54
2022-23	133.89	723.43
2023-24	124.45	853.47

To further ease, the way of submission of Jeevan Pramaan, Face Authentication based Life Certificate application has been launched on 29th November 2021.

There are 184 sanctioning authorities and 183 disbursing agencies onboarded with Jeevan Pramaan. These include the central government, state government, banks, PSUs, Autonomous Bodies etc.

2.5.14.16 Smart Card Technology Division

The MoRTH initiated an e-governance project for computerizing all Regional Transport Offices (RTOs) and introducing Smart Card-based Driving Licenses (DL) and Vehicle Registration Certificates (RC). The application adheres to national standards based on ISO 7816, utilizing SCOSTA (Smart Card Operating System Specification for Transport Applications) developed by NIC. SCOSTA specifications, gazette by the Government of India, ensure interoperability nationwide, addressing security concerns related to fake duplication/issuance. NIC plays a crucial role in the Key Management System (KMS), overseeing the production, maintenance, and distribution of authority cards to State Key Management Authorities. NIC develops and maintains all software applications at the Central, State, and RTO levels, periodically revamping them to incorporate new technologies. The recent introduction of a web-based DL/RC KMS with a centralized database has streamlined operations and reduced infrastructure costs at the local level.

2.5.14.17 Mining Tenement System (MTS)

The MTS is an online platform developed by NIC to manage the entire mining industry ecosystem in accordance with the Mining Conservation & Development Rule (MCDR) 2017. MTS is regulated by the Indian Bureau of Mines (IBM) under the Ministry of Mines. MTS comprises 3 core applications viz Registration System, Returns Management System (Mines & mineral ore users file Monthly and Annual Returns of production, sales and consumption) and Mining Plan Approval System (Mines submit their detailed 5-year Mining Plans, its modifications and Renewals). The core application, includes Registration System, Returns Management System, and Mining Plan Approval System. The system features online application

submission with Aadhaar-based e-sign, role-based dashboards, single sign-on, email and SMS alerts, and a support ticketing system. With 600 IBM users, additional state government users, and over 16,000 registered industry users. MTS has gained significant recognition for fostering transparency, substantial time savings for stakeholders, and an enhanced ease of doing business.
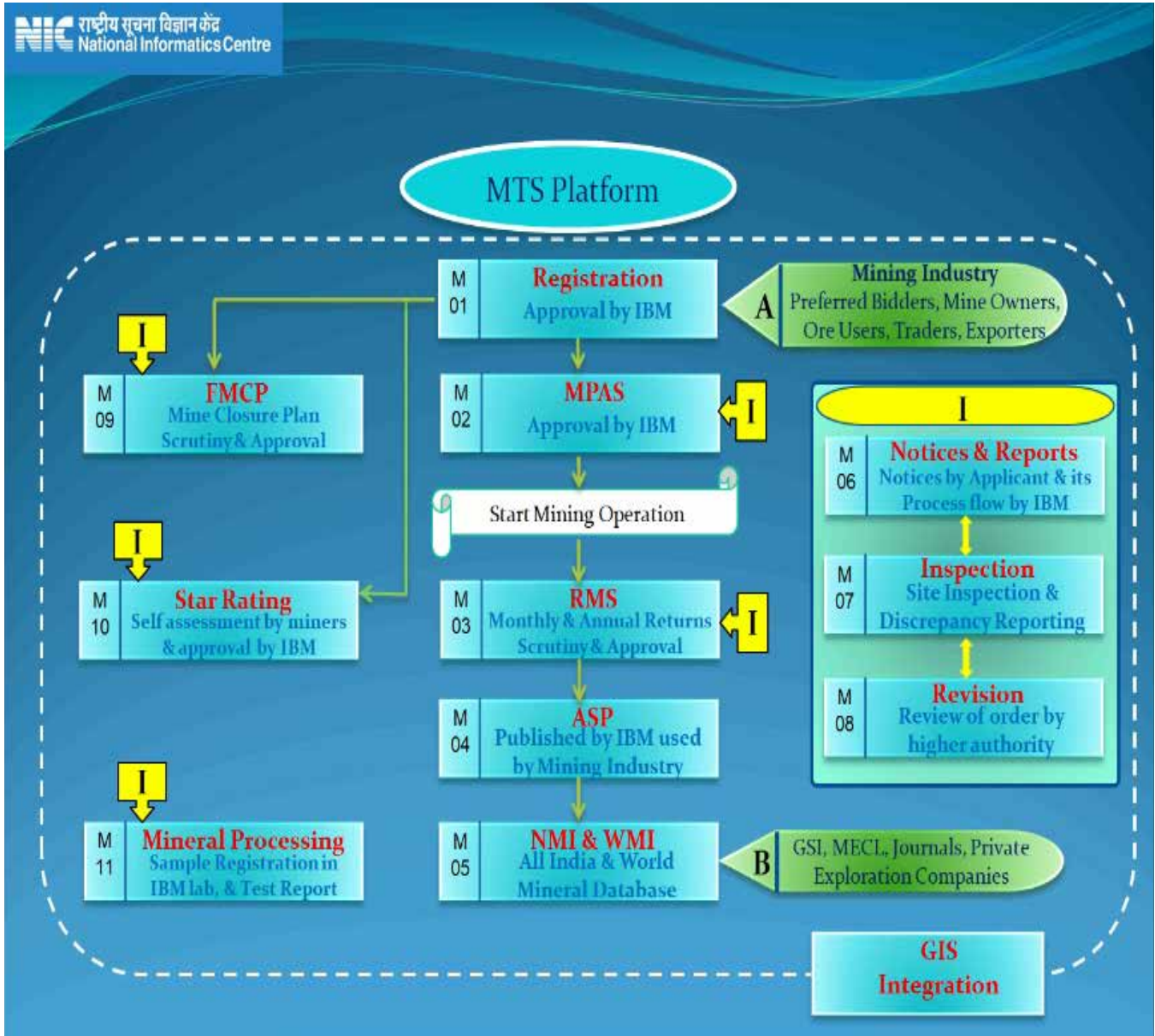
2.5.14.18 MCD Suite of IT Applications

Suite of 35+ IT applications has been developed by NIC by using the open-source technologies, and successfully implemented & for the last 3 years for Municipal Corporation of Delhi for seamless delivery of services to the citizens. Mainly, the suite includes applications for Property Tax collection, Building Plan approval, Swachh Bharat Mission (e-SBM), Registration of Birth & Death, and issuance of licenses for Various Trades,

like Veterinary, Factory, Health, and General & Storage etc. besides that it also covers booking of community centers, Parks, marriage places and open grounds.

2.5.14.19 Centralized Public Grievance Redress and Monitoring System (CPGRAMS)

CPGRAMS, is a web-enabled system that aims at providing the citizens with a platform that primarily aims to enable submission of grievances by the aggrieved citizens from anywhere and anytime (24x7) basis to the concerned Ministries/ Departments/ Organizations/ State Governments and facilitates Grievance Redress Officers (GROs) to scrutinize and take action for speedy and appropriate redress of these grievances within stipulated timelines.

There are 5 Nodal/ Apex Grievance portals available for citizen to lodge grievances with

the Central Government/ State Government departments /agencies:

- https://pgportal.gov.in
- https://dpg.gov.in
- https://www.pmindia.gov.in
- https://helpline.rb.nic.in
- https://pgportal.gov.in/pension

To reduce the manual intervention and save redress time, reforms in CPGRAMS are introduced in August 2022 with a new version i.e., CPGRAMS 7.0. The citizens have been empowered to send the grievance directly to the line-end office where

resolution happens. In this bottom-up approach, the complainant has been facilitated to navigate his complaint, in real time to the line end office. All Ministries/Departments have created their subordinate offices and map them with the services exposed for citizens in the portal through drop-down menus so that the complaint flows seamlessly to the office providing resolution.

CPGRAMS is receiving more than 19 Lakh grievances per year and having disposal percentage of more than 90%. The CPGRAMS interlinks 89 Central Ministries/ Departments and 36 States / UTs.

Year Wise Receipt/Disposal of grievances in CPGRAMS, w.e.f. 01-01-2019 to 31-03-2024
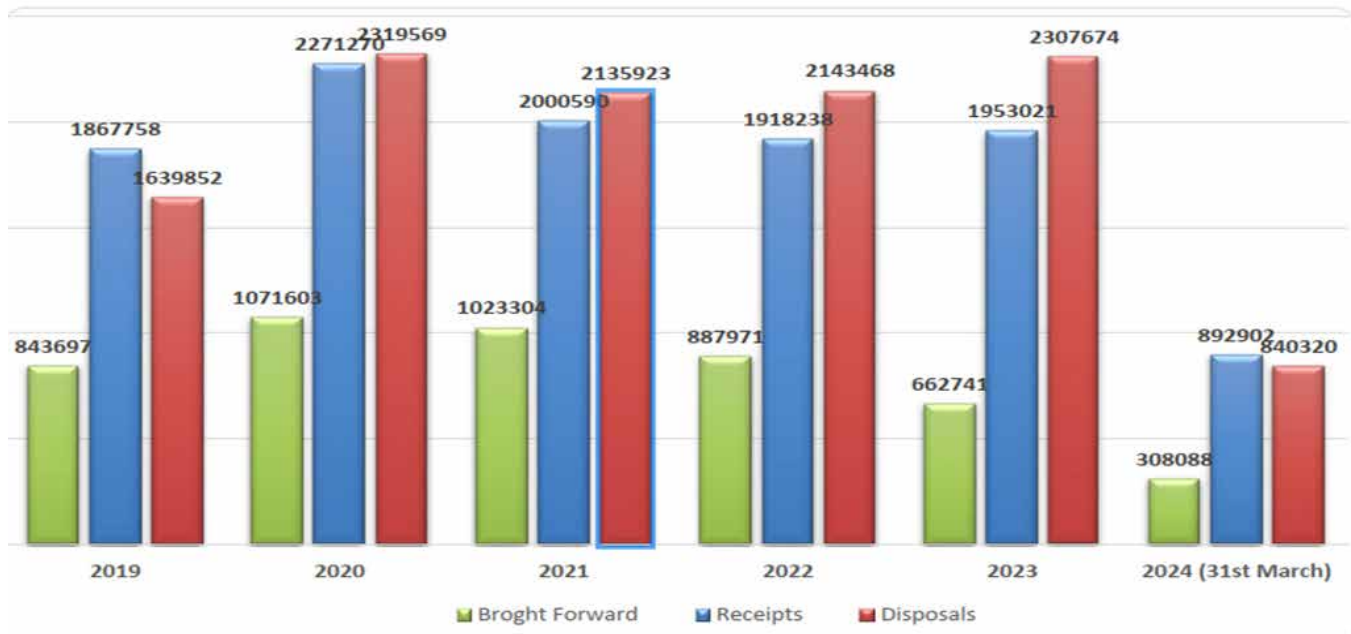
2.5.14.20 RTI Online Portal

The RTI Online web portal, initiated by the DoPT and developed by NIC-DoPT, allows citizens to submit RTI requests and appeals online. Launched for Central Government Ministries/ Departments in August 2013, it facilitates online registration by citizens and NRIs, with integrated payment gateways. The portal has been extended to subordinate organizations, attached offices, PSUs,

and State Governments, including Maharashtra, Delhi, Karnataka, Uttar Pradesh, and Ladakh UT. The system provides bilingual support, enables online payment of RTI fees, generates unique registration numbers, and allows citizens to track the status of their requests and appeals. It features dynamic reports, archival of RTI data, and KPI dashboards for efficient monitoring and response to RTI requests.

2.5.14.21 Member of Parliament Local Area Development Scheme (MPLADS)

The Ministry of Statistics and Programme Implementation oversees the MPLADS Scheme, allowing MPs to recommend developmental works in their constituencies. NIC played a vital role in developing and maintaining the MPLADS Portal, offering features such as G2G reporting, G2C citizen-centric solutions, real-time monitoring, and alerts for project milestones. The portal also includes a message forum for communication between MPs and District Authorities. The impact includes 100% compliance with PFMS EAT Module, individual dashboards for stakeholders, a public dashboard for key indicators, and a GIS dashboard for geographical work distribution.

2.5.14.22 Summons and Notices Management System (SNMS)

SNMS is a collaborative effort between NIC and domain experts from Serious Fraud Investigation Office (SFIO), designed to effectively manage cases handled by different Investigation Units and the issuance of summons/notices. The system, aligned with SFIO's workflow, facilitates the generation of investigation orders and captures information related to cases, companies, and individuals through user-friendly interfaces. Once an order is generated, the system makes it accessible to concerned inspectors and Investigation Officers, enabling them to view case details and create summons/notices using predefined templates. Customized dashboards provide real-time status updates based on the user's role, enhancing efficiency.

2.6 Digital Empowerment of Citizens

2.6.1 e-Learning

e-Learning is an effective tool for quality and lifelong education to learners. e-Learning is the learning facilitated and supported by ICT. Advancements in ICT have made possible the availability of quality education on 24x7 basis to millions of people in a cost-effective manner. The use of ICT in education has opened the doors for "anytime, anywhere" learning. Supplementing the formal way of education with e-learning tools/content and use of ICT in formal education is important to facilitate enhanced learning environment; especially when there is large gap in demand and supply of quality content and educators. The Ministry has been financially supporting R&D projects in this area at various academic educational institutes, R&D Labs etc. for development of tools and technologies to promote e-learning.

The project "Rollout of Online Labs (OLabs) for schools" being implemented by C-DAC, Mumbai jointly with Amrita Vishwa Vidyapeetham, Kollam, Kerala, aims to create infrastructural and support framework for making OLabs (online labs for schools) accessible and usable by students and teachers across India.

Project: "Rollout of OLabs" by C-DAC Mumbai jointly with Amrita University Kerala is being implemented for 3 years with budget outlay of ₹816.00 Lakh from 2015. The project duration was extended by 18 months and extension till 31.12.2020.

Objectives:

(i) To create the infrastructural and support framework for making OLabs (online labs for schools) accessible and usable by students and teachers across India. This includes level 1 and 2 support, toll free numbers, etc.

(ii) To train approximately 40,000 teachers across India in effective use of OLabs resources to enhance the teaching learning experience

Achievements:

There are total 173 experiments available on the Olabs portal using interactive Simulators and Videos etc. These 173 lab experiments are covering various subjects viz. Physics-54, Chemistry-46, Biology-36, Maths-25, and English-12. The OLabs contents are available in four languages viz. English, Hindi, Marathi and Malayalam and available in the public domain as www.olabs.edu. in.

As per the objectives of Olab project, Level 1 and 2 Support system under the project has been setup and operationalize to address issues/queries of Olabs users, using e-mail, phone and queries on portal. Helpdesk is hosted at http://support.olabs. co.in.

Under the project so far, 35,349 CBSE teachers and 4,997 State Board teachers have been trained. A total of 9,404 CBSE schools, 1,654 State Board Schools have been covered and more than 14,97,800 students (considering approximately total 200 students per school from classes 9-12) have been benefitted. The project is processed for extension upto 31.12.2020 with 10,000 additional teachers target.

2.6.2 Next Generation (NextG) Online Labs (OLabs) for schools

Project OLabs for schools by C-DAC, Mumbai jointly with Amrita University Kerala is being implemented for 3 years.

Objectives:

(i) To design and develop of 500 Online Labs for schools for classes VI-XII for various subjects and upgradation of existing 173 labs using latest tools/technologies.

(ii) To translate 500 Labs from English to Hindi, to translate 237 new Physics, Chemistry, Maths and Biology to Marathi and Malayalam.

(iii) To organise two Hackathons to contribute to design and develop labs.

(iv) To train 10,000 teachers/ students from 200 schools on using OLabs.

(v) To update existing labs based on feedback from schools.

Duration: 08.11.2021- 31.07.2024

Budget: ₹20.47 Crore (MeitY- ₹18.47 Crore & ₹2.0 Crore from Ministry of Education)

2.6.3 Knowledge and Resource Centre for Accessibility in ICT

MeitY is implementing a project- Knowledge & Resource Centre for Accessibility in ICT (KAI) to develop accessibility standards and procurement guidelines for hardware & software through C-DAC, Pune.

Various activities and the policy decisions taken for implementation of the RPwD Act 2016, in FY 2021-22 are as follows: -

- ERNET India is executing a project funded by Department of Empowerment of Persons with Disabilities (DEPwD), MSJE (Govt. of India) to develop 917 websites of State Government to make them accessible to Divyangjan as per standards Government of India Guidelines for websites (GIGW) and Web Content Accessibility Guidelines WCAG 2.0. As of now, 724 websites have been developed and made accessible.

- BIS has set up a committee- LITD 35 which is entrusted with the finalization of ICT Accessibility standard and its notification

thereupon MeitY and C-DAC has formulated the draft Accessibility Standards, Guidelines for ICT products and solutions.

- MeitY along with BIS has published Accessibility Standards IS 17802 (Part-I & Part-II).

2.7 National Public Digital Platform

The DIP weaves together large number of ideas, thoughts, and digital initiatives into a single comprehensive vision to ensure that benefits of development reach every citizen of country in equal measure along with faster and timely public service delivery. It has made significant contribution in e-Governance and led to fundamental shift in implementation from project to platform. Unlike project, which is targeted towards delivering a set of services to a target set of users. National Public Digital Platforms are geared towards ecosystem centric approach, that aims to deliver the integrated services in universal manner to one and all. It is based on bringing and integrating together ongoing digital initiatives from Central and State Governments & even private sectors, unifying the existing systems through APIs and India Digital Ecosystem Architecture(InDEA), leveraging emerging technologies such as AI Machine Learning, Deep Learning, Augmented Reality, Virtual Reality, ITs, Distributed Ledger Technology, Drone, etc. and in aggregate manner, delivering personalized services to citizen over his/ her lifecycle. The implementation of digital platforms involves in Government, Industry, Start-ups, Academia, Researchers, and Citizens. It also provides ample opportunity for innovation and value-added services, supported through Sandbox.

Some of the remarkable national public digital platforms, which have been implemented at population scale, are as follows:

i. **Aadhaar** – It is the largest biometric based digital identity platform in the world. It has enrolled over 134 Crore persons and has facilitated around 8,000 Crore e-authentications.

ii. **Unified Payment Interface** – It is the leading digital payment platform. It is integrated with 376 banks and has facilitated 730 Crore digital transactions worth ₹11.90 Lakh Crore in the month of November 2022.

iii. **Co-Win** – It is the world's leading covid vaccination platform. It has facilitated delivery of 220 Crore doses of covid-vaccination, and registered more than 110 Crore persons.

iv. **DigiLocker** – It is the leading paperless initiative in the government. It has made available 562 Crore documents issued by 2311 organizations.

v. **UMANG** – It is the leading M-Governance initiative in the country. It makes available 1668 government services from 311 Central and State Government Departments in 23 Indian languages. It also makes available 20,197 bill payment services at UMANG app. Recently, text and voice bot services are also enabled at UMANG.

vi. **DIKSHA** – It is the leading digital learning platform that offers 20,000 courses. It has enrolled 17.39 Crore persons and has facilitated over 542 Crore learning sessions.

vii. **E-Sanjeevani** – It is the national tele-medicine platform. It works in hub-and-spoke model. There are 13,728 Hubs and 1,08,248 operational spokes. It has served over 7.6 Crore patients.

viii. **Government e-Marketplace (GeM)** – It is the leading public procurement platform. It has onboarded 64,000+ government buyer

organisations and over 55 Lakh sellers and service providers. It has facilitated 1.25 Crore orders worth ₹3.43 Lakh Crore since 2016.

ix. **Goods and Services Tax Network (GSTN)** – It is one nation, one tax platform. It has 1.4 Crore registered taxpayers. It has achieved processing of 24.85 Lakh as the highest returns transactions in a day and 9.55 Lakh as the highest payment transactions in a day.

Most of the above platforms are cross-domain in nature. The National Public Digital Platforms are also taking shape in key social sectors. ABDM has been rolled out nationally to establish integrated healthcare ecosystem. It has delivered 29.24 Crore unique and lifelong Health ID (called ABHA). It has made available 3.44 Crore ABHA linked EHR. It has created registry of 1.73 Lakh health facilities and 1.09 Lakh healthcare professionals, in November 2022.

National Digital Education Architecture (NDEAR) and InDEA have been conceptualized, and its blueprint are prepared with aim to establish vibrant digital ecosystem in Education and Agriculture respectively. The national public digital platforms are also underway in Rural Development, Logistics sectors etc. The national public digital platforms would be crucial in making this decade 'India's TechAde' and would contribute towards to achieving 'Trillion Dollar' Digital Economy.

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Chapter 3

Make in India: Electronics Manufacturing

Electronics industry is the world's largest and fastest growing industry and is increasingly finding applications in all sectors of the economy. The Government attaches high priority to electronics hardware manufacturing and it is one of the important pillars of both "Make in India" and "Digital India" programmes of Government of India. The intent of the Government is to provide a level playing field for the domestic manufacturers enabling them to compete with imports in the sector by rationalizing tariff structure, simplifying procedures, providing incentives and upgrading infrastructure.

3.1 National Policy on Electronics 2019 (NPE 2019)

NPE 2019 which was notified on 25.02.2019 envisions to position India as a global hub for Electronics System Design and Manufacturing (ESDM) by encouraging and driving capabilities in the country for developing core components, including chipsets, and creating an enabling

environment for the industry to compete globally. The implementation of the schemes and initiatives under the aegis of NPE 2019, is expected to generate employment for about 10 million (1 crore) persons (Direct and Indirect) at various levels.

NPE 2019 has been formulated to reflect the new aspirations, requirements and realities of the electronics manufacturing sector in the country and the emerging international dynamics. The aim of NPE 2019 is as follows:-

- NPE-2019 is focused on promoting an eco-system of manufacturing (group of industries) which form supply chain of a product as against the emphasis of existing policy on promoting individual industries. NPE-2019 aims to increase domestic value addition and combining potential of both domestic demand and export with the aim to make India a global hub of electronics manufacturing. The policy promotes generation of intellectual property in India and deepening of the domestic research, development and designing capabilities.

- NPE-2019 also envisages intervention in emerging sectors of electronics like IoT, 5G equipment, Sensors, drones, additive manufacturing (3D printers), robotics etc. and promotes their R&D and manufacturing. Among the sectors, Medical Electronics, Strategic Electronics, Auto & Power electronics have been especially identified as thrust areas for promoting manufacturing in India.

- Concept of trusted value chain in electronics has been introduced, which will help in addressing concerns related to cyber bugs and data thefts from our equipment. There is also focus on skilling, re-skilling and employment generation.

- To provide the supportive environment, NPE-2019 envisages extending the Phased

Manufacturing Programme (PMP) to products other than mobile phones, maintain a progressive duty regime and incentivize industry to compensate for disabilities as compared to other manufacturing economies. The NPE-2019 will also enable India to take advantage of the global shifts in electronics manufacturing locations.

- NPE-2019 has ushered in a slew of new incentive schemes. Prominent among these are Production Linked Incentive (PLI) Scheme for Large Scale Electronics Manufacturing, Scheme for Promotion of manufacturing of Electronic Components, Semiconductors (SPECS) and Electronics Manufacturing Clusters (EMC 2.0) Scheme.

In furtherance of the vision of AatmaNirbhar Bharat and positioning India as the global hub for ESDM, a comprehensive program for the development of semiconductors and display manufacturing ecosystem in India has been approved by Government of India with an outlay of ₹76,000 crore (> $10 billion). The program will usher in a new era in electronics manufacturing by providing a globally competitive incentive package to companies in semiconductors and display manufacturing as well as design. This shall pave the way for India's technological leadership in these areas of strategic importance and economic self-reliance.

3.2 Growth of Electronics Sector

Indian electronic manufacturing industry has undergone major transformation in the last couple of years with the host of initiatives and reforms. Government has taken several initiatives to promote electronics manufacturing and as a result, the electronic manufacturing is on high growth trajectory (domestic production of electronic items has increased substantially from ₹3.88 lakh crore ($60 billion) in 2017-18 to ₹8.22 lakh crore in 2022-

23 ($101 Billion), growing at a Compound Annual Growth Rate- CAGR of 16.28%). The key drivers of growth are large domestic market, and availability of skilled talent and low-cost labour.

The Government's "Make in India" programme, launched in 2014, was designed to make India as the Global design and manufacturing hub by increasing domestic manufacturing and reducing India's dependence on the services sector, thereby imparting a healthy mix of contribution from all sectors to the Indian Economy. Another flagship initiative, "Digital India", also targets a substantial boost in the domestic manufacturing of electronics and aims at reducing India's dependence on imports in this important sector.

Production, Imports and Exports

The production, imports and exports of electronic goods for previous 6 years are presented below:

(Values in ₹ Crore)

	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Production*	3,88,306	4,58,006	5,33,550	5,54,461	6,40,810	8,25,000
Imports**	3,40,901	4,01,450	3,85,081	3,99,374	5,49,713	6,20,752
Exports**	41,220	61,908	82,929	81,822	1,16,895	1,89,934

* Source: MeitY Annual Report, Industry Association for FY2022-23

** Source: Directorate General of Commercial Intelligence and Statistics (DGCI&S)

- CAGR for Production from FY17-18 to FY22-23: 16.28%
- CAGR for Imports from FY17-18 to FY22-23: 12.7%
- CAGR for Exports from FY17-18 to FY22-23: 35.7%

Electronics manufacturing sector has several verticals in terms of its constituents. The production profile of the electronics sector for FY 2021-22 and 2022-23, based on the information provided by Industry Associations is as follows:

Product Segment	FY21-22 ($ Billion)	FY21-22 (₹ Crore)	FY22-23 ($ Billion)	FY22-23 (₹ Crore)
Mobile Phones	38	2,75,000	44	3,50,000
IT Hardware (Laptops, Tablets)	4	29,801	4	37,291
Consumer Electronics (TV, Audio, Accessories)	10	74,503	12	99,442
Strategic Electronics	4.25	31,664	4.75	39,363
Industrial Electronics	11	81,953	11.75	99,442
Wearables & Hearables	0.25	1,863	1	10,359
PCBA	0.6	4,470	1	62,151
Auto Electronics	7	52,152	9.5	24,861
LED Lighting	2.5	18,626	3	16,574
Electronic Components	9.5	70,778	10.75	82,868
Electronics Manufacturing	87.1	6,40,810	102	8,22,350

Source: Industry Association

Note: Medical Equipment and other equipment having electronic content have not been taken into consideration.

As per DGCI&S data, import of electronic goods has increased from ₹5,49,713 crore in 2021-22 to ₹6,20,752 crore in 2022-23. It is seen that growth rate of imports of finished goods have declined and that of electronic components have grown up indicating setting up of manufacturing units of electronic products in the country.

As per the data provided by DGCI&S, the export of electronic goods has increased from ₹1,16,895 crore in year 2021-22 to ₹1,89,934 crore in year 2022-23. Government has taken several measures for the growth of the exports of electronics hardware sector. Special Economic Zones (SEZs) are set up to enable hassle-free manufacturing and trading for export purposes and EHTP units are the major contributors to exports.

a. Mobile Phones

India has emerged as the 2nd largest manufacturer of mobile handsets in the world in volume terms. Over 200 units are manufacturing cellular mobile phones and parts/ components thereof in the country, up from only 2 units in 2014. The production of mobile phones stood at ₹3.50 lakh crore ($ 43.55 billion) in FY 22-23 as per industry association and the export of mobile phones stands at approx. ₹90,000 crore ($ 11.1 billion) for FY 2022-23.

MeitY had introduced the Phased Manufacturing Programme (PMP) for cellular mobile handsets and related sub-assemblies/ parts manufacturing with the objective of progressively increasing the domestic value addition for establishment of a robust cellular mobile handsets manufacturing eco-system. As a result of implementation of the PMP and other Schemes/ Programmes of Government of India, now almost entire demand of cellular mobile handsets is being met by domestic manufacturing. The aforesaid Schemes/ Programmes and the recently Notified Schemes viz. PLI, SPECS and EMC 2.0 are expected to significantly boost the production and export of cellular mobile handsets and identified sub-assemblies/ parts/ sub-parts thereof.

b. Information & Communication Technology (ICT) Hardware

The first application of electronics was in the domain of communication and computing. With the emergence of integrated circuit, the world saw the advent of the digital computer era, and with the advent of microprocessor in the 1970's, the world saw an exponential growth of the ICT industry. Such is its strategic importance that countries across the world have declared it as an essential commodity. With its pool of technical manpower, its proven capability as a design center for most of the global hardware companies, the country is all ready to emerge as an end-to-end player and global leader in the ICT hardware design and manufacturing space.

India has a huge opportunity arising from both import substitution and export led manufacturing in the space of ICT hardware. In addition, ICT hardware holds the promise of high value addition in India, with the manufacturing of the Components (i.e., Sub-Assemblies of ICT Products), Product design and Semiconductor Design being done in the country.

Emerging domains of AI, ML, IOT are becoming the new driving forces behind the growth of ICT hardware segment. These domains require the design of specialized Semiconductors, Sensors and Servers for which India has the capability. Another emerging domain in ICT hardware is the Large-Scale Data Centres.

India with its technical prowess, cheap labour, large pool of manpower, English as the working language, has the opportunity to lead the world in all these domains.

Year 2020 has seen a rise in demand for ICT hardware arising out of work from home and the need to be connected remotely due to the COVID-19 pandemic. Individual consumers have bought computers and tablets, enterprises have invested in their data centre infrastructure (to service the work from home, online B2B dealings) and the Telecom Service providers have been upgrading their infrastructure to cater to the increased broadband demand.

The newly released National Education Policy 2020 will promote the use of ICT in education towards building India's next generation of skilled manpower and narrow the digital divide in the nation. The Union Cabinet had given approval to introduce the PLI Scheme 2.0 for IT Hardware on May 17, 2023, with a budgetary outlay of ₹17,000 crore. The scheme was notified on May 29, 2023.

PLI Scheme 2.0 for IT Hardware is expected to generate following outcomes during the tenure of 6 years w.e.f. 01.07.2023:

i)   Expected incremental production is ₹3.35 Lakh crore

ii) Expected incremental investment is ₹2,430 Crore

iii) Expected incremental direct employment is 75,000

c. **Electronic Components**

The global market for electronic components is expected to grow. Following this global trend, the Indian electronic components market is also poised to grow significantly. Mobile Phones, Consumer Electronics and Industrial Electronics account for the major demand (82%) for electronic components in India. This is followed by the demand of electronic components in computer hardware, strategic electronics and lighting industry sector. Industries like Mobile Phones, Industrial Electronics (due to the advent of EVs) and Strategic Electronics are expected to witness substantial growth in the near future.

Government of India launched the Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS) (notified vide Gazette Notification No.CG-DL-E-01042020-218992 dated April 01, 2020). This scheme provides financial incentive of 25% on capital expenditure for the identified list of electronic goods that comprise downstream value chain of electronic products, i.e., electronic components, ATMP units, specialized sub-assemblies and capital goods for manufacture of aforesaid goods. Apart from SPECS, the other policies of Government that boost the production of electronic components include rationalization of tariff structure, Phased Manufacturing Programme (PMP), and notification of electronics products under the Public Procurement (Preference to Make in India), Order 2017. Under the umbrella of "Make in India" program, BCD has been imposed and increased on Printed Circuit Board (PCB) Assembly of Mobile handsets with the intention to strengthen the domestic EMS and components segment in India. Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing is also supporting manufacturing of specified electronic components.

The Electronics Manufacturing Services (EMS) industry in India is growing rapidly and key

global players as well as a number of domestic companies are operational in the country. A strong component manufacturing base is essential for a sustainable Electronics System Design and Manufacturing (ESDM) ecosystem in India. This segment needs very high efficiency of operations to stay profitable. Availability of components and an effective supply chain is vital for EMS companies for their growth.

d. Consumer Electronics

Consumer electronics refers to any device containing an electronic circuit board that is intended for everyday use by individuals for the purpose of entertainment, recreation or communication. This encompasses a massive category of electronic products which includes televisions, cameras, digital cameras, PDAs, calculators, VCRs, DVDs, clocks, audio devices, headphones, and many other home product. Key drivers for this market's growth are growing awareness, easier access, changing lifestyle, higher disposable income and reduction in the per unit prices.

Television is an important device in the home consumer electronics and has been identified as one product for which India can become the global hub for manufacturing. As per FICCI, India's TV production stood at $ 4.24 billion in 2020-21 and is expected to reach $10.22 billion by 2025-26 with a CAGR of 20%. Type of televisions available today in the market cover a wide range that starts from Plasma to LED and LCD TVs which offer sharper, higher resolution pictures. With the decreasing trend in the prices of LCD/ LED televisions, the penetration of these TVs is increasing significantly.

Some of the initiatives taken by the government are increasing the Basic Customs Duty (BCD) on several consumer electronic goods to encourage companies to substitute imported goods with domestically manufactured goods; permitting 100% FDI in the consumer electronics manufacturing sector via the direct route and providing Capex subsidy under the Modified Special Incentive Package Scheme (M-SIPS), etc. Due to these efforts, foreign companies have been encouraged to set up manufacturing facilities in the area of consumer electronics without the need to establish a joint venture or some other form of partnership with a domestic entity. In distributing consumer electronic goods to their end users, a local partner is both legally and practically required.

e. Light Emitting Diodes (LEDs) Products

The lighting infrastructure in India is evolving rapidly through the replacement of conventional products and LED lighting is extensively used now, in a wide variety of domestic and industrial products ranging from screens and walls to ceilings and wearables. LED lighting offers multiple benefits over the other types of lighting systems including energy efficiency, cost-saving, longer life, lower heat emission, etc. Demand for the LED lighting market in India has been majorly driven by Government initiatives such as Unnat Jyoti by Affordable LEDs for All (UJALA) and Street Lighting National Programme (SLNP), Smart City project, housing for all etc. Under the SLNP, Government aims to replace over 1.34 crore conventional street lights in India. Further with the decline in Average Selling Price of chips and components, the manufacturing cost of LEDs has declined significantly and has resulted in the growth of the LED market. Opportunities for LEDs have emerged in sectors like automotive, communications, signaling, and entertainment. Global LED lighting market was approx. $ 50.91 billion in 2020 and is

expected to grow to approx. $135.58 billion by 2028 at CAGR of 12.5%. (Source- Report by Grand View Research, Inc).

Indian LED lighting industry is assembling LED lighting products in India and is dependent on imports of chips and electronic components which are not manufactured in India.

f. Industrial Electronics

Industrial electronics can be classified on the basis of segments viz Power Electronics, DC/AC converters, Material handling and Industrial Robots. The key application segments of the industrial electronics industry are process control equipment, test and measuring equipment, power electronics equipment, automation and analytical instruments. These technologies are gaining ground as modernization, automation and robotics would play an important role in the modern industry. The industrial electronics sector is witnessing growth due to enhanced digitization and robotics applications in Industry 4.0. Additionally, the impetus on Smart Cities and IoT will bring a whole new focus and demand on smart and automation electronics.

Increasing focus on the use of renewable power sources across the globe, growing adoption of power electronics in the manufacturing of electric vehicles, and increasing use of power electronics in consumer electronics are the major factors driving the growth of the power electronics market. Power electronics space in India is dominated by unorganized regional players, which is expected to grow at higher rate due to huge demand and low penetration. Inverters and UPS are also becoming household items driving the growth of this segment. Some of the Indian players have set up global tie-ups over the last few years and have brought in newer technologies into the Indian industry. Solar Photovoltaic and allied

equipment is another segment which is likely to grow at a sustained high growth rate.

Industrial electronics is an empirical barometer of overall growth in the contribution of the manufacturing sector in the economy. The spurt in investments due to the "Make in India" programme is bringing significant interest in engineering, electrical, automotive and electronics segments which are the driving force behind the growth of industrial electronics sector. In future, M2M (machine-to-machine and machine-to-man) communication modules driven by Industry 4.0 activities will drive the growth of the Industrial electronic segment.

g. Automotive Electronics

Automotive electronics are the electrically operated systems integrated and mounted in several vehicle applications such as body electronics, safety systems, and infotainment. The automotive market demand is experiencing trends related to advanced mobility solutions, powertrain & vehicle system electrification, and advanced safety systems. Due to the increased implementation of these systems in vehicles, the penetration of automotive electronics has also increased, further creating the demand for automotive electronics products across the globe. The digitization of automotive systems by including connected technologies, in-vehicle communication, and ADAS & automated systems have created several opportunities for market growth. The growing integration & adoption of automotive electronics in modern vehicles to deliver enhanced safety & comfort to consumers is one of the major factors driving the automotive electronics industry growth. Several features offered by OEMs including Automated Emergency Braking (AEB) system, airbag system, and lane departure warning, etc. have significantly decreased road

accidents worldwide. Automotive electronics along with the presence of broad computing technologies and connected features are enhancing automobile capabilities. Alcohol ignition interlock, accident data recorder system, and emergency call system are some of the features gaining attraction, which will further propel the growth. According to Allied Market Research, the global Auto electronics market is estimated to reach $382.16 billion by 2026, growing at a CAGR of 7.3% from 2019 to 2026.

Automotive Mission Plan 2016-26 targets India to be among the top three in the world for engineering, manufacturing and export of vehicles and auto components. The growing presence of global automobile Original Equipment Manufacturers (OEMs) in the Indian manufacturing landscape has significantly increased the localization of their components in the country. India has become the preferred designing and manufacturing base for most global auto OEMs for local sourcing and exports.

The introduction of autonomous or driverless cars that offer a self-driven experience to the user along with the launch of cost-efficient electric vehicles with enhanced features is driving the growth of the market. Furthermore, a shift toward hybrid and luxury vehicles equipped with in-vehicle entertainment devices offering a more sophisticated and interactive user experience is further augmenting the demand for automotive electronics.

h. Strategic Electronics

The strategic electronics segment consists of Military Communication systems, Radars and Sonars, Network Centric systems, Electronic Warfare systems, Weapon systems, Satellite based Communication, Navigation and Surveillance systems, Navigational aids, Underwater electronic systems, Infra-Red (IR) based detection and ranging system, Disaster management system, Internal security systems, etc.

India has the second largest armed force in the world, and is considered the seventh largest aerospace and defence (A&D) market globally with a sizeable budget to cover the needs of the country's Army, Navy and Air Force. The large-scale modernization of the defence forces and the drive to manufacture local have become focus areas of the government. Emerging technologies are going to reshape modern day warfare, and will harness the power of electronics to do so. This will make the Indian strategic electronics (SE) sector, mainly comprising aerospace and defence, a vibrant industry over the next decade. The defence sector in the country has been growing at a modest pace for the past few years. However, it is the strategic partnership (SP) model in defence production that will boost the Make in India programme to a great extent. The concept of import substitution is being gradually accepted by stakeholders.

The next decade is likely to see exponential growth in combat systems as well as non-platform-based programmes, facilitating smart battalions. Therefore, there are opportunities for electronics manufacturing in India in both standalone systems (as part of platforms) as well as at a sub-system level. Key factors that will influence growth are:

• The modernization of weapon platforms

• The induction of state-of-the-art weapons by the armed forces

• The impact of indigenization and the Make in India programme

i.   Medical Electronics

Designing, implementation and use of electronic components, devices and equipment for medical or healthcare purposes, comes under the field of medical electronics. Some of the important applications of medical electronics are research, examination, diagnosis, treatment, assistance and care to name a few.

Indian medical devices market is among the top twenty in the world by market size, and fourth in Asia after Japan, China and South Korea. The Government has taken various regulatory steps to promote this sector and has created excellent opportunities for the domestic manufacturers, thereby reducing the dependence on imports. Medical devices industry in the country is dominated by multinationals that controls about 75-80 per cent of the Indian market. Further, more than 80% of domestic manufacturers are in the small-scale sector and have a turnover of less than ₹10 crore. Also, more than 6,000 types of medical devices are in use worldwide, but India manufacturers are just one-sixth of these medical devices.

3.3 Schemes and programs

3.3.1 Modified Special Incentive Package Scheme (M-SIPS)

In order to promote large scale manufacturing in the country, a Modified Special Incentive Package Scheme (M-SIPS) was announced by the Government in July 2012. The Scheme has been amended twice – in August, 2015 and in January, 2017. The Scheme has been closed on 31st December, 2018 to receive new applications. The salient features of the Scheme are:

* Provides Capital Subsidy - 20% for investments in Special Economic Zones (SEZs) and 25% in non-SEZs.

* Provides incentives for both new units and expansion units.
* Provides incentives for a period of 5 years from the date of approval of application.
* Provides incentives for 44 categories/verticals across the value chain (raw materials including assembly, testing, packaging and accessories, chips, components).
* Minimum investment threshold for each product category/vertical.
* Unit to be in Industrial Area notified by Central/ State Govt.

Status of M-SIPS till March, 2024 is as follows:

As on 31st   March, 2024, 320 applications with proposed investment of ₹85,448 Crore are under consideration. Out of these, 320 applications, 316 applications with proposed investment of approximately ₹83,247 Crore have been approved, 3 applications with proposed investment of approximately ₹192 Crore have been recommended by the Appraisal Committee for approval, 1 application with proposed investment of ₹2,009 crore is under appraisal.

The incentives to the tune of ₹2,375.89 Crore have been disbursed to the 140 applicants.

Out of 316 approved applicants, 293 applicants have started incurring investment on their projects and have made investment of ₹40,775 Crore. 269 applicants have commenced commercial production with reported turnover of ₹10,63,571 Crore, which includes exports to the tune of ₹2,08,730 Crore. These units have given employment opportunities (Direct & Indirect) to over 4,25,830 persons and given revenue of approximately ₹1,44,188 Crore to the Government.

3.3.2 Electronic Cluster Manufacturing (EMC) Schemes

To   create   conducive   and   sustainable ecosystem for electronics manufacturing in the

country, Government notified the Electronics Manufacturing Cluster (EMC) Scheme in October, 2012 for providing support to create world-class infrastructure along with common facilities and amenities for attracting investments in the ESDM sector. The scheme was open to receive applications for a period of five years from the date of its notification i.e., upto October, 2017. Further period of five years is available for disbursement of funds to the approved projects. The salient features of the scheme are as follows:

i)   To create robust infrastructure base for electronics manufacturing in the country through development of Greenfield EMCs and Common Facility Centres (CFCs).

ii) Financial assistance upto 50% of the project cost subject to a ceiling of ₹50 crore for every 100 acres of land for Greenfield EMC and 75% of the cost of infrastructure, subject to a ceiling of ₹50 crore for Common Facility Centre.

iii) State Government incentives are over and above the Central financial assistance.

iv) Development of EMCs to provide ready infrastructure for industry engaged in electronics verticals and its entire value chain to set up their manufacturing facilities in EMC.

Status of EMC till March, 2024 is as follows:

Under the scheme, MeitY received 50 applications out of which 46 applications were for setting up of Greenfield EMCs and 4 applications for setting up of Common Facility Centers (CFC) in Brownfield Clusters from 19 states across the country. Of these, nineteen (19) Greenfield EMCs and Three (3) CFCs were accorded approval admeasuring an area of 3,464 acres with project cost of ₹3,499 crore including Grant- in-aid of ₹1,470 crore from Government of India. These EMCs were poised to attract an investment of ₹46,619 crore and are expected to generate 6.30 lakh employment opportunities once operational. The details are as follows:

List of Approved Greenfield EMCs

S.No.	State	Location/City
i	Andhra Pradesh	Village-Cherivi, Satyavedu Mandal, Chittor District
ii		Vikruthamala Village, Yerpedu Mandal, Chittor District
iii		Renigunta and Yerpedu Mandal, Chittoor District, Near Airport Tirupati
iv	Assam	Bongora (Village), Chayani (Mouza), Palasbari (Revenue Circle), Kamrup (R) (District)
v	Chhattisgarh	Village-Tuta, Sector-22, Naya Raipur
vi	Gujarat	Village-Tunda, Taluka- Mundra, District-Kutch
vii	Goa	Village-Tuem , Taluka- Pernem, North Goa District
viii	Jharkhand	Adityapur, Saraikela-Kharsawan District
ix	Kerala	Kakkanad Village, Kanayannur Taluk, Ernakulam District
x	Madhya Pradesh	Badwai-Bhopal
xi		Purva-Jabalpur
xii	Odisha	Infovalley, Bhubaneswar Industrial Area, Khurda District
xiii	Rajasthan	Salarpur Industrial Area, Khushkhera, Bhiwadi
xiv		Karoli Industrial Area, Bhiwadi, Alwar District
xv	Telangana	E-city, Fab City, Hyderabad
xvi		Maheshwaram, Ranga Reddy District
xvii	Uttar Pradesh	Ecotech-VI Industrial Area, Greater Noida
xviii	West Bengal	Falta Industrial Centre, P.S. Ramnagar, South 24 Parganas District
xix		Naihati town, North 24 Parganas District

List of Approved Common Facility Centres (CFCs)

S.No.	State	Location/City
i	Karnataka	Hebbal Industrial Area, Mysore
ii	Maharashtra	Shendra Five Star Industrial Area, Aurangabad District
iii		Pimpri Industrial Area, Pune

The infrastructure development is under progress. As on March, 2024, a Grant-in-aid amounting to ₹832.76 crore has been released for implementation of these projects. These EMCs/CFCs are providing developed infrastructure with plug & play facility along with requisite testing/validation services to electronics industry to start their production activity in the country. Electronics industries are showing their interest to set up their manufacturing operations in these clusters. About 388 companies with projected investment of ₹50,122 crore have committed for setting up of their manufacturing facilities within these EMCs with estimated employment generation of more than 2.40 Lakh. Of these, 114 companies started their commercial production with an investment of ₹16,500 crore and provided employment opportunities to over 64,505 persons. Another 128 electronics manufacturing units are at various stages of construction and implementation.

Year wise progress of the EMC scheme is depicted below:

GIA released V/s Land Allottees

■ GIA released (Rs. In crore) ■ No. of land allottees
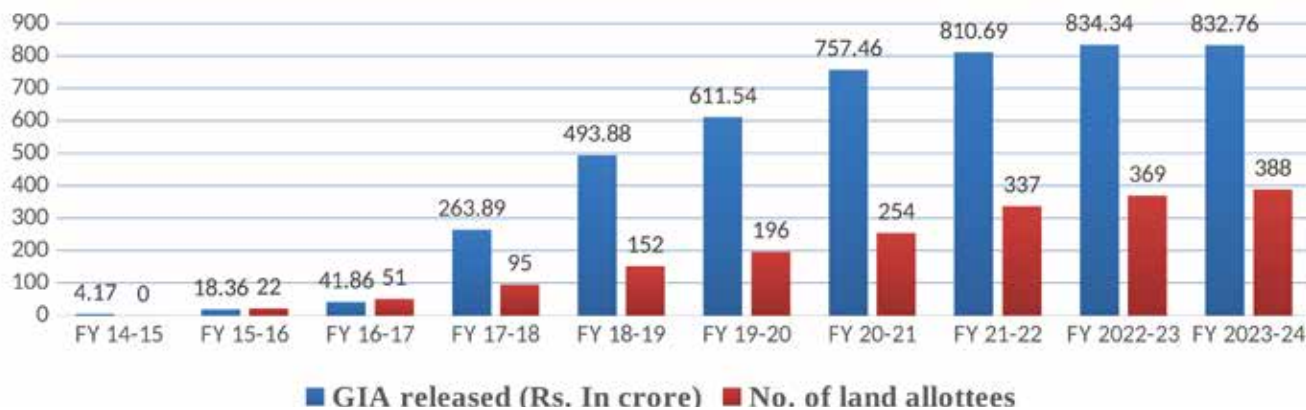
3.3.3 Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme

To provide avenues for expanding and strengthening of electronics manufacturing ecosystem in the country; MeitY notified the Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme on April 01, 2020. By providing support for creation of world class infrastructure along with common facilities and amenities for attracting major global electronics manufacturers along with their supply chains, the scheme aims to make India an Electronics Manufacturing Hub. The scheme also provides requisite financial assistance for creation of industry specific facilities like Common Facility Centers, Ready Built Factory Sheds / Plug and Play facilities etc. This will attract large scale electronics manufacturers to commence their production in the country and act as Anchor units to bring their suppliers in such clusters. It will also ensure greater integration

with the global supply chains in the electronics manufacturing sector. The salient features of EMC 2.0 Scheme are as follows:

(i) Financial assistance upto 50% of the project cost subject to ceiling of ₹70 crore per 100 acres of land for setting up of Electronics Manufacturing Cluster projects and 75% of the project cost subject to a ceiling of ₹75 crore for Common Facility Centres (CFCs).

(ii) Minimum land area requirement is 200 acres (100 acres in case of North-Eastern States, Hill States and UTs).

(iii) Commitment from Anchor Units for having min. 20% of saleable/ leasable area with investment Commitment of ₹300 crore (10% and ₹150 crore in case of North-Eastern States, Hill States and UTs).

(iv) Development of Ready Built Factory (RBF) Sheds and Plug & Play facilities in atleast 10% of the saleable / leasable land area.

(v) Open for new as well as expansion of existing EMCs/CFCs.

(vi) Implementation and execution of scheme through Project Management Agency i.e., STPI.

(vii) State Government/its agencies, Central PSUs/ State PSUs, Industrial Corridor Development Corporations (ICDCs) or joint venture of such agencies with Anchor units or industrial park developers (existing SPVs in case of expansion of projects) all eligible to apply.

(viii) Scheme is open for receipt of application for a period upto March, 2024 and further five (05) years (upto March, 2028) is available for release of financial assistance to approved projects.

Status of EMC 2.0 till March, 2024 is as follows:

Under the scheme, 5 applications for setting up of EMC and 1 application for setting up of CFC admeasuring an area of 1,696.43 acres with a project cost of ₹2,323.81 crore including Central financial assistance of ₹1111.37 crore have been approved. These EMCs are poised to attract an investment of ₹23,122 crore and have potential to generate over 77,140 employment opportunities after getting fully operational. A financial assistance of ₹179.91 crore has been released so far. An investment commitment of ₹8,857 crore has already been received from Anchor unit(s)/units with employment potential of 19,025 persons. 3 units such as IFB, Starion HK & AIL Dixon have already started production and other 3 units are in construction. An investment of ₹2,490 crore has been mobilized with employment generation of 4,470 persons.

Figure: ESDM Landscape (Key Clusters/Hubs)

3.4 Electronics Development Fund (EDF)

Electronics Design & Manufacturing is a sector which is characterized by high velocity of technological change. Intellectual Property is possibly the most critical determinant of success, not only for the companies of this sector but also to the countries and economies as a whole. Setting up of EDF was one of the important strategies to enable creation of an electronics industry ecosystem in the country. Encouraging a vibrant ecosystem of innovation, R&D with active industry involvement is essential for a thriving electronics industry. It is with this objective that an EDF has been set up as a "Fund of Funds" to participate in professionally managed "Daughter Funds" which in turn provides risk capital to companies developing new technologies in the area of Electronics and Information Technology (IT). This fund is expected to foster R&D and innovation in these technology sectors through creation of an ecosystem for providing risk capital to industry to undertake market driven R&D. It will, in the process, enrich the intellectual property in the country and encourage more entrepreneurs towards product

and technology development.

Canbank Venture Capital Funds Ltd. (CVCFL), a 100% subsidiary of Canara Bank, is the Investment Manager and MeitY is the anchor investor of EDF. EDF has drawn ₹216.33 crore from its contributors, which includes ₹210.33 crore from MeitY. The total targeted corpus of these 8 Daughter Funds is ₹2,176 crore and the current commitment by EDF to these 8 Daughter Funds is ₹271.30 crore.

As on 31.03.2024; EDF has invested ₹257.25 crore in eight Daughter Funds, which in turn have made total investments of ₹1,335.06 crore in 128 Ventures/Startups. Total Funds raised by the supported startups of the Daughter Funds of EDF are approx. ₹17,400 crore (other than Daughter fund). Total employment in supported Startups was more than 21,900. Number of IPs created/acquired by the supported start-ups is 392.

The supported start-ups and companies are majorly working in IOT, Robotics, Drones, Autonomous Cars, Health-tech, Cyber security, Artificial Intelligence / Machine Learning etc.

S. No.	Daughter Fund Name	Amount Invested by EDF (₹ in Crore)	Total Amount Invested by the Daughter Fund in Startup/Companies (₹ in Crore)	No. of Investee Startups/Companies of the Daughter Fund
i	Endiya Seed Co-Creation Fund	30.00	137.03	12
ii	KARSEMVEN Fund	24.00	83.43	17
iii	YourNest India VC Fund II	43.15	184.74	19
iv	PI Venture Fund – 1	14.82	186.53	15
v	Unicorn India Ventures Fund – I	15.82	63.64	17
vi	Aaruha Technology Fund - I	6.75	26.31	13
vii	Ventureast Proactive Fund II	97.41	425.70	18
viii	Exfinity Technology Fund Series-II	25.30	227.68	17
	Total	257.25	1,335.06	128

3.5 Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing

Notified vide Gazette Notification No.CG-DL-E-01042020-218990 dated April 01, 2020, the Scheme provides financial incentive to boost domestic electronics manufacturing and attract large investments. The Scheme extends an incentive of 4% to 6% to eligible companies on incremental sales (over base year i.e., 2019-20) of manufactured goods including mobile phones and specified electronic components for a period of five years (FY 2020-21 to FY 2024-25) subsequent to the base year. The scheme will promote large scale electronics manufacturing particularly in the mobile phones segment and contribute significantly to achieving a $1 trillion digital economy and a $ 5 trillion GDP by 2025.

PLI Scheme has been a huge success in terms of the immense interest received from Global as well as Domestic Mobile Manufacturing companies. Over the next 5 years, the Scheme is expected to lead to total production of about ₹8.12 lakh crore. The scheme is also expected to boost exports significantly. Out of the total production, about 60% is expected to be contributed by exports of the order of ₹4.87 lakh crore. The Scheme will bring additional investment in electronics manufacturing to the tune of ₹7,000 crore. PLI Scheme will also help in promotion of domestic champion companies by reviving Indian Brands and strengthening Indian EMS companies.

After the success of the First Round of Production Linked Incentive Scheme in attracting investments in mobile phone and electronic component manufacturing, Second Round of the PLI Scheme for Large Scale Electronics Manufacturing was launched on 11.03.2021 for incentivizing Electronic Components. Under the Second Round, incentives of 5% to 3% have been extended on incremental sales (over base year i.e., 2019-20) of goods manufactured in India and covered under the target segment, to eligible companies, for a period of four years.

In accordance with the announcement made by Hon'ble Union Finance & Corporate Affairs Minister on 28.06.2021 to provide relief to companies approved under the PLI Scheme affected by the COVID-19 pandemic, the tenure of the PLI Scheme has been extended by one year i.e., from 2024-25 to 2025-26. The notification in this regard was issued on 23.09.2021.

3.6 Production Linked Incentive Scheme (PLI) for IT Hardware

With an objective to boost domestic manufacturing and attract large investments in the value chain, MeitY came up with PLI for IT Hardware which was notified on 03.03.2021. This scheme extends an incentive of 4% to 2% / 1% on net incremental sales (over base year of FY2019-20) of goods under target segments - Laptops, Tablets, All-in-One Personal Computers (PCs) and Servers for a period of four years (FY2021-22 to FY2024-25). Incentives are applicable under the scheme from 01.04.2021.

The scheme was open for filing applications till 30.04.2021. A total of 14 companies were approved under the PLI Scheme.

3.7 PLI Scheme 2.0 for IT Hardware

The Union Cabinet had given approval to introduce the PLI Scheme 2.0 for IT Hardware on May 17, 2023, with a budgetary outlay of ₹17,000 crore. The scheme was notified on May 29, 2023.

The scheme provides increased flexibility and options for applicants and is tied to incremental sales and investment thresholds to further incentivize growth. Furthermore, semiconductor design, IC manufacturing, and packaging are also included as incentivized components of the PLI Scheme 2.0 for IT Hardware. The Scheme will promote large scale manufacturing in Laptops, Tablets, All-in-One PCs, Servers and Ultra Small Form Factor (USFF) devices. The Scheme is expected to result in broadening and deepening of the manufacturing ecosystem by encouraging the localization of components and sub-assemblies and allowing for a longer duration to develop the supply chain within the country by extending an average incentive of around 5% for localization of items and net incremental sales (over base

year) of goods under target segments that are manufactured in India to eligible companies for a period of 6 years.

PLI Scheme 2.0 for IT Hardware is expected to generate following outcomes during the tenure of 6 years w.e.f. 01.07.2023:

- Expected incremental production is ₹3.35 Lakh crore

- Expected incremental investment is ₹2,430 crore

- Expected incremental direct employment is 75,000.

On November 18, 2023, the Hon'ble Minister of Electronics and Information Technology, Shri Ashwini Vaishnaw, approved 27 applicants under the PLI Scheme 2.0 for IT Hardware.

3.8 Scheme for Promotion of manufacturing of Electronic Components and Semiconductors (SPECS)

Notified vide Gazette Notification dated April 01, 2020, the Scheme provides financial incentive of 25% on capital expenditure for the identified list of electronic goods that comprise downstream value chain of electronic products, i.e., electronic components, semiconductor/ display fabrication units, ATMP units, specialized sub-assemblies and capital goods for manufacture of aforesaid goods. The scheme promotes development of electronic components manufacturing ecosystem in the country and deepening of electronics value chain and is expected to bring new investments to the tune of ₹20,000 crore with total employment generation potential (Direct and Indirect) of 6,00,000. The scheme is open for applications for 3 years from the date of its notification i.e., till 31.03.2023. Vide Notification dated 05.04.2023, the window for receiving new applications under

the scheme was extended by one year i.e. till 31.03.2024.

The status of SPECS till March, 2024 is as follows:

Under the scheme 49 applications have been approved with total proposed investment of ₹14,121 crore. The total employment generation potential of the approved applications is 37,380.

3.9 Modified Programme for Development of Semiconductors and Display Manufacturing Ecosystem in India

In furtherance of the vision of AatmaNirbhar Bharat and positioning India as the global hub for ESDM, a comprehensive program for the development of semiconductors and display manufacturing ecosystem in India was approved by Government of India with an outlay of ₹76,000 crore (>$10 billion). The Programme contained various schemes to attract investments in the field of semiconductors and display manufacturing. The following four schemes have been notified under the Semicon India Programme:-

3.9.1 Modified Scheme for setting up Semiconductor Fabs in India

- The scheme is aimed at attracting large investments for setting up semiconductor wafer fabrication facilities in the country to strengthen the electronics manufacturing ecosystem and help establish a trusted value chain.

- The Scheme extends a fiscal support of 50% of the project cost across the technology nodes for setting up of Silicon based Semiconductor Fabs in India.

- The fiscal support under the scheme shall be provided on pari-passu basis for a period of six

years from the date of approval.

- Apart from such fiscal support, Semiconductor Fabs set up in India will be supported through purchase preference in procurement of electronic products by the Government under the Public Procurement (Preference to Make in India) Order.

3.9.2 Modified Scheme for setting up of Display Fabs in India

- The scheme is aimed at attracting large investments for manufacturing TFT LCD or AMOLED based display panels in the country to strengthen the electronics manufacturing ecosystem.

- The Scheme extends fiscal support of 50% of Project Cost for setting up of Display Fabs in India.

- The fiscal support under the scheme shall be provided on pari-passu basis for a period of six years from the date of approval.

- Apart from such fiscal support, Display Fabs set up in India will be supported through purchase preference in procurement of electronic products by the Government under the Public Procurement (Preference to Make in India) Order.

3.9.3 Modified Scheme for setting up of Compound Semiconductors / Silicon Photonics / Sensors Fab / Discrete Semiconductors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP) / OSAT facilities in India

- The scheme extends a fiscal support of 50% of the Capital Expenditure for setting up of Compound Semiconductors / Silicon

Photonics (SiPh) / Sensors (including MEMS) Fab/ Discrete Semiconductor Fab and Semiconductor ATMP / OSAT facilities in India.

- Companies / Joint Ventures proposing to set up such facilities can apply for support under the scheme through an online portal. The scheme will be open for receiving applications till 31.12.2024. Fiscal support shall be available for a period of five years from the date of acknowledgement of the application.

3.9.4 Semicon India Future Design: Design Linked Incentive (DLI) Scheme

- 'Design Linked Incentive Scheme' has been notified on 21.12.2021. It shall offer financial incentives as well as design infrastructure support across various stages of development and deployment of semiconductor design for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design.

- Under the "Product Design Linked Incentive" component of the scheme, reimbursement of up to 50% of the eligible expenditure subject to a ceiling of ₹15 crore per application will be provided as fiscal support to the approved applicants. This shall include expenditure relating to design, development, testing, fabrication, validation, prototype development, product development, filing of Intellectual Property Rights etc. It will also include manpower costs.

- Under the "Deployment Linked Incentive" component of the scheme, incentive of 6% to 4% of net sales turnover over 5 years subject to a ceiling of ₹30 crore per application will be provided to the approved applicants whose

semiconductor design for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design are deployed in electronic products.

- C-DAC is the Nodal Agency to implement the scheme and establish the semiconductor design infrastructure such as EDA Tool Grid, repository of IP Cores, hardware and software licenses, patents and trademarks etc.

- The duration of the scheme for receipt of applications is three years. Fiscal support shall be available for a period of five years from the date of application.

3.9.5 India Semiconductor Mission (ISM)

- ISM has been established as an Independent Business Division under the Digital India Corporation on 22.12.2021. ISM will implement the schemes for Semiconductor and Display Fabs, Compound Semiconductor Fabs, Silicon Photonics Fabs, MEMS Sensors Fabs, Discrete Semiconductor Fabs and Semiconductor Packaging Units (ATMP / OSAT). It shall drive the long-term strategies for the development of semiconductor and display ecosystem in the country.

- The India Semiconductor Mission will be led by global experts in semiconductor and display industry. It will act as the nodal agency for efficient and smooth implementation of the schemes for setting up of Semiconductor and Display Fabs.

Advisory Committee:

An Advisory Committee comprising global semiconductor industry, academia, and Government experts has been constituted to advise on the long-term strategy and roadmap for the Semicon India programme.

3.9.6 Semi-Conductor Laboratory (SCL)

The Union Cabinet has also approved that Ministry of Electronics and Information Technology will take requisite steps for modernization and commercialization of Semi-conductor Laboratory (SCL), Mohali. Semi-conductor Laboratory (SCL), Mohali has been brought under the administrative control of Ministry of Electronics and Information Technology from Department of Space.

SCL is an Integrated Device Manufacturer which undertakes activities pertaining to design, development, fabrication, assembly & packaging, testing and quality assurance of Silicon CMOS and MEMS Devices for various applications. Presently, SCL has two wafer fabrication lines, i.e., 200 mm wafer line operating in 180nm CMOS technology and 150 mm wafer line for MEMS technology. SCL predominantly caters to low volume requirements for various applications.

Boston Consulting Group (BCG) has been engaged for providing consultancy services for Modernization of Semi-Conductor Laboratory, Mohali. Preliminary Information Memorandum (PIM) has been published on 22.09.2023 to invite Expressions of Interest (EoI) from Indian and global entities to facilitate partner outreach for the modernization and commercialization of the Semiconductor Laboratory (SCL) in Mohali.

3.9.7 Approvals issued under the Programme

Micron Ground Breaking Ceremony

i Micron Technology Inc.'s proposal for setting up an ATMP facility in India with an investment of ₹22,516 crore was approved in June 2023. Micron's facility in India will enable assembly and test manufacturing for both DRAM and NAND products and address demand from domestic and international markets with a production capacity of around 40 million per week. Groundbreaking of the Micron facility was held in September 2023. The construction of the facility is on full swing.

ii. Tata Electronics Private Limited (TEPL)'s proposal for setting up a Semiconductor Fab facility in India with an investment of ₹91,526 crore was approved in February 2024. The fab facility will be set up in technology partnership with PSMC, Taiwan. PSMC is an established semiconductor company having 6 semiconductor foundries in Taiwan. The production capacity of the project would be around 50,000 wafer starts per month (WSPM). Groundbreaking of TEPL Semiconductor Fab facility was held in March 2024.

iii. TEPL's proposal for setting up of OSAT facility in India with an investment of ₹27,120 Crore was approved in February 2024. The facility will use indigenous semiconductor packaging technologies with a production capacity of 48 million per day. Groundbreaking of TEPL Semiconductor Fab facility was held in March 2024.

iv. CG Power and Industrial Solutions Limited's proposal for setting up OSAT facility in India with an investment of ₹7,584 crore was also approved in February 2024. The facility will be set up as joint venture partnership with Renesas Electronics America Inc., USA,

and STARS Microelectronic, Thailand. The Technology would be provided for this facility by Renesas Electronics Corporation, Japan and STARS Microelectronic, Thailand. The production capacity would be around 15.07 Million Units per day. Groundbreaking of CG Power and Industrial Solutions Limited was also held in March 2024.

v. Further, the approval has also been granted to Eleven (11) start-ups/ MSMEs companies viz. DV2JS Innovation LLP, Vervesemi Microelectronics Pvt Ltd, Fermionic Design Pvt Ltd, Morphing Machines Pvt Ltd, Calligo Technologies Pvt Ltd, Aheesa Digital Innovations Pvt Ltd, Netrasemi Pvt Ltd, Green PMU Semi Pvt Ltd and WiSig Networks Pvt Ltd for fiscal support under 'Semicon India Future Design: Design Linked Incentive (DLI) Scheme'. Additionally, 25 semiconductor design companies have been approved for access of the EDA tools made available by National EDA Tool Grid setup at ChipIN Centre at C-DAC Bengaluru. The semiconductor manufacturing facilities will generate direct employment of about 25 thousand advanced technology jobs and about 60 thousand indirect jobs.

3.10 Investment Promotion to Attract Investment in ESDM Sector

3.10.1 Promotion of PLI, SPECS, EMC 2.0 and Schemes for Development of Semiconductors and Display Manufacturing Ecosystem in India

After the successful launch of schemes (i.e., PLI Scheme for Large Scale Electronics Manufacturing, SPECS and EMC 2.0) and aggressive promotional activities for these schemes, MeitY, further came out with PLI Scheme 2.0 for IT Hardware and

Schemes for Development of Semiconductors and Display Manufacturing Ecosystem in India. Online meetings were organized with individual companies where presentations on the aforesaid schemes were made. Individual meetings with companies at various levels including Secretary, Joint Secretary, Senior Director and other senior officials of MeitY were organized in this focused and strategic outreach initiative. As a result of this outreach exercise, the PLI schemes, SPECS and EMC 2.0 got a tremendous response from the industry.

3.10.2 Advocacy and Outreach Programmes

The new leadership in MeitY showed the way and renewed the focus of the Ministry in developing a strong ESDM ecosystem in India. The mandate was to invite global suppliers to the OEM/ ODM/ EMS companies to consider India as their manufacturing base and be a part of the trusted value chain of India.

US Visit of Hon'ble PM

The visit of Hon'ble PM of India, to United States from 21-23 June 2023 has had a profound impact on the Semiconductor and ESDM sector. The significant announcements made by Lam Research, Applied Materials, and Micron Technologies during this visit stand out as remarkable and crucial developments. This visit has etched a memorable moment in the history of Indo-US relations, underscoring the strength of their strategic partnership. Conversations encompassed a wide range of topics, including trade, defense, technology, climate change, and counter-terrorism, all of which served to reaffirm their dedication to democracy and human rights.

Roadshow under DLI Scheme

3rd future DESIGN roadshow was held under

the Design Linked Incentive (DLI) Scheme on 12th May 2023 at IIT Delhi with Hon'ble Minister of State, MeitY as Chief Guest and other experts from Industry, academic and government; which was participated by about 1500 participants across the country.

Semicon India Conference 2023 (28-30 July 2023)

Hon'ble PM inaugurated SemiconIndia 2023 on 28 July 2023 in Gandhinagar, Gujarat, with the theme 'Catalysing India's Semiconductor Ecosystem.' The conference showcases India's vision of becoming a global semiconductor hub. Industry leaders expressed their support for India's semiconductor ambitions, praising India's potential in semiconductor production and lauding Micron's investment. Semiconductor industry leaders expressed their support for India's Semiconductor initiatives.

SEMI, an industry association of companies involved in electronics, semiconductors and their supply chain, has announced to organize SEMICON INDIA Conference in partnership with ISM from 2024 onwards. The Semicon India Conference for 2024 has been scheduled in September 2024.

3.10.3 Supply Chain Focused Meetings & Webinars

- As part of its continuous outreach program by MeitY multiple interactions with industry stakeholders were organized for awareness on PLI Scheme 2.0 for IT Hardware encouraging companies to localize manufacturing in accordance with the recently introduced PLI Scheme 2.0 for IT hardware and further increase domestic production and employment in IT Hardware target segments.

- A Roundtable Discussion on Broadening of Component Ecosystem and increasing value addition in Electronics Manufacturing in India was held with Industry stakeholders on 23.05.2023

- A Stake holder Consultation on Resilient Supply Chain was organized wherein Hon'ble MoS Shri Rajeev Chandrasekhar interacted with Industry Leader to finalize the path to a more Trusted, Secure & Resilient Supply Chain for India's growing demand of IT Hardware and servers.

3.10.4 International Collaborations and Business Delegation Visits

- Indo-US Task Force for Electronics - Inaugural Meeting was held on 25th August 2023 in association with ICEA comprising Industry leaders in the sector to boost and elevate electronics trade between India and USA to approx. $100 billion within a decade from the current $8 billion figure.

- A Taiwanese delegation consisting of prominent electronics enterprises visited India to explore potential business prospects in India. The meeting was held under the chairmanship of Shri S. Krishnan, Secretary, MeitY to exchange views about the potential investment prospects in India's Electronics & Semiconductor Sector. This session provided the participants with a comprehensive overview of the existing electronics, semiconductors and display market opportunities in India along with incentives offered by Ministry of Electronics & IT through its schemes.

3.10.5 National Level Events & Facilitations

- Investment Promotion Workshop and Industry Interaction was organized in association with ICEA and APETA (Govt. of Andhra Pradesh) on 8th June 2023 to provide invaluable insight and exploration of growth avenues in electronics manufacturing Industry in India.

- MeitY in association with IESA organized Digital India Dialogues on PLI Scheme 2.0 for IT Hardware on 6th July 2023. A session on "Catalyzing the design of NextGeN Processors, IPs & embedded systems" was conducted under the chairmanship of Hon'ble MoS with Industry stakeholders.

- An interactive session under the chairmanship of Hon'ble MEIT with all the applicants of PLI Scheme 2.0 for IT Hardware was held on 30th August 2023 as a result of an overwhelming response from the Industry with commitments more than the scheme outlay.

- A Ground Breaking ceremony of Micron Technology was organized at its plant at Gujarat Industrial Development Corporation's (GIDC) industrial estate in Sanand on 23rd

September 2023. The event was witnessed by Hon'ble CM of Gujarat, Hon'ble MEIT, and Hon'ble MoS along with other senior official of State and Central Government.

- To connect with IT/ ITeS and ESDM sector investors and showcase state vision the Department of Industries, Govt. of Bihar in association with MeitY, Government of India organised an IT/ ITeS and ESDM Sector Investor's Meet in New Delhi on 11th July 2023.

- The 'SemiconIndia 2023' was organized by the India Semiconductor Mission under the leadership of Hon'ble PM.

- This event was in partnership with industry stakeholders and associations. More than, 8000+ individuals from more than 23 countries attended the conference, which included participation from every segment of the semiconductor value chain.

- Conducted various One to one meeting with ESDM companies to understand the issues being faced by them.

- Numerous Industry consultation sessions during policy creation

- Over 250 women workers from Electronics Manufacturing Industry were invited as special invitees to witness the spectacular Republic Day 2024 celebration. They experienced the vibrant energy of our security personnel & thunderous roar of jets. Their enthusiasm reflects unity & pride of our nation.

3.10.6 International Events & Facilitations

- Outreach engagements held with Indian Consulates/ Embassies/ High Commissions in other countries for promoting the schemes launched by MeitY.

- MeitY's participated in various Investment Promotion Roadshows organized by other Ministries like DPIIT to Taiwan, Korea, Japan, Singapore etc.

- MeitY also contributed to international engagements like G20, India-EU TTC, India-Taiwan Cooperation Forum, World Economic Forum, Industrial Collaboration Working Group (ICWG) between India and Taiwan (ICWG), India-Japan Industrial Competiveness Partnership (IJICP).

- During the India Investment & Trade Promotion Roadshow in Malaysia and Singapore 2024, MeitY provided valuable insights on investment opportunities in the Electronics & Semiconductor Sector.

3.10.7 Social Media Participation

- To reach out to all ESDM stakeholders, all the events, webinars were widely promoted on twitter through the official handle (@ Electronics_GoI) of IPHW Division of MeitY.

3.10.8 International Collaborations in the field of Semiconductors

Recognizing the critical role semiconductors play in any country's electronics manufacturing, Government of India started engaging with other countries to establish a Semiconductor Supply Chain and Innovation Partnership.

MoU with USA: Government of India had signed MoU with USA on 10.03.2023 for establishing semiconductor supply chain and innovation partnership under the framework of India-United States Commercial Dialogue to enhance bilateral collaboration on opportunities to advance resilient semiconductor supply chains and leverage complementary strengths.

MoC with Japan: Government of India has also signed a Memorandum of Cooperation (MoC) with Government of Japan for "Semiconductor Supply Chain Partnership" to strengthen cooperation between Japan and India towards the enhancement of semiconductor supply chain. This partnership will be a win-win situation for both the countries for supply chain activities like semiconductor manufacturing, R&D, capacity building, workforce training and development owing to India's exceptional semiconductor design talent pool and rapidly expanding design ecosystem. The first India-Japan Semiconductor Policy Dialogue was held in November, 2023. The B-to-B meeting between the Indian companies interested to invest in semiconductors and Japanese Semiconductor Companies was organized in January, 2024 during the Vibrant Gujarat Global Summit 2024.

3.10.8.1 Capacity building and talent development for semiconductors

New curriculums have been launched at UG, Diploma level as a step towards creation of Talent pool in Semiconductor design and Manufacturing domain. Curriculums at Diploma, UG and PG level have been adopted by more than 625 colleges and institutes with approved intake of 16,307 students. These courses at Diploma and UG level will drastically reduce the time gap to make students industry ready. Semiconductor design and technology specific curriculums in Diploma and Engineering, have been designed according to Semiconductor industry needs. On the recommendation of MeitY, an Implementation Committee has been constituted by Ministry of Education to implement the recommendations set by the "SemiconIndia FutureSkills Talent Committee Report". Further, Gap Analysis in the implementation of the recommendations set by the "SemiconIndia FutureSkills Talent Committee Report" is in progress.

ISM has signed an MoU with Purdue University, to enable collaboration for development of skilled workforce (through curation of specific courses/ academic programs), specialized R&D programs, collaboration for funding/ grants support.

Lam Research, USA, Semiconductor Equipment Manufacture has announced to train 60,000 workforce in the next 10 years through its Semiverse Solution, a virtual platform, in collaboration with Indian academic institutions, aiming to expedite India's semiconductor education and workforce development goals.

3.10.8.2 R&D Road map

A R&D committee comprising Global Semiconductor industry, academia, and Government experts has been constituted to develop a comprehensive R&D roadmap for the establishment of a world-class R&D facility in India. Applied Materials Inc. (AMAT) has announced a planned investment of $400 Million to establish Collaborative Engineering Centre in Bangalore. During the initial 5 years the centre would support $2 billion + of spending and create ~500 advanced engineering jobs. This initiative will facilitate R&D collaboration amongst R&D team of Applied Materials, Indian academic institutions and R&D team of vendors of Applied Materials. This will also help in development and sourcing of components/ sub-assemblies required for the AMAT's semiconductor equipment.

3.10.8.3 Measures to facilitate Ease of Doing Business

Central Board of Indirect Taxes & Customs (CBIC), Department of Revenue, Ministry of Finance has decided to exempt the Electronics and Semiconductor Manufacturing Sector from application of Section 65A of the Customs Act.

3.11 Other Programs

3.11.1 Compulsory Safety Standards for Electronics

The "Electronics and Information Technology Goods (Requirements for Compulsory Registration) Order, 2012" was notified on 3rd October, 2012 under the Compulsory Registration Scheme notified by Bureau of Indian Standards (BIS) under the ambit of the BIS Act, 1986, to ensure the safety of Indian consumers and curb the inflow of substandard electronic products. The Order has been migrated to BIS Act 2016 as "Electronics and Information Technology Goods (Requirement of Compulsory Registration) Order, 2021". The Order necessitates creation of an institutional mechanism for developing and mandating standards and certification for electronic products to strengthen Conformity Assessment infrastructure nationwide. As per the provisions of the Order, before manufacturing, import, sale, stock etc of the products notified under the schedule of the Order, the products need to be registered with BIS based on testing of the notified product at BIS recognized laboratories as per the Indian Standards. The registration is granted to a manufacturer for manufacturing a product at a particular location. As per the provisions of the scheme, BIS grants registration to the manufacturers and in order to check compliance of the Order, random surveillance is carried out by MeitY. The order has come into effect for 63 notified product categories.

The Compulsory Registration Scheme has resulted in high compliance of notified electronic goods to Indian safety standards and more than 31,000 registrations have been granted by BIS to manufacturing units covering approximately 1,75,000 products models/ series.

3.11.2 Public Procurement (Preference to Make in India) Order, 2017

The Government has issued Public Procurement (Preference to Make in India) Order 2017 [PPP-MII Order 2017] vide the Department for Promotion of Industry and Internal Trade (DPIIT) Order No. P-45021/2/2017-B.E.-II dated 15.06.2017, as amended by Orders dated 28.05.2018, 29.05.2019, 04.06.2020, and 16.09.2020 to encourage 'Make in India' and promote manufacturing and production of goods and services in India with a view to enhancing income and employment.

In furtherance of the aforesaid Order, MeitY vide Notification No. W-43/4/2019-IPHW-MeitY dated 07.09.2020 has notified the mechanism for calculating local content for 13 electronic products viz., (i) Desktop PCs, (ii) Thin Clients, (iii) Computer Monitors, (iv) Laptop PCs, (v) Tablet PCs, (vi) Dot Matrix Printers, (vii) Contact and Contactless Smart Cards, (viii) LED Products, (ix) Biometric Access Control / Authentication Devices, (x) Biometric Finger Print Sensors, (xi) Biometric Iris Sensors, (xii) Servers, and (xiii) Cellular Mobile Phones.

MeitY has also notified Cellular Mobile Phones under clause 3(a) of the PPP-MII Order which mandates public procurement of Cellular Mobile Phones from local suppliers only.

3.11.3 Development and Implementation of Indian Conditional Access System (iCAS)

Conditional Access System (CAS) is a system used to limit the access of TV signals to only authorized viewers and forms an integral part of Set Top Boxes (STBs). A major impediment in design and development of domestic STBs was identified as the CAS license. Therefore, the need as well as an opportunity was felt to develop Indian CAS (iCAS) for boosting the development and manufacturing of STBs in the country. MeitY,

through a novel PPP model, had funded a unique project for the development and implementation of Indian Conditional Access System (iCAS) for Set Top Boxes (STBs). In November, 2014, M/s ByDesign India Pvt. Ltd., Bangalore, was selected and awarded the task for development and implementation of iCAS, in association with Centre for Development of Advanced Computing (C-DAC).

The iCAS was successfully developed in November, 2015, within the specified time limit. The development of iCAS has enabled India to enter a niche market hitherto dominated by few big global companies. The solution has been well received by Indian Operators at large. iCAS has been integrated with multiple leading chipsets for SD / HD / HEVC signals such as ALI-SD(M3281P), MSTAR HD (MSD5043), MSTARSD(5C35), STM Platform HD (STiH273), Broadcom 7581 and with different Head-ends such as Teleste, Ericsson, Thomson, Wellav, Dexin, Gospell, Arris, Winnersat, Harmonic, Envivio. iCAS has been localized in 22 Indian languages for Subscriber Management System (SMS). Electronic Program Guide (EPG) has also been developed in 22 Indian languages.

Over 22,00,000 STBs with iCAS have been deployed with more than 200 cable operators. Doordarshan has also adopted iCAS for its Free Dish DTH platform, thus giving thrust to 'Make-In-India' initiative.

3.12   Centre of Excellence in Electronics and ICT application

3.12.1 National Centre of Excellence for Large Area Flexible Electronics (NCFlexE)

The project for setting up of National Centre of Excellence for Large Area Flexible Electronics (NCFlexE) at IIT-Kanpur was approved on 14th November, 2014 with a project cost of ₹132.99 crore including Government Grant-in-aid (GIA) of ₹111.12 crore. The main objective of the NCFlexE centre is to establish a research programme to engage in leading edge research in large area of flexible electronics and building strategic academic collaborations to address requirements through joint technology developments and to realize home grown technologies for manufacturing.

Overall objective of NCFlexE is to spur development of ecosystem for flexible electronics in the country. The Centre has been mandated to develop technology prototypes, in PPP mode through industry collaborations on areas such as Printable electronic tags, Anti-counterfeiting for medicine packages. Flexible solar module, OLED lighting, sensors, Conductive inks etc.

The centre has been established with state-of-the-art laboratory facilities in the emerging flexible electronics area and has a portfolio of 64 filed patents. 7 Technology/ Know-how have been transferred to industry including incubation & mentoring support to start-ups. A startup M/s Transpack Ltd. has been incubated in Anti-counterfeiting technology. The technology has been transferred to M/s SPMCIL and got ordered of more than 300 crore from Delhi Excise Department etc. The other startup M/s Likhotronics Pvt. Ltd. has been incubated recently for the product Educational Kits using special inks. In addition, 5 technologies of the centre have been transferred to industries/start-ups for commercialization. Several companies have invested in the centre for R&D, prototype & product developments etc. The Centre is working closely with industries to meet their requirement in this thematic area and developed various prototypes like Temperature Sensors for Milk Adulteration & Gas Sensors for Food Spoilage, Smart Label with tamper evident tracking, OLED Display, Handheld Infrared Thermometer, Screen-printed sensor for Bilirubin

detection in Serum, Warm Hug/Heater Jackets, TFT Array, Sensor for Breast Cancer detection, Smart IV Bottle, Piano keyboard on paper etc.
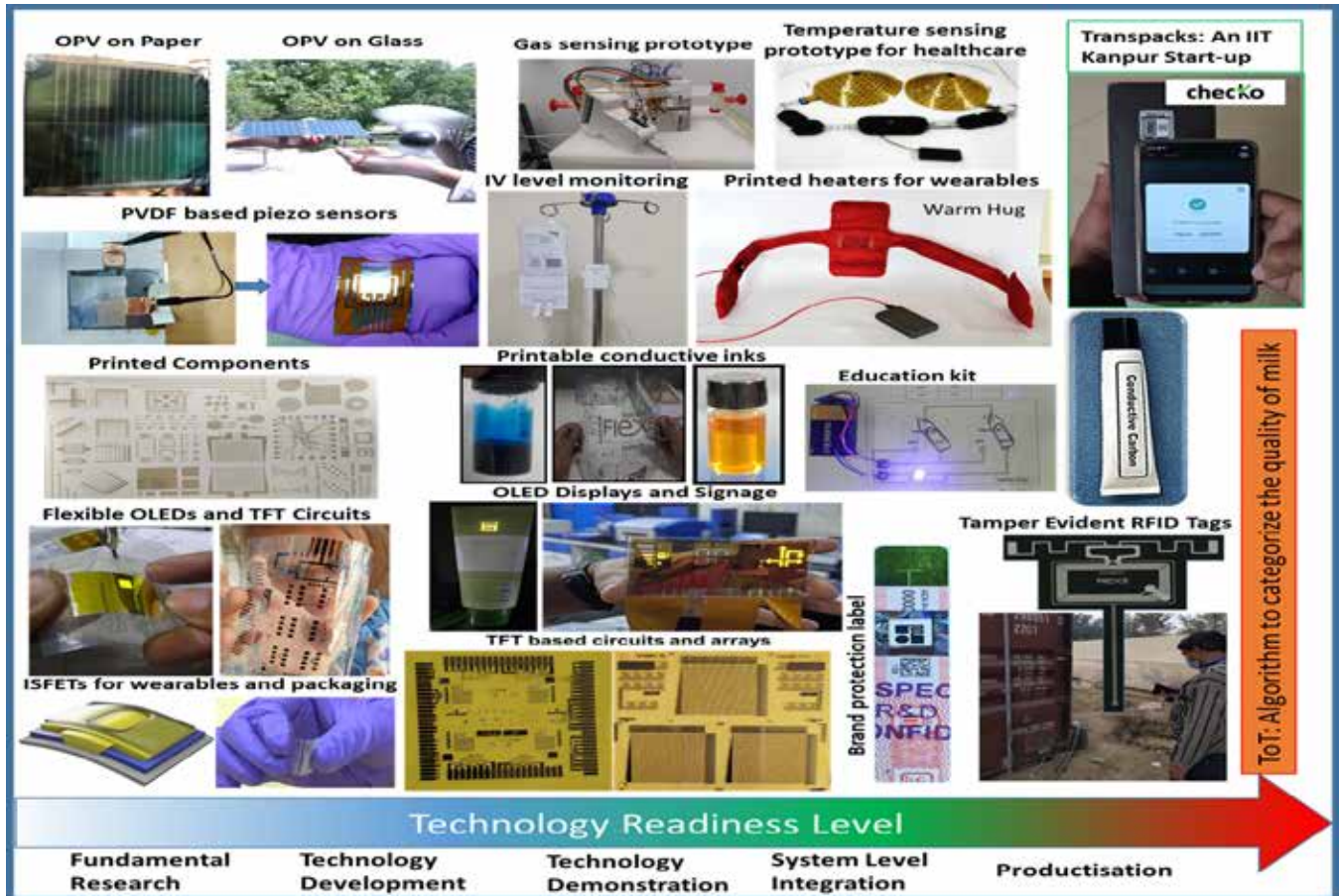
Product/ prototype developed in the Centre

The Phase-I has successfully achieved its targeted objectives. Based on achieving of projected milestones and to take the center activities further, MeitY accorded approval to IIT-Kanpur on 24.11.2023 for initiation of Phase-II activity with a project cost of ₹83.08 crore including Government Grant-in-aid of ₹60 crore from MeitY, ₹10.00 crore as industry contribution and ₹13.08 crore from IIT-Kanpur. As on March, 2024, MeitY has released a Grant-in-aid of ₹1.50 crore to IIT-K towards the Phase-II of the project. Under the Phase-II, prima-facie, the prototypes /technological applications in the field of level & Packaging,

Strategic and Healthcare sector (but not limited to) has been considered to address the technological requirement of the industry/organization in these sectors. The center facility is available for industry/ start-ups/ academia/ MSME/ other organizations for active collaboration.

3.12.2 National Centre of Excellence in Technology for Internal Security (NCETIS)

NCETIS at IIT-Bombay has been approved on 28th May, 2015 with a total outlay of ₹83.89 crore (MeitY contribution: ₹83.89 crore). The aim of the CoE is to address the challenges of homeland security and

to develop state-of-the-art technologies which are vital for the national security agencies for providing rescue and relief operations with the indigenously developed technologies/ products. The project is envisaged to set up the required infrastructures and carrying out R&D activities for developing prototype model, commercialization and technology transfer of multiple products. The project is expected to be completed in March 2023. Under the project, various technologies have been developed and three of them have commercialized. Explosive detector developed under the project has been registered and made available at GEM portal after the successful certification and trials. Two Start-ups have been incubated under the CoE.

3.12.3 Next Generation AMOLED Displays, OLED Lighting and OPV Products

The project "Next Generation AMOLED Displays, OLED Lighting and OPV products: Development of disruptive Technologies to enable cost effective electronic component manufacturing in India", was approved by MeitY to be implemented by IIT Madras with total budget outlay of ₹41.60 Crore, including Grant-in-Aid amounting to ₹34.65 Crore. The objective of the center is to demonstrate state-of-the-art AMOLED based displays developed by Fine Metal Mask (FMM) and Closed Space Sublimation (CSS) processes. OPV devices are also being developed for roll-to-roll manufacturing. A laboratory has been developed successfully for state-of-the-art research facility. A clean area has been set up of area around 3,000 sq ft. There are two parts in the clean area. One is of class 100 and the rest of the area is of class 1000. The class 100 area is used for substrate cleaning, which is very crucial for the fabrication. Class 1000 area has all the deposition units and is utilized for AMOLED device fabrication.

1. AMOLED Dock system Control

2 AMOLED clean room

3. AMOLED Dock system

3.12.4 Centre of Excellence in Medical Electronics and Bio-Physics

- Centre of Excellence on Medical Electronics and Bio-Physics has been set up at the Andhra Pradesh MedTech Zone Limited (AMTZ), Visakhapatnam with a total outlay of ₹32.02

crore (MeitY contribution: ₹18.67 crore). The Center of Excellence in Medical Electronics and Bio-Physics has been approved in the month of April 2020. The Project is being implemented by the Kalam Institute of Health Technology (KIHT), AMTZ for a period of three years.

- The aim of the project is to strengthen the medical electronics devices manufacturing eco-system in the country with suitable innovations, import substitution and value addition, etc. The objectives of the CoE are to provide functional research support to design and prototyping for manufacturing in ESDM, conduct R&D for manufacturing of electronics and integration of components to make functional critical parts (PCB assembly/ sub-assembly) for medical devices, carrying out Bio-Physics research such as Bio-Organs/ Electro-organs, etc., and research and prototyping of key electro-potential based components, etc.

- The Centre of Excellence at AMTZ has procured the necessary machinery supporting manufacturing of PCBA for Medical Electronics and Bio 3D Printing applications. AMTZ has a self-sustainable model and it acts as one stop solution for all kinds of medical device manufactures and startups. The funds released by MeitY are being used for purchasing of capital equipment only. The CoE, since its inception has been providing functional research support for innovators, manufacturers, researchers on medical devices and has led to the following achievements:

  ➤ Skill building on ESDM has led to 82 trained professionals.

  ➤ Design, Prototype and Manufacturing for ESDM has enabled PCBA line installation

which supports production of 10,000 units of ventilators, 5,000 Oxygen Concentrators, 100 units of Defibrillator.

➤ Electro Bio Physics research has enabled development of prosthetic arms and prototyping of electro-bio organs.

➤ Ongoing research at Centre for Bio-physics include development of 3D bio printed synthetic ears.

➤ 10 startups have been supported so far.

3.13 Establishment of Gallium Nitride (GaN) Ecosystem Enabling Centre and Incubator (GEECI) at Society for Innovation and Development (SID), IISc Bengaluru

MeitY has awarded the project to Society for Innovation and Development (SID), IISc Bengaluru for "Establishment of Gallium Nitride (GaN) Ecosystem Enabling Centre and Incubator (GEECI) for High Power and High-Frequency Electronics" at Centre for Nano Science and Engineering (CeNSE), Bengaluru with budget outlay of ₹334.30 Crore. The project envisions to nucleate an end-to-end ecosystem for enabling GaN based electronics manufacturing in the country for power and RF electronics. The incubator will be a R&D foundry dedicated to GaN that will function to generate its own IP, generate IP for industries based on their problem definition for a fee and provide foundry services for pilot scale manufacturing. The Objective of the Project is to establish GaN based Development Line Foundry facility for RF and Power applications and to incubate startups and Entrepreneur-in-Residence.

Clean Room

RF Load Pull

The project is expected to meet India's strategic RF needs and develop devices that can be used to make prototype systems for the emerging 5G and power applications. Establishment of GaN foundry facility as part of the Incubator will help to stimulate the flow of capital and technology, create employment opportunities, promote higher value addition in the electronic products manufactured in the country, especially in RF and power applications, including strategic applications, reduce dependence on imports and give thrust to the Hon'ble Prime Minister's clarion call for "AtmaNirbhar Bharat''.

DUV Stepper

Contact Lithography

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International Cooperation

With the Government's outlook on Digital Diplomacy, Digital Economy and launch of Digital India Program **(DIP)**, MeitY has synergized its efforts to expand IT/ITeS sector globally including diversification of geographies, domain expertise, High Skill Work Forces to enhance business opportunities. Efforts have also been made to evolve strategic cooperation with potential foreign partners in emerging and frontier areas of ICT under bilateral and multilateral framework of cooperation. The Ministry regularly engages with various Governments including academic and industrial bodies for forging partnerships for mutual progress, also provide an opportunity for sharing of knowledge and experience. The International Cooperation Division **(ICD)** has been involved in the following tasks:

- Aligning foreign collaboration activities in India's 'Digital India Program' and 'Make in India' initiatives of the Government of India.

- Strengthen India's position on multilateral forums for the different issues like Digitalization, Digital Divide, Digital Government, Digital Infrastructure and Gender Divide etc.,

- Creating a conducive environment for international cooperation to help industries to cooperate with the industries of other countries.

- Fostering, encouraging and promoting research and development in the application of Information Technology related facilities.

- Coordinating technical and policy issues with international bodies/institutions like G20, UN & its associated organizations (UNESCO,

UNCTAD, UNDP, ECOSOC, ESCAP etc.), ASEAN, SCO, BRICS, SAARC, WSIS, World Bank, WTO, ADB, World Economic Forum (WEF) etc., to safeguard India's interest.

- Initiating joint projects like IT institutes, software parks, programmes for joint R&D and facilitating IT Advisers etc.

- Showcasing India's ICT strength across various international forums by organizing, sponsoring and participating in trade fairs, symposiums, exhibitions etc.

The ICD of MeitY has been pursuing the above objectives through MoUs, Joint Working Groups (JWG) meetings, Multilateral deliberations/ negotiations, Projects in other geographies/ countries, participating in major International events to showcase India's strength and enhance business opportunity for Indian IT/ Software Industry. Also, issues faced w.r.t India's IT exports and mobility of Indian IT professionals have been handled at various bilateral and international forums from time to time.

4.1 Multilateral Cooperation

Introduction

To safeguard India's interests and advocate for the nation's digital transformation journey on the international stage, MeitY has been engaging with several multilateral fora. Multilateral Cooperation activities encompass deliberations, negotiations and coordination of technical and policy issues with key international bodies and institutions such as the G20, G7, BRICS, SCO, WTO, UN-ESCAP/ APCICT, BIMSTEC, World Bank, ADB, Commonwealth, IPU, ITU, ASEAN, SAARC, OECD, IPEF, QUAD, and others in the IT/ Software and Electronics Sectors.

Participation in these diverse multilateral gatherings served as a significant platform for India to

underscore its commitment to digital progress and to foster partnerships with nations through various inter-governmental and multistakeholder groups. This active involvement allowed India to highlight its achievements in the field of digitalization and to explore opportunities for cooperation, aligning with its vision for a digitally connected and inclusive global economy. By participating in these meetings, India has been able to strengthen its diplomatic and technological presence while furthering its mission to become a global leader in the digital era.

4.2 Key Achievements

4.2.1 G20 Digital Economy Working Group (DEWG) under india's presidency

- **India had assumed the Presidency of G20** for the period of one year from December 1, 2022, to November 30, 2023. MeitY, as the nodal ministry for DEWG, hosted DEWG and the Digital Economy Ministers' Meeting (DEMM) during India's Presidency.

First Meeting of Digital Economy Working Group at Lucknow (14–15 February, 2023)

- As part of India's G20 Presidency, MeitY led the G20 DEWG, which had identified three priority areas, namely **DPI, Security in the Digital Economy, and Digital Skilling.** Multilateral under ICD prepared multiple deliverables pertaining to these priority areas such as Concept Notes, Agenda, Toolkits, Outcome Documents and likewise. Over the eight months of extensive discussions among G20 members, guest countries, and International Organizations on the various aspects of the priority areas and key deliverables.

Hon'ble Dignitaries Addressing the G20 Side Events' participants

- The first, second and third meetings of the DEWG were organized at Lucknow, Hyderabad, and Pune in February 2023, April 2023, and June 2023, respectively.

- The Fourth DEWG (August 16-17) and Digital Economy Ministers' Meeting (DEMM) (August 18) was held in August, 2023 at Bengaluru. The Ministerial Meeting was a culmination of the four DEWG Meetings.

- Hon'ble PM, addressed the ministers and delegates and underlined that India's digital transformation is powered by its unshakeable belief in innovation and its commitment to speedy implementation while also being motivated by the spirit of inclusion where no one is left behind.

- Shri Ashwini Vaishnaw, Hon'ble Minister of Railways; Communications; and Electronics and Information Technology chaired the Ministerial Meeting and shared PM's vision of 'democratising technology', emphasised global collaboration for DPI, digital economy, and digital skilling.

Hon'ble PM Modi & Hon'ble MEIT congratulating the G20 Delegates during DEMM

Key Achievements of Digital Economy Working Group (DEWG)

After deliberations, the G20 Digital Economy Ministers adopted the ambitious & forward-looking Outcome Document and Chair's Summary which reiterates the priorities of the Working Group and strengthens commitments on the following deliverables:

- Framework for Systems of DPI.

- One Future Alliance (OFA) for financing DPI in LMICs.

- Global DPI Repository (GDPIR).

- G20 High-Level Principles to Support Businesses in Building Safety, Security, Resilience and Trust in the Digital Economy.

- G20 Toolkit for Cyber Education and Cyber Awareness For Children and Youth.

- G20 Roadmap to Facilitate Cross Country Comparison of Digital Skills.

- CoE Fostering Digitally-Skilled Talent.

- Over 100 bilateral meetings during the Fourth Meeting of DEWG and DEMM, Bengaluru

- Participation of 200 + delegates in DEWG and DEMM

Other Highlights:

- Launch of two DPI Knowledge Products: Accelerating the SDGs through DPI and The DPI Playbook.

- Participation of 1000+ people in the side events.

- 3 MoUs signed between India & 3 other countries (Armenia, Sierra Leone, and Suriname).

Suriname

Sierra Leone

Armenia

- G-20 Digital Innovation Alliance (DIA) Summit on August 17-19, 2023:

  ➤ Platform to bring together the digital innovation and start-up ecosystem

  ➤ 6 Themes: AgriTech, Circular Economy, EdTech, FinTech, and HealthTech

  ➤ Over 5000 registrations for the Summit

  ➤ 119 Start-ups from 23 countries 6 Winners under each theme

Inauguration of DIA Summit was graced by Shri Rajeev Chandrasekhar, Minister of State for Electronics and Information Technology and Skill Development & Entrepreneurship, Shri Alkesh Kumar Sharma, Secretary– MeitY, Shri. Akash Tripathi, Joint Secretary– MeitY, and Ms Debjani Ghosh, President - NASSCOM

Global DPI Exhibition

- Digital India Mobile Van - Experiencing Digital Transformation
- An "Ask AI" exhibit for visitors' interactions
- An interactive table showcased various Indian government initiatives on AI

- A Virtual Reality (VR) tour of Lucknow in a 360-degree digital representation of the city
- "Ask Gita" an interactive AI installation for interaction with the Bhagavad Gita

Flagging off of the Digital India Mobile Van in Lucknow by Hon'ble Chief Minister, Uttar Pradesh on Feb 5, 2023

a. India's Presidency of SCO 2023

- In 2022-23, under India's SCO chairmanship, MeitY, serving as the Nodal Ministry for the Special Working Group (SWG) on Modern Information & Telecommunication Technologies (MITT), played a pivotal role.

- MeitY convened two (2) meeting of the SCO Expert Working Group (February 28, 2023 and May 8, 2023) wherein "Concept for the Development of DPI for Distributing Digital Technologies Among the Population (Digital Inclusion) and Promoting Innovations" was discussed and finalized. Subsequently, the Concept of DPI was approved by the representatives of the SCO member states during the "Session of Heads of Ministries and Agencies of the SCO Member States Responsible for Information and Communication Technologies" held on 13th May 2023.

- Shri Ashwini Vaishnaw, Hon'ble Minister of Railways; Communications; and Electronics

and Information Technology chaired the Ministerial Meeting which was held virtually. Hon'ble Minister emphasised on "India stack" being interoperable and resulting in higher digital inclusion among SCO members. He encouraged fellow SCO members to assess, evaluate, and adopt India Stack to benefit from its DPI. Also, he emphasized the importance of this DPI in ensuring completion, democratizing technology, and promoting digitally inclusive growth among member states.

4.3 Bilateral Cooperation

During the year 2023, bilateral cooperation activities with other countries in the field of Electronics & IT have been taken up in line with nation's bilateral engagements:

- The 1st Working Group meeting on "Strategic Technologies, Digital Governance and Digital Connectivity" under EU-India Trade and Technology Council (TTC) followed by a Business Round table meeting, was held on May 3, 2023 in hybrid mode jointly chaired by Secretary, MeitY and Director General, DG CONNECT (European Commission) and discussed Cooperation in High Performance Computing and Quantum Technologies, Supply Chain Resilience, Digital Skills, DPI, AI, Telecom and IT Standardisation.

- 1st meeting of India-EU TTC was held on May 15-16, 2023 in Brussels, jointly chaired by Executive Vice-Presidents in presence of Hon'ble EAM, CIM and MoS (E&IT).

- Hon'ble MEIT presided over the Second India-EU TTC Ministerial meeting on November 24, 2023. Based on the outcome, a workplan 2023-24 has been agreed upon. India and EU signed an MoU on Semiconductor on November 21, 2023.

- An inter-ministerial delegation led by Secretary,

MeitY visited USA in May 2023 to deliberate upon areas like electronics manufacturing including semiconductor, DPI, emerging technology, digital skills, Telecom standardisation, pilots in 5G, ORAN, Interoperability of payment and remittance through UPI, etc.

- A virtual meeting between India and Germany was held on May 2023 where both sides virtually signed the Indo- German Digital Dialogue Work Plan 2023-24. The Work Plan 2023-24 focusses on key areas like i) Internet governance, data policy, and IT security; ii) Emerging technologies; & iii) Digital business opportunities and models.

- To synergize the bilateral cooperation with foreign countries in DPI, MeitY organised the Global DPI Summit in June 2023 at Pune, which was inaugurated by Hon'ble MoS (E&IT). During the Summit, 4 MoUs on DPIs were signed with Armenia, Antigua and Barbuda, Suriname and Sierra Leone.

- Joint India-EU Workshop on High-Performance and Quantum Computing under the India-EU Intent of Co-operation Program was held in June 2023, at C-DAC Pune. It outlined extreme uses of supercomputing power in the areas of HPC & Quantum Computing, Bioinformatics, Climate Change and Natural Hazard.

- A meeting between Joint Secretary, MeitY and the delegation from Netherlands led by Director, Innovation and Knowledge, Ministry of Economic Affairs & Climate Policy, was held on July 7, 2023 at MeitY. Various schemes including Semicon were briefed to Netherlands side and proposed for collaboration with Netherlands.

- An MoU between MeitY and the Ministry of Economy, Finance and Industrial and Digital Sovereignty of the French Republic was

signed on July 13, 2023 for cooperation in the field of Digital Technologies, particularly in the fields of supercomputing, cloud computing, AI, and quantum technologies, including the framework of the GPAI.

- On July 14, 2023, an agreement was executed between NPCI International and Lyra Network of France to implement Unified Payment Interface (UPI) in France and Europe. Post launch of the UPI payment mechanism from the iconic Eiffel Tower in Paris, Indian tourists can make payments in France through UPI.

- A meeting between Shri Ashwini Vaishnaw, Hon'ble Minister for Electronics and Information Technology and a high-level delegation led by H.E. Mr. Yasutoshi Nishimura, Minister of Economy, Trade and Industry of Japan was held on July 20, 2023. During this meeting, an MoC was signed between MeitY and the Ministry of Economy, Trade and Industry (METI), Japan on Japan-India Semiconductor Supply Chain Partnership under India-Japan Digital Partnership and India-Japan Industrial Competitiveness Partnership.

- The first India-Japan Semiconductor Policy Dialogue was held on 10.11.2023 in hybrid mode, under the co-chairmanship of Secretary, MeitY and Mr. Satoshi Nohara, DG, METI, Japan to converse about the bilateral collaboration on opportunities to advance resilient semiconductor supply chain. More than 130 companies participated in the policy dialogue from both the sides.

- A technical delegation led by NPCI visited Japan in July 2023 to discuss UPI with various Japanese stakeholders in the digital payments domain.

- MeitY and Papua New Guinea signed an MoU on 'cooperation in the field of Sharing Successful Digital Solutions implemented at Population Scale for Digital Transformation' on July 28, 2023.

- A meeting between Secretary, MeitY and Minister of Digital Transformation, Trinidad and Tobago was held on August 7, 2023 in MeitY. Discussions centered on digital identity and institutional mechanism by UIDAI, Digital Locker and Open-Source Software Products by NeGD; and Digital Payment by NPCI.

- A courtesy meeting was held on August 8, 2023 between Hon'ble MoS (E&IT) and Minister of Digital Transformation, Trinidad and Tobago at Shram Shakti Bhawan. Also, the T&T delegation visited C-DAC, Noida on August 8, 2023 and NIELIT on August 9, 2023 to discuss and explore opportunities in e-governance, High performance Computing and Digital Skilling.

- An MoU was signed with Trinidad & Tobago on August 11, 2023 on 'Cooperation in the field of sharing successful Digital Solutions implemented at Population Scale for Digital Transformation'.

- An MoC between Ministry of Communications and Information Technology (MCIT), Kingdom of Saudi Arabia & MeitY, Government of India in the field of Digitisation and Electronic manufacturing, was signed on August 18, 2023 in Bengaluru. It aims to enhance cooperation in SMEs and Start-ups, knowledge sharing in new and emerging technologies, electronics system design and manufacturing and technical development and expansion in the markets of the ICT sector.

- To explore synergies and exchange views about the potential investment prospects in India's Electronics & Semiconductor Sector, a Taiwanese delegation comprising prominent electronic enterprises, visited India

in September 2023. A meeting under the chairmanship of Secretary, MeitY was held on September 22, 2023 in MeitY.

- A virtual meeting was organised with EU on September 27, 2023 regarding interoperability between India's DPI and the EU Digital Identity Wallet. The agenda of the virtual meeting included discussions on EU's Large-Scale Pilots for testing the EU Digital Identity Wallet reference implementation; review of digital payment initiatives within the Large-Scale Pilots; and overview of the Architecture Reference Framework.

- An MoU was signed on October 9, 2023 between MeitY and the Ministry of Information, Communication and Information Technology of the United Republic of Tanzania on "Cooperation in the field of sharing successful Digital Solutions implemented at Population Scale for Digital Transformation".

- Shri S. Krishnan, Secretary, MeitY met with UK PM's Deputy representative for AI and Director- International and Economic Security, Department for Science, Innovation and Technology on October 12, 2023 in MeitY to discuss bilateral cooperation activities in the digital sector between the two countries.

- An Indo-German knowledge exchange session on data protection was organised on October 20, 2023 within the Indo-German Digital Dialogue. It was aimed at enhancing understanding of data policies in Germany and India. The discussions focused on frameworks, challenges, and both sides shared insights on EU GDPR and India's DPDP Act, 2023.

- Hon'ble MoS addressed the inaugural plenary session at the 'AI Safety Summit 2023' at Bletchley Park, Buckinghamshire in the UK on November 1-2, 2023. He emphasized on India's perspective on AI and, India's commitment to AI with a strong focus on safety, trust, and accountability.

- An Annual Meeting of the Indo-German Digital Dialogue (IGDD) co-chaired by Mr. S. Krishnan, Secretary, MeitY from Indian side and Mr. Stefan Schnorr, State Secretary, BMDV from German side was held on 4th December 2023 in Hybrid Mode to promote stronger economic relations in the field of digitalisation and ICT. Both sides discussed current priorities and agreed on focus topics and activities of the dialogue in the background of the jointly agreed Work Plan for 2023 and 2024.

- The World Economic Forum (WEF) Annual Meeting took place in Davos, Switzerland from January 15-19, 2024. A delegation from MeitY led by the Hon'ble MEIT, participated in this forum.

- An MoU was signed on 'Cooperation in the field of Sharing Successful Digital Solutions Implemented at Population Scale for Digital Transformation' between MeitY and Ministry of Communications, Cuba on January 19, 2024.

- On February 16, 2024, Shri Rajeev Chandrasekhar, Hon'ble MoS (E&IT) and Mr. Mauricio Lizcano, Minister of ICT of Colombia, met and exchanged an MoU on 'Cooperation in the Field of Sharing Successful Digital Solutions Implemented at Population Scale for Digital Transformation' viz. 'INDIA STACK'.

- Hon'ble MEIT attended and addressed a session on 'Digital Public Infrastructure' at the Web Summit Qatar 2024, on 27 February, 2024 in Doha, Qatar.

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Chapter 5

Innovate and Design in India

5.1 Creation of Research Eco-System

5.1.1 National Supercomputing Mission (NSM) & High-Performance Computing (HPC)

Under the National Supercomputing Mission (NSM), approved by the Cabinet Committee on Economic Affairs (CCEA) in 2015, through C-DAC MeitY is engaged in indigenous R&D in petascale computing systems encompassing HPC Components (including processor, server board, interconnect, cluster, cooling system), HPC System Software, HPC Applications, and HPC Solutions and Services. It is mandated to design and develop Indigenous supercomputers targeted at Exascale ecosystem in a phased manner from "Assembly" to "Manufacturing" to "Design and Manufacturing" of HPC systems and deployment of petascale computing systems across the country. NSM aims at Atmanirbhar Bharat in HPC for undertaking investigation by scientific community of the country.

Figure : Inauguration of PARAM Kamarupa at Guwahati by Hon'ble President of India

Till March 2024, C-DAC has deployed 17 systems at IISc, IITs, IISER, IUAC, JNCASR, NABI, NIC under Phase-1, Phase-2 and Phase-3 with a cumulative compute power of more than 29.5 Petaflops. Three systems comprising PARAM Shivay (838 TFLOPS) at IIT (BHU) Varanasi, PARAM Brahma (1.7 PFLOPS) at IISER Pune, and PARAM Shakti (1.66 PFLOPS) at IIT Kharagpur under Phase-1, twelve systems comprising of PARAM YUKTI (1.8 PFLOPS) at JNCASR Bangalore, PARAM Siddhi-AI (210 AI PFLOPS/ 6.5 PFLOPS) at C-DAC Pune, PARAM Utkarsh (838 TFLOPS) at C-DAC Bangalore, PARAM Sanganak (1.66 PFLOPS) at IIT Kanpur, PARAM Pravega (3.3 PFLOPS) at IISC Bangalore, PARAM Smriti (838 TFLOPS) at NABI Mohali, PARAM Seva (838 TFLOPS) at IIT Hyderabad, PARAM Ganga (1.66 PFLOPS) at IIT Roorkee, PARAM Ananta (838 TFLOPS) at IIT Gandhinagar, PARAM Porul (838 TFLOPS) at NIT Trichy, PARAM Kamrupa (838 TFLOPS) at IIT Guwahati, and PARAM Himalaya (838 TFLOPS) at IIT Mandi under Phase-2 and two systems comprising of PARAM Rudra (3.1 PFLOPS) at IUAC New Delhi and PARAM System (50 AI PFLOPS/ 1.5 PFLOPS) at NIC Delhi under Phase-3 are operational. These systems cater to the computational demands of academia, researchers, MSMEs, and startups in areas of national and strategic importance.

A significant number of components utilized in building Phase-3 systems are designed, manufactured, and assembled locally, which include C-DAC's Rudra servers and HPC Software Stack. A wide range of applications from scientific & engineering and data science domains are optimized and scaled for underneath architecture/ processor. These systems are accessed by more than 8100 active researchers and academicians from 224 institutes across the country on Nation

Knowledge Network (NKN). More than 94 lakh jobs have been executed on these systems till March'24 by more than 1400 PhD research scholars, who have collectively published around 1,200 research papers in leading journals in India and overseas.

5.1.1.1 PoC for implementation of AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT)

In addition to the above, C-DAC has realized PoC for AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT) of 200 AI PFLOPS. It acts as a common computational cloud platform for Big Data Analytics and Assimilation with a large, power-optimized AI cloud infrastructure connecting all Centers for Research Excellence in AI (COREs), Indian Centers for Transformational AI (ICTAIs), and other Academic, Research Labs, Scientific Community, Industry and Start-Ups institutions with NKN. It empowers Academia, Research Labs, the Scientific Community, Industry, and Start-Ups to develop indigenous AI enabled products and solutions. Along with PARAM SIDDHI–AI system, installed earlier, HPC-AI infrastructure of AIRAWAT PoC makes the cumulative compute capacity of 410 AI PFLOPS.

Figure : AIRAWAT-PARAM SIDDHI-AI, ranked at No. 75 in 'TOP500 Supercomputer List – June 2023' and declared during International Supercomputing Conference 2023 (ISC23) at Germany.

5.1.1.2 Indigenous Rudra-I server

C-DAC's indigenously designed Rudra-I server platform is built for ½ width 1U and ½ width 2U form factor. Maximum supported Thermal Design Power (TDP) is up to 600W. Baseboard Management Controller (BMC) firmware for Rudra-I is used for server management. Rudra-I is targeted for Hyperscale Data Centers in addition to HPC, Cloud, Edge Computing, and Communication. It is poised to ensure India's self-sufficiency (ATMANIRBHAR BHARAT) to Design, Develop, and Deliver as per the country's needs, and has critical strategic and national importance.

Phase-3 systems under build approach of NSM are built using Rudra-I server. Earlier in July 2022, C-DAC signed a contract with VVDN for production of Rudra-I servers. Mass production started in August 2023. C-DAC has partnered with M/s VVDN and M/s Kaynes technologies with technology transfer of server design for proliferating Rudra servers in the commercial server market.

C-DAC is working on the Rudra-II server in collaboration with Intel and, the HDR switch in collaboration with Nvidia. RUDRA-II is based on Intel's 4th generation Xeon Scalable Processor (Sapphire Rapids). Rudra series servers support 1/10G Ethernet, HDR/NDR NIC slot, and SSD/SATA. Rudra-II server is designed with effective thermal design to support up to 350W TDP processor.

Figure 1: Rudra-II: CPU-CPU
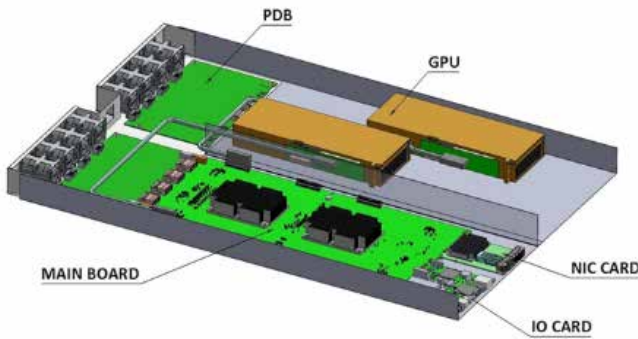
Figure 2: Rudra-II: CPU-GPU

Rudra-I has an exceptionally greater acceptance and has an edge in security conscious environments and businesses. HPC applications were benchmarked on Rudra-I server and performance was found at par with clusters with commercial servers elsewhere.

5.1.1.3 Indigenous HPC Network – Trinetra

C-DAC's Trinetra interconnect development is aimed at Indigenous Exascale network design, allowing for scalability to hundreds of thousands of compute nodes without need for dedicated switching hardware. It consists of Trinetra-A (Currently in production), and Trinetra-B (Under Development).
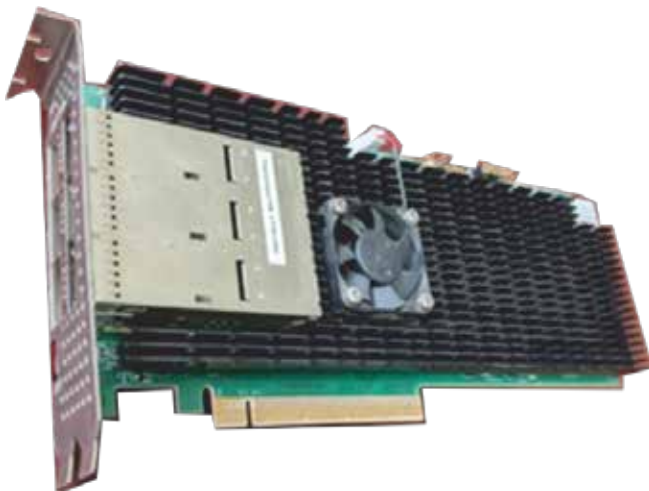
Figure 1: Trinetra-A NIC

Trinetra-A, a 4th generation network is an interconnect of 600 Gbps (100Gbps*6) throughput and supporting 3D Torus network topology for HPC. Multiple hardware and software components realize high bandwidth, low latency, scalable network fabric supporting industry-standard programming interfaces. OFED compliant software stack supports Industry standard programming interfaces such as Message Passing Layer (MPI) and legacy TCP/IP using emulation.

Figure 2: Trinetra-B

Trinetra-B is based on 200Gbps physical link layer technology and its design uses 10 such links to realize the 'Supercluster' topology which is an improvement over the 3D Torus used by Trinetra-A. The prototype of Trinetra-B hardware was validated using the Bit Error Test (BERT) level. Aggregate throughput from Trinetra-B physical link layer is 2 Terabits/sec, full duplex. To achieve such high data rates, several critical high speed PCB design and Signal Integrity (SI) validation techniques have been used. Work on porting of NCC chip and software is currently under progress.

5.1.1.4 Direct Contact Liquid Cooled (DCLC) System

In order to cool the HPC server using liquid cooling technology, a Coil-on-Chip Liquid Cooling System was designed in collaboration with IIT Bombay.

It was optimized using CFD, and fabricated to extract heat load up to 330 W (165 W from each processor) to cool Rudra server board.
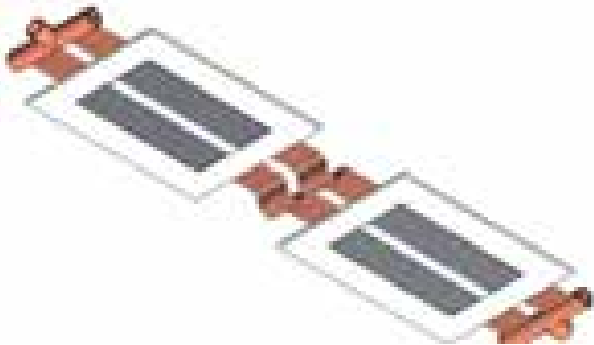
Figure: A 330 W coil on chip-based cooling system for Rudra Server

5.1.1.5 Special Purpose Computer for Molecular Dynamics (SPC-MD) Simulation: Architecture Exploration

Optimized 3D FFT was implemented on two Alveo U200 board (Xilinx development board) with own FPGA-to-FPGA interconnect for communication between them. Multi-FPGA 3D-FFT IP design was verified on Alveo board. A design of prototype board with different functional blocks was finalized.

5.1.1.6 NSM India Portal [www.nsmindia.in]

NSM India portal provides detailed information about NSM project and related ongoing activities, updates, training programs. It includes live chart of number of jobs submitted using API, derived from C-Chakshu monitoring platform.

5.1.1.7 Human Resources

C-DAC conducted 6 months PG diploma course in HPC System Administration and HPC Application Programme Development under NSM during March 2023 – August 2023 and September 2023 – February 2024. Under NSM, more than 20,000 next generation of HPC aware manpower trained till March 2024, comprising Students, Researchers, and Faculties through the organization of Faculty Development Programs, Workshops, Bootcamps, and Hackathons.
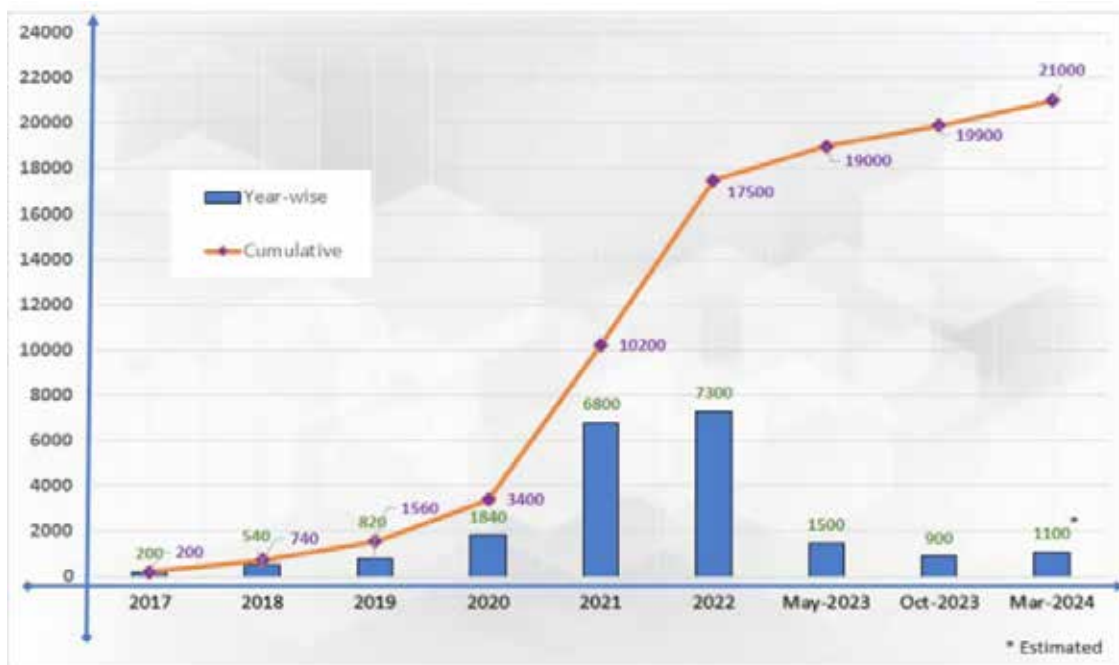
Figure: Year-wise HPC Aware Manpower vTrained

The following activities were carried out under NSM-HRD during 2023-24:

- Training School on WRF Modeling System in association with South Asian Metrological Association (SAMA)
- HPC Workshop at NIT Trichy
- GPU BOOTCAMP in association with SERC, IISc, and Nvidia
- NSM-Nvidia Domain Specific Training
- oneAPI online AI Hackathon in association with Intel
- NSM HPC/DL Awareness Bootcamp at IIT Roorkee
- NSM HPC/DL Awareness Bootcamp at IIT Mandi
- One day GPU training & user meet at NIT Trichy, NABI Mohali and IIT Hyderabad

5.1.1.8 Application Porting, Optimization and Scaling services

Using Spack, 300+ applications/ libraries/ tools in molecular dynamics, computational fluid dynamics, weather prediction, material science, computational chemistry, bio-informatics, physics, ML, DL, and other domains were deployed on NSM sites. System acceptance tests were completed for NSM Systems at multiple sites.

ANUGA hydrodynamic model for flood prediction, was optimized on Intel Cascade Lake cluster to produce timely flash flood forecasts in Mahanadi delta. The simulated output was verified using ground observations and microwave Sentinel satellite data. Optimizations were carried out for Mahanadi delta with mesh resolution of 900 square meters, 300 square meters and 100 square meters. Partitioning of 5.8 Crore triangles with a mesh resolution of 300 square meters was achieved by upgrading the partitioning library. Efforts are ongoing to run simulation with a mesh

resolution of 100 square meters for making early warnings with superior output within a realistic time and rewrite code to run simulation on GPU cluster.
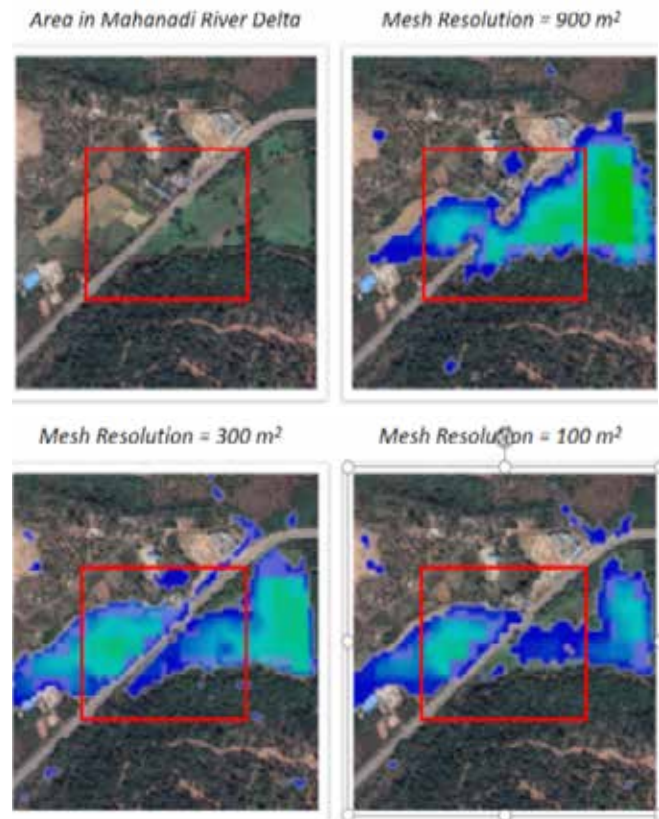
Figure: Mahanadi-Delta 11372 Sq Km; 900, 300 and 100 square meter mesh resolution

CUDA based SeisAcomod-2D was ported to DPCPP (SYCL) Intel oneAPI DPC++ to make it runnable on Intel GPU. This enabled single unified source code to be run on Intel Data center GPU Max and Nvidia A100 GPUs along with Intel CPU.

An indigenous finance modeling software stack is being explored for PARAM clusters using python and Julia packages. Stock market's historical data (40 years) from NSE, India was integrated with live streaming data and tested on a multicore system. Multiple use cases are being implemented for PARAM clusters.
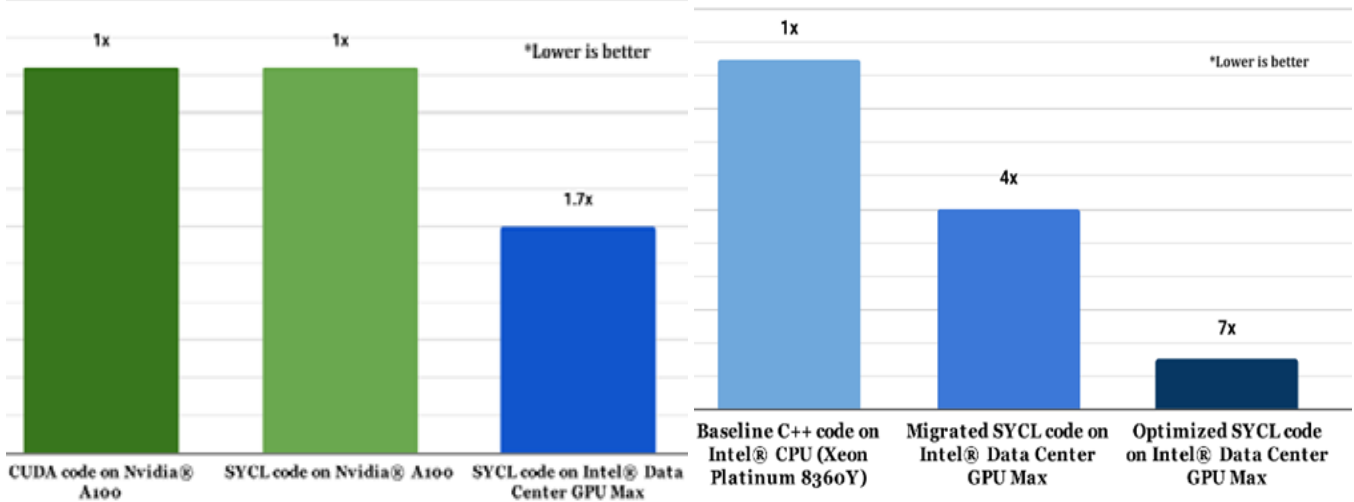
(a) Performance of SYCL code NVIDIA GPU and Intel GPU

(b) Performance of SYCL code on Intel CPU and GPU
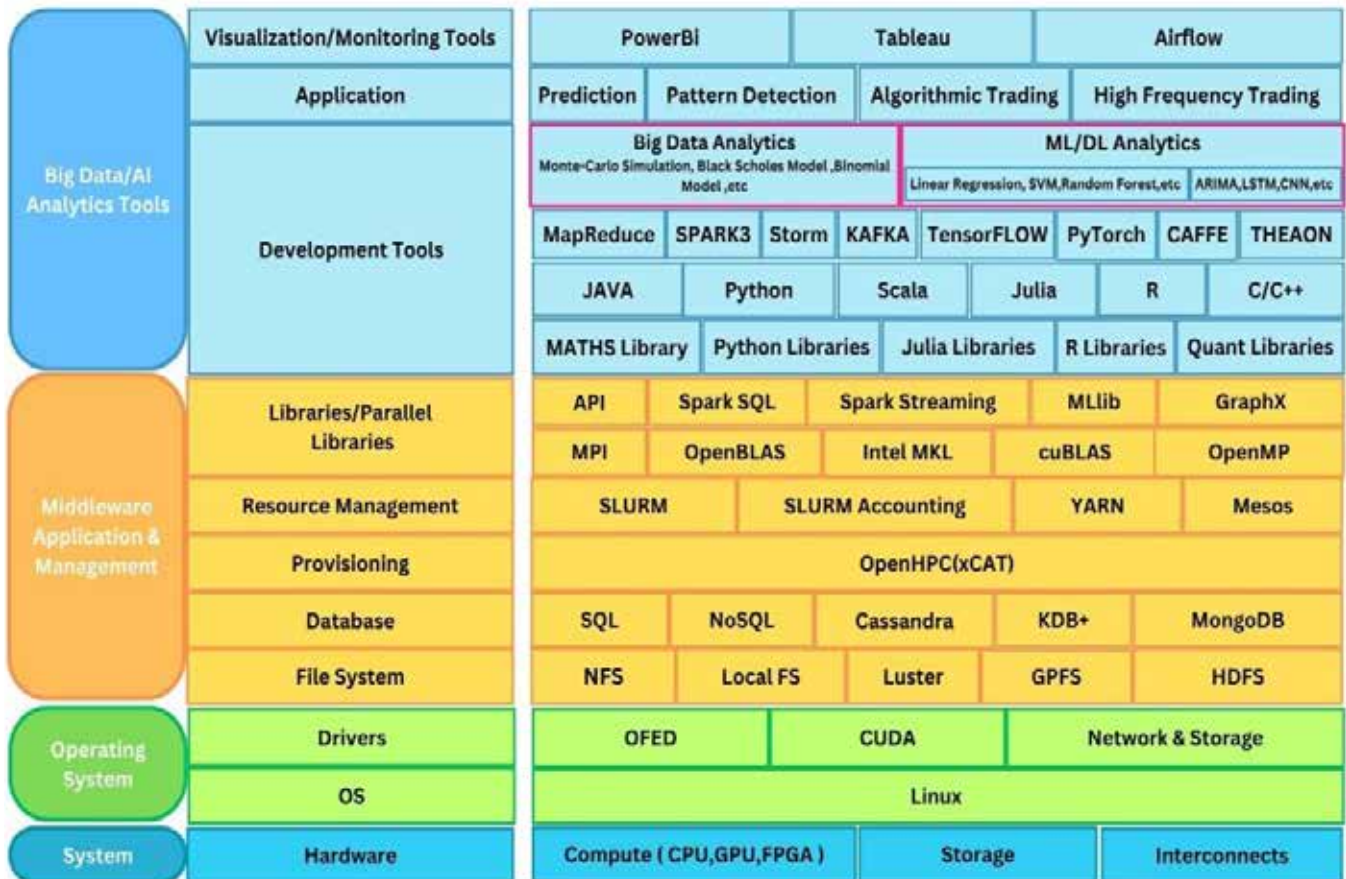
Figure: Finance Domain Software Stack

AMD Instinct MI200 Series accelerators were examined for HPC and DL workload to assess performance by AMD Instinct MI200 against NVIDIA A100. For DL workload TF-CNN Benchmarks were run with Resnet50 Model for a synthetic dataset.
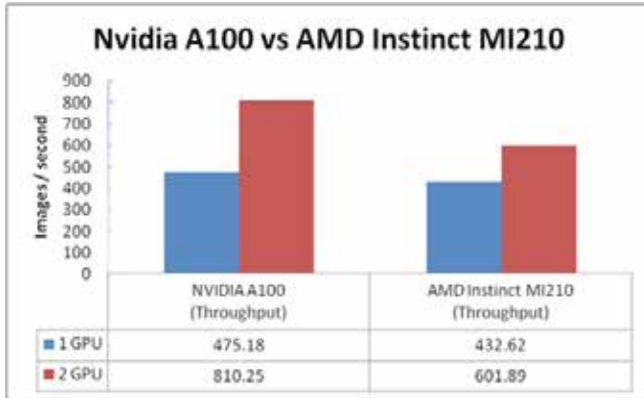
IPU system from Graphcore was explored to study and understand core compute model and its strength offered by architecture. Activities performed were: 1) POPLAR SDK for graph computation, developed computational graph for MLP; 2) IPU architecture and programming models; 3) Benchmarked IPU POD-16 system using ResNet-50 model with real and synthetic data by following different graph distribution strategies.
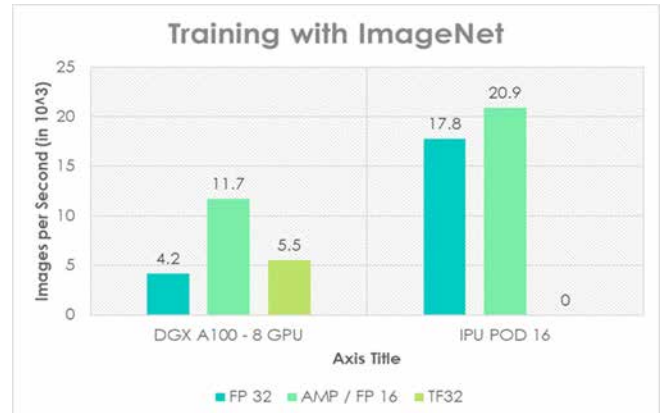
Resnet 152 inference benchmarks were explored on Rudra Server for cloud setup. Objective was to compare performance of RUDRA server cloud instances to AWS cloud instances. For OV-FP32 precision, OpenStack on Rudra and AWS performed alike.

User Behavior Analysis (UBA) searches for patterns of usage on HPC cluster that indicate unusual or anomalous behavior, regardless of whether the activities are coming from an anomalous user or actual user, or even malware or other processes. sshd system logs were analyzed to get parameters like login time, Ip address, user, etc.

5.1.1.9 Early warning system for flood prediction in river basins of India

Since 2020, the simulation runs for predicting floods for the Mahanadi River Basin are being carried out by C-DAC and since 2022, the 2-days flood forecasts and percentage village inundation information were shared with Central Water Commission (CWC) at Delhi and Odisha State Water Resources Department at Bhubaneswar.

A geospatial portal SimInu (Simulation of Inundation) was developed to disseminate flood early warning information to disaster managers enabling them to take timely & informed decisions. It boasts of a significant lead time of around 2 hours to forecast flood for next 48 hours. Flood

forecast (inundation and water level) information is available on-click over interactive map. Central to early warning system is a robust 2D hydrodynamic model "ANUGA Hydro". Currently, it is being implemented for Mahanadi River Basin at behest of user agency CWC.
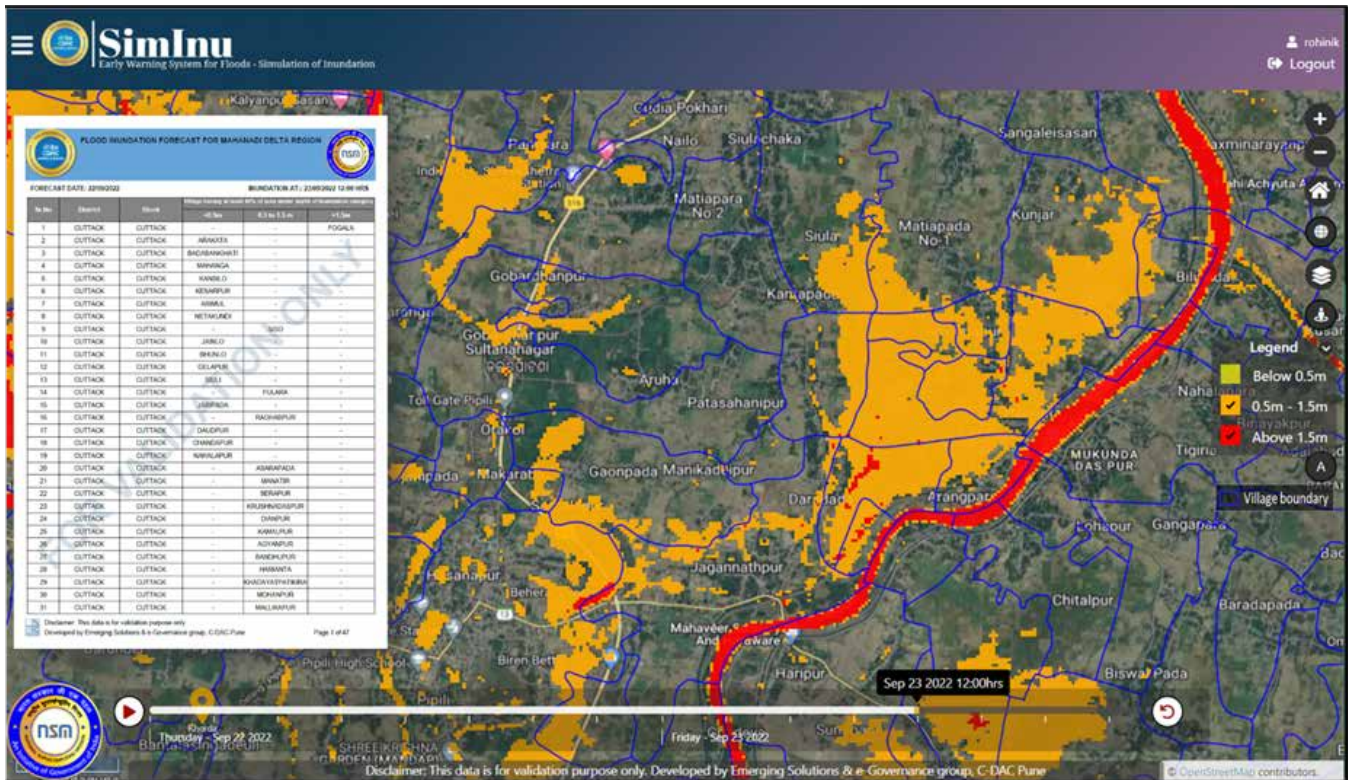
Figure: SimInu (Inset- Village level inundation report)

5.1.1.10 Development of multi-sectorial simulation lab and science-based decision support framework to address urban environment issues

Integrated meteorology, air quality and hydrology system aim at coupled modeling with urban parameterization, urban canopy, UHI, boundary layer, data assimilation of atmospheric, chemical and morphology data with business as usual and what-if scenarios test bed and interoperable cross-sectorial data, metadata and query framework. It has a multi-scale, multi-disciplinary modeling ecosystem as per the following:

A. Setup WRF model for daily weather forecast and heavy rainfall events over Pune, Bhubaneswar, and Bengaluru

B. Sensitivity analysis and setup model for heat wave forecast over Pune, Bhubaneswar, and Bengaluru

C. Quasi-operational runs for heat wave forecast for five NSM cities namely Ahmedabad, Bhubaneswar, Pune, Bangalore and Delhi

D. Develop World Urban Database and Access Portal Tools (WUDAPT) Local Climate Zone (LCZ) maps into WRF model for heavy rainfall event simulation over Pune city

E. Develop an automated model execution framework for policy makers, general weather forecasts, warnings for the common man

F. Develop and Set-up of air quality forecasting system for Indian urban cities

G. Near-real time fire emission estimation and fire forecasting system for Delhi Air Quality

5.1.1.11 A HPC Software Suite for Seismic Imaging to aid Oil & Gas Exploration

SeisRTM, a Reverse Time Migration (RTM) software for seismic imaging of complex structures under the earth, is developed to perform RTM using Conventional Wavefield Saving, Boundary Wavefield Saving and Excitation Amplitude techniques. It includes utilities such as creating 2D geometry, 2D interpolation, conversion of binary model file to SEG-Y format, smoothing, padding, muting, stacking, frequency analysis, wavelet generation etc.

5.1.2 R&D and IP development

5.1.2.1 Blockchain Technology

Design and Development of a Unified Blockchain Framework for offering National Blockchain Service and creation of a Blockchain Ecosystem: MeitY has initiated an R&D project titled "Design and Development of a Unified Blockchain Framework for offering National Blockchain Service and creation of Blockchain Ecosystem". It is a consortium project with C-DAC centres (Hyderabad, Pune and Mumbai), NIC, SETS Chennai, IIT Hyderabad, IIIT Hyderabad and IDRBT Hyderabad as implementing agencies. The project aims at development of a unified Blockchain framework which enables a technology stack that would aid in rapid development of Blockchain applications, deployment of developed applications, emerge as a shared infrastructure and also enable cross domain application development. Technology Stack has been designed and developed for deployment with several components such

as dashboard for automated network setup, generic smart contract layer, authentication and authorization functions, certifying authority and enabling the same through Open APIs. As part of the project 5 patents and 30 Research Papers are published. Infrastructure is set up at two Data Centres. Application development with various Government departments is ongoing.

Blockchain and Machine Learning Powered Unified Video Know Your Customer (KYC) Framework: KYC is a financial industry requirement for customer identity verification. Video KYC is the process of establishing KYC over a video interaction session with the customer. While financial regulators permit Video KYC, it's currently done separately by different Regulated Entities (REs), causing repetitive KYC for customers and resource wastage. MeitY has initiated this research project to develop a Blockchain and Machine Learning Powered Unified Video KYC (VKYC) Framework which is envisaged as multiple regulated entities (REs) in the financial sector will collaborate to carry out VKYC of their customers and to share KYC data among themselves on a need-to-know basis. It is being implemented at IDRBT Hyderabad, IIIT Hyderabad and IIT Bhilai as implementing agencies. Team has developed a VKYC Chatbot with advanced features, including dialogue management, speech synthesis, language understanding, and automated speech recognition. Implemented advanced text-dependent speaker verification and face spoof detection methods. The team is building platforms to collect voice/textual conversational data in English and Hindi, as well as face data for testing speech recognition, synthesis, and face verification modules.

Open Challenge Competition for Development of Indian Web Browser with built-in CCA India Root Certificate: A browser is an important component for any digital transaction

over internet. It is also noted that our unique requirements, particularly those related to digital signing within the framework of Indian laws, have not been fully addressed by existing popular browsers. Furthermore, the existing web browsers do not support Transport Layer Security (TLS) certificates issued by CCA India. Symbolizing a significant step towards the spirit of AatmaNirbhar Bharat, the Indian Web Browser Development Challenge, an initiative of MeitY, Govt of India has been launched on August 9th, 2023. The initiative is being implemented by C-DAC Bangalore. The objective of the Indian Web Browser Development Challenge is to create an indigenous web browser, tailored for prevalent desktop operating systems and mobile platforms. It emphasizes adherence to W3C standards, incorporates its dedicated Trust Store housing, built-in CCA India root certificate and Seamless support for official Indian languages. Furthermore, it features all the functionality including parental controls Web Filters etc. Upon project completion, three web browsers will emerge: one as the winner and two as runner-ups.

5.1.2.2 Quantum Technology

Centre of Excellence in Quantum Technology (CoE-QT) : MeitY has also initiated a project CoE-QT which aims to lay a solid foundation for the field of Quantum technology in India, with a focus on the development of quantum processor, quantum communication, and quantum sensing solutions, as well as study of quantum interactions, quantum algorithms, and post-quantum cryptography. It is being implemented by Indian Institute of Science (IISc), Raman Research Institute (RRI), and C-DAC, Bangalore.

Key Achievements include advanced microfabrication technology, high-quality waveguides, superconducting detector facility, efficient light-chip coupling, and graphene-

based detectors. The project also focuses on the development of on-chip quantum communication networks utilizing optical fibres, and benchmarking of QKD protocols. The project also has significant scientific contribution towards quantum algorithms and simulations, post-quantum cryptography, the development of quantum random number generator, the demonstration of high dimensional free space QKD, the study and development of precision laser system, physical ion trap modules, and a precision magnetometer quantum sensor.
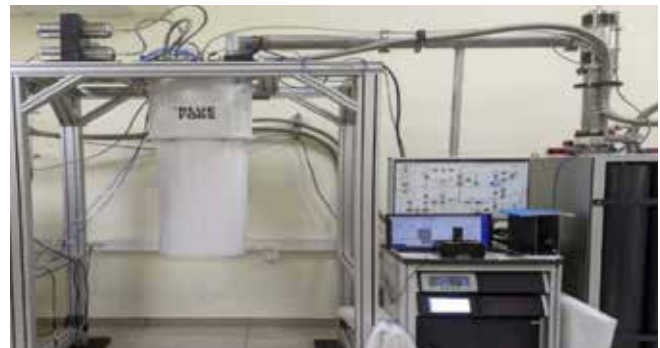
Figure : Facilities created at IISc-Bangalore

Quantum Computer Simulator (QSim) Toolkit and Capacity Building initiative : QSim Toolkit allows researchers to explore and develop Quantum algorithms and applications. It provides a realistic simulator considering the effects of noise. Project is being executed collaboratively by C-DAC, IISc Bangalore and IIT Roorkee. QSim is accessible via web portal at https://qctoolkit.in and has 6000+ active users. It is also available as a standalone system as PARAM SHAVAK QSim. The indigenous simulator is also ported for running quantum simulations on GPU platform.

As part of the project a month-long course on Quantum Computing utilizing the indigenously developed QSim was conducted online on weekends spanning from May 6th to May 28th, 2023. More than 2,000 participants attended the online lectures which were conducted by officials from IIT Roorkee and C-DAC which enabled participants to

grasp good understanding of Quantum Computing and explore the potential applications and implications of this cutting-edge technology. 915 participants appeared in the assessment & 733 participants completed the certification.
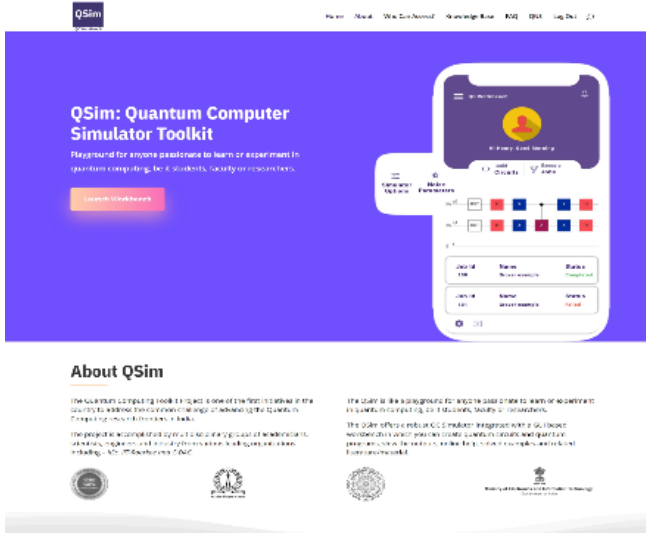
Figure 1: Web Portal of Qsim

Figure 2: Simulation of Quantum Circuit on Qsim Portal

Agile and Adhoc Free Space based Quantum Communication using Drone (D-QC):

MeitY has initiated a project on the D-QC, which is a potential candidate for reconfigurable aerial quantum nodes. The project will achieve indigenous design,

development and demonstration of aerial payload including indigenous quantum pointing acquisition and tracking system for performing quantum communication on a moving platform (vehicle).

Figure: QKD using Drone

This project will pave way for a state-of-the-art quantum technology demonstration bringing India amongst the front runners of quantum communication technology.

Development of a Quantum optical sensor based system to identify and categorize Arsenic and Lead in water even with very low concentration:

Identification of ultra fine trace elements in water, packaged food etc. is a much-needed requirement of the society. Existing measurement techniques have the limitation to identify them with limited resolution. A project has been initiated by MeitY to develop a quantum sensor-based array device towards the quality grading of usable water for several purposes (mainly drinking). The project is being implemented by C-DAC (Kolkata) and Tezpur University (Assam). The team has successfully synthesized and characterized Sensing material Fe@rGO for the detection of As. Optical fibre coupler successfully fabricated procured with sensing region.

HPC based Quantum Accelerators for enabling Quantum Computing on Supercomputers:

The Quantum Accelerator project, initiated by MeitY, is an effort to develop a quantum computing simulator platform, using high-performance computing capabilities of existing PARAM supercomputers. Its primary objective is to expedite the execution of quantum algorithms, harnessing the processing power of GPU, Vector, and FPGA cards, with a notable demonstration featuring the state-of-the-art Rudra GPU board. The outcome of this project is the establishment of a "Quantum Experience Centre".
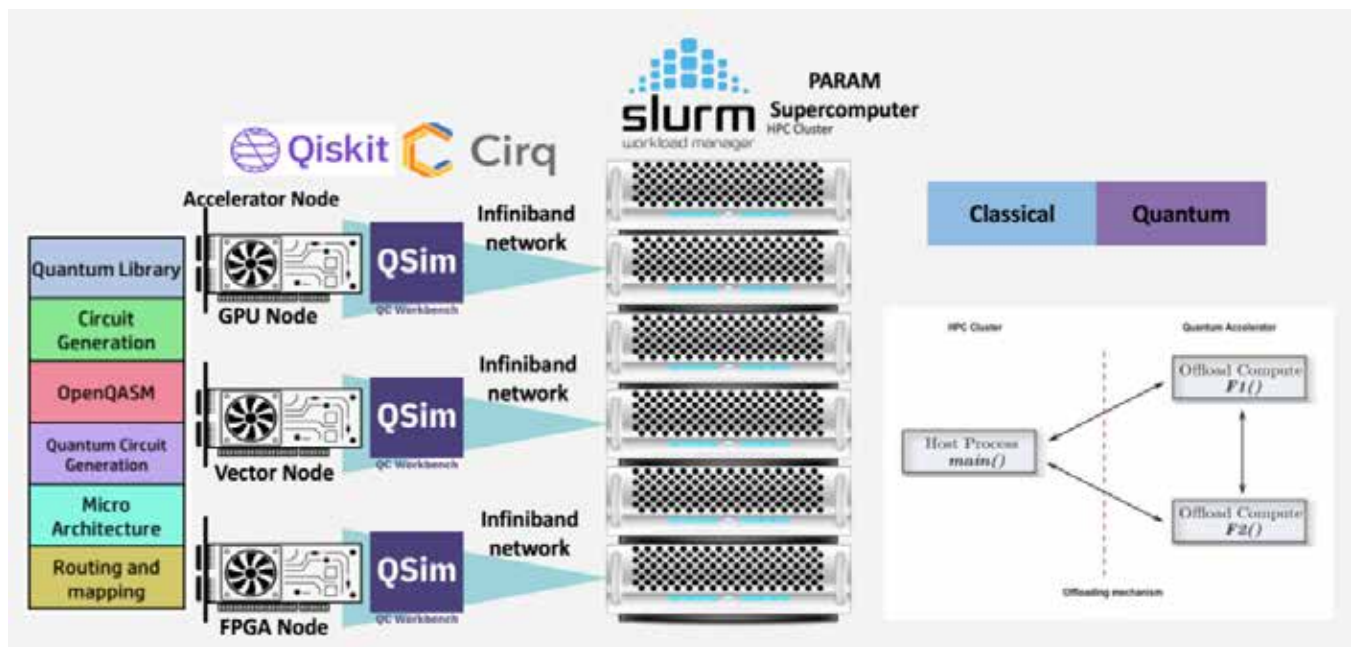
Figure : Quantum Accelerator Architecture

Development of Secure Post Quantum Public Key Infrastructure (PKI):

The advent of quantum computers threatens the security of existing PKI. To address this, MeitY has initiated a project "Development of Secure Post Quantum PKI" which is proposed to enable PKI with Post Quantum Cryptographic Algorithms, ensuring a secure PKI in the quantum computing era. The project brings multidisciplinary expertise of prestigious institutions such as C-DAC Bangalore, C-DAC Noida, IIT Madras, SETS Chennai and IIITD Kurnool. The objective of the project is to develop Post Quantum Crypto Token by implementing CRYSTALS-Dilithium (for Digital Signature Scheme) and CRYSTALS-Kyber (for Key Encapsulation Mechanism) algorithms. These algorithms have been chosen by the National Institute of Standards and Technology (NIST) as winners in the competition for PQC Schemes.

5.1.2.3 Artificial Intelligence (AI)

Development of an AI platform for Human Health: MeitY has initiated a research project at IIT Jodhpur, CSIR-IGIB and AIIMS Jodhpur with aims to develop AI based framework (i) to predict patient outcome to treatment based on patient

biopsy derived tumour spheroid and (ii) to develop an automated chest radiograph based diagnostic tools for detection and differentiation of silicosis and tuberculosis. Team generated patient-derived 3D multicellular spheroids and standardized the generation of patient derived cells (microglia, astrocytes and tumour cells). Currently the team is working on the gene and protein expressions within the spheroids and to develop AI based algorithms to predict Glioblastoma Multiforme (GBM) spheroid characteristics. Team also designed a deep learning algorithm to predict silicosis, tuberculosis and silico-tuberculosis and differentiate healthy from chest x-rays and being tested.

Design and Development of software system for detecting and flagging Deepfake Videos and Images: Deepfakes are getting used to spread misinformation in the form of fake speech and fake videos etc. A need is felt to develop AI technology to detect and verify the authenticity of images and videos, especially in countering Deepfakes. MeitY has initiated a project "Design and Development of software system for detecting and flagging Deepfake Videos and Images" at C-DAC Hyderabad and C-DAC Kolkata. The project aims to develop an AI based system to detect and flag questionable person videos as fake or authentic. The first version of a web portal for uploading and viewing multimedia (video, image and audio) evaluation results is complete and being tested for scalability. A desktop based Deepfake detection application has been developed and evaluation version of same has been shared with Law Enforcement Agencies. Improvements in desktop application and enhancing Deepfake Detection accuracies is ongoing.

Neurocomputing and Cognitive Intelligence: MeitY has initiated a project "Neurocomputing and Cognitive Intelligence" at IIT Delhi and NIT Durgapur. The project aims to develop (i) real-time Epilepsy Prediction helmet and (ii) Intelligent vest with assistive technology for Autism Spectrum disorder. Towards epilepsy prediction, a software prototype for seizure detection and localization has been developed and is being validated on more generalized and focal cases. Team also developed deep learning algorithms for static facial expression recognition from images and exploring to integrate these the patient's face expression features with different brain states during the epileptic episodes. Towards the development of Intelligent vest, team designed a microcontroller-based pressure control circuit, integrated physiological sensors for recording various parameters in an intelligent vest and AI algorithms for detecting the onset of anxiety and terminating it. Team is working on integration of the individual components into a single wearable device for autism therapy.

AI for Agriculture & Food Sustainability: MeitY has initiated a research project with the objective to develop AI techniques for Farming, Soil and Water Management, Pest and Disease Management, Post-Harvest Technologies, Processing. This project is being implemented at IIT Kharagpur, IIIT Kalyani and BCKV Kalyani. Under the project, App has been developed to analyze and classify the various soils i.e. clay, loam, sandy loam, loamy sand based on the soil characteristic (Texture). Soil nutrient analysis by Hyperspectral Reconstruction using deep learning techniques is being done. A mobile-based prototype app for rice disease identification has been developed and working on enhancing the APP to detect more diseases. Deep learning algorithms are also being developed for prediction of the phenological stage of the rice plant.

Resource Constrained AI: MeitY has initiated a research project at CEERI Pilani, IIT Jodhpur,

IIIT Allahabad and IIT Indore, aims to design and development of Resource Constrained architectures to improve performance while reducing the targeted resource usage, energy consumption, latency and bandwidth requirements, and prototype system demonstration for Video-based Human Action Recognition System for Industrial Activity Monitoring. Generative Adversarial Networks (GANs) architectures for video anomaly detection and Capsule Networks (CapsNets) architectures for Human Activity Recognition. Team also developed a prototype system for human activity recognition in the industrial environment using the Human Industrial Activity Dataset generated at CSIR-CEERI and working to translate the developed technologies into industry ready solutions.

Intelligent Multimedia Systems with Applications: MeitY has initiated a research project at IIIT Hyderabad, aims to develop algorithms, technologies, and applications in the area of multimedia perception with a goal of advancing the ability of intelligent systems to both comprehend and utilize information in various sources other than text such as multimedia, rich images and domain specific videos. The team developed a road video Q&A module, organized an international challenge, and is creating a web-based prototype for image-based Q&A. They're also focused on enhancing human activity understanding with skeleton models and working on a prototype for automated lab experiment assessment in industrial settings.

Identifying Anomalous Dealers in GST using Big Data Analytics: MeitY has initiated a project at IIT Hyderabad, aimed to develop a software product for GST tax evasion detection using deep learning techniques. This would help in identifying fake invoice traders in GST, identifying malicious dealers and potential return defaulters. Defaulters Tool enhanced to send GSTR-3B (monthly return) defaulters lists and reports to field officials and deployed to the Government of Telangana. GSTR9- a tool for detection of under reporting of GST is designed to detect fraud committed by taxpayers, generate automated notice, and track the collection.

Indigenous Intelligent and Scalable Neuromorphic Multi Chip for AI Training and Inference Solutions: MeitY has initiated a research project at IIT Hyderabad, aims is to design and develop an indigenous neuro-morphic architecture for AI training and inferencing leading to development of firstly FPGA prototyping. Subsequently system on Chip (SOC) realization of this indigenous Neuromorphic system resulted in a ChipSet fabrication and design. Then fabrication of one MCM (Multi-Chip Module) module which comprises several such SOCs. Further, it will be demonstrated using real-life applications including assistive technology as an illustration. The team has designed the prototype on FPGA and demonstrated different applications like image classification, object detection etc. Design is implemented in TSMC 40nm technology and GDSII is ready for tapeout to Europractice.

Development of computational protocols for designing inhibitors using PARP-1: Breast cancer is the most common type of cancer among the Indian population. Lack of awareness and high cost of treatment leads to lower reporting of illnesses. Poly Adenosine Diphosphate Ribose polymerase (PARP-1) inhibitors are among a few handfuls of targets which play an efficient role in treating breast cancer. A project has been initiated at NIPER, Guwahati for the development of computational protocols for designing inhibitors using PARP-1 as a model and synthesis & biological evaluation of designed inhibitors. Robust ML models for prediction of PARP-1 activity have been built and deployed as a web-server-based GUI. The work has resulted in publications in high-impact journals.

Development of an Integrated Solution for Automatic Assessment of Autism: Autism is a lifelong developmental disability that affects how people perceive the world and interact with others. The project "DISAAA: Development of an Integrated Solution for Automatic Assessment of Autism using Visual Attention, Facial Expression and Vocal emotion cues" is being implemented by C-DAC-Kolkata, C-DAC-Noida and NIEPID-Kolkata.

C-DAC has indigenously designed and developed in collaboration with NIEPID an Automatic Assessment Tool for the specially enabled to detect traits of Autism using Visual Attention (both Attention Analysis and Eye Gaze), Facial Expression and Vocal Emotion Recognition. The tool is based on Deep Learning based AI technique for classification and Machine Learning based algorithms for accurate quantification of intensity (degree) of attention, expression, and emotion. The system helps in determining the cognitive level of a child and assists in improving the cognitive aspect through the affective components of emotion of people with Autism Spectrum Disorder (ASD). Under the initiative, three ICT based labs at NIEPID Kolkata, Noida and Secunderabad have been set up and deployed for children with autism for analysis.

The project has led to the development of an Autism Mobile Screening App (AMSA), replacing manual records with Digitized ISAA, a tool for capturing response of ASD child, an analytical suite DISAAA for automatic assessment of Autism and finally a consolidated report generation of each assessed child.

The system would help, and guide affected persons to learn through stimuli generated based on different emotional situations. The responses captured by the app would assist psychologists in understanding the mental condition of the affected person.

Figure: Product launch of DISAAA by Secretary, MeitY in the presence of DG C-DAC

Improving the effectiveness of the Gems and Jewellery Industry by leveraging Machine Learning and Data Science to improve the Hit Ratio and address the Casting issues:

A project has been initiated at IIT-Bombay to develop and build a data platform to collect data, and design machine learning algorithms to aid Gems and Jewellery industry in reducing their manufacturing cost, improve their Jewellery quality and increase hit-ratio for their designs. In totality, this would help the sector consolidate its leadership position globally and make them more competitive to capture new emerging markets.

The project is a collaborative initiative comprising of MeitY and GJSCI (Gem and Jewellery Skill Council of India). Eleven Jewellery industries are working constantly with IIT Bombay under this project. This project comprises of two verticals, namely, Machine Learning Model for porosity in castings and Machine Learning Model for demand forecasting.

Under this project, the models have been developed to detect the hard spot and for preliminary validation at the manufacturing industry.

1. Hard spots identification

2. Interdendritic porosity identification

3. Gas Porosity   4. Ir EDX map (hardspots)   4. FEM Simulation results
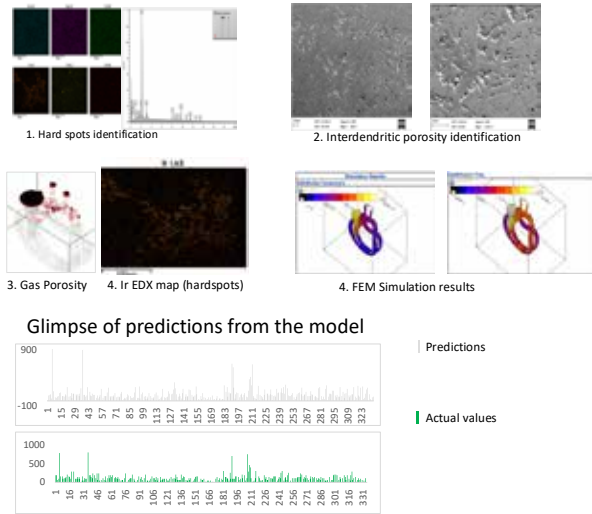
Figure : Glimpse of predictions from the model

Also, an AI-based forecasting and hit-ratio prediction GUI tool is developed. Various versions of models have been developed including Random Forest Ensemble Regression, Light Gradient Boosted Multiclass classification with Bayesian scaling, Decision Tree coupled nearest neighbor classifier and spatial-temporal tree-based demand forecasting.

A Brain Machine Interface enabled Assistive Communication System for special needs: MeitY has initiated a project aimed at addressing the needs of individuals with special needs. Brain Computer Interface (BCI) serves as a transformative bridge between individuals with special needs and the external world, offering assistive technology. It helps people for communication by brain signal who can't communicate verbally or through gestures. It collects EEG data from a person non-invasively and analyses it to understand their intentions. The computer performs the commands as per the person's requirement. This multidisciplinary niche area of research work is being implemented by C-DAC Delhi, AIIMS Delhi, C-DAC Thiruvananthapuram and GMC Thiruvananthapuram. The project has the potential to open new ways of communication and learning, empowering individuals to overcome physical limitations and participate more actively in social interactions.

Figure 1: P300 oddball paradigm speller developed at C-DAC Delhi

Figure 2: SSVEP based paradigm is tested with children at AIIMS Delhi

Development of Multi-Model Neuro-Physiological Framework for Cognitive Behavioral Analysis:

Understanding Human Behaviour is a very important phenomenon. It can be done by human cognitive analysis with the help of AI. The project integrates diverse neurological and physiological signal data of users to understand human cognition skills like perception, attention, memory, reasoning, and problem solving. The key feature of the project is to apply advanced fusion algorithms on generated Indianized data by setting-up a multi-modal lab. Here, the project objectives like Lie detection and malicious behaviour detection may lead to help in further behaviour analysis in extended domains like security and forensic. This is expected that this comprehensive approach will enhance the ability

to decipher complex behavioural patterns using multidisciplinary domain expertise like Psychology, Neurology, and AI. The research is being done by C-DAC Delhi in collaboration of domain experts to detect behaviour with higher sensitivity and specificity.

Figure: Multimodal Neuro-Physiological data collection at LAB set-up

Visvesvaraya PhD Scheme for Electronics & IT

Details are available at Para 9.10.2.6

5.1.2.4 Convergence, Communications & Broadband Technologies (CC&BT)

CC&BT have continued to play a pivotal role as key enabling technologies for economic growth and development, facilitating India's journey towards digital transformation. The previous years have witnessed significant strides in R&D efforts in the domain of cutting-edge Communication and Broadband Technologies, with a clear focus on empowering citizens with pervasive access to digital services across a multitude of use cases and verticals.

The R&D efforts within the CC&BT group, MeitY aim to achieve several key objectives. These objectives include fostering R&D activities in CC&BT, and Strategic Electronics, with a strong emphasis on collaborative initiatives involving academic and research institutions, user organizations, industry, and international partners. Furthermore, the Group strives to promote the commercialization of the

developed technologies. It also plays a pivotal role by providing essential technical insights and support to various ministries, departments, and organizations, including the Department of Telecommunications (DoT), TRAI, Telecom Standards Development Society of India (TSDSI), the Department of Science and Technology (DST), C-DOT, Telecom Centers of Excellence (TCOE), the Ministry of I&B, the Department of Space, and the Bureau of Indian Standards (BIS). These efforts collectively contribute to the growth and advancement of the digital technology landscape in India.

In alignment with the ever-evolving digital landscape, our relentless pursuit of R&D initiatives in CC&BT, and Strategic Electronics has been instrumental in nurturing indigenous capabilities. These initiatives have been centered around critical areas such as Next Generation Networks (NGN) and Communication technologies, next-generation mobile technologies, Broadband Wireless Technologies, Green Communications, Quantum Communication, Vehicular Communication, Cyber Physical Systems, AI-enabled Communication, Big Data Analytics, and IoTs for societal applications and disaster management. Furthermore, Machine-to-Machine (M2M) Communication and Strategic Electronics have emerged as instrumental components in both civil and defense domains, along with innovative backhaul communication technologies.

The R&D projects remain dedicated to the creation of intellectual properties, leading to valuable patents, the design of innovative algorithms to enhance product development, and the development of prototypes that provide a head start in the pursuit of technological solutions and prototypes. The outputs stemming from these projects are poised to make substantial contributions in achieving the goals set forth by the 'Make in India' and 'Digital India' initiatives of the Government of India.

In the continued endeavor to foster indigenous

capabilities in Next Generation Communications and Convergence technologies, focus extends to a diverse range of innovations, including massive multiple-input-multiple-output (MIMO), Software Defined Radio (SDR), Software Defined Networks (SDN), Network Function Virtualization (NFV), Cognitive Radio, and Heterogeneous Wireless Networks, among others. This dynamic scope encompasses Green Communication, Cyber Physical Systems, IoTs, M2M Communications, Wireless Sensor Networks, the convergence of wired and wireless networks, and fixed-mobile convergence. Additionally, emphasis is laid on ICT applications in strategic sectors, Broadband Wireless Access Technologies, Visible Light Communication (VLC), Vehicular ad-hoc Networks (VANET), IP-based products and services, electromagnetic wave applications, high-power RF/microwave tubes, Terahertz (THz) wireless systems, and Radar Systems etc., to name a few.

The significance of R&D initiatives lies in their potential to propel the nation into the next wave of digital transformation. These efforts underscore unwavering commitment to advancing the frontiers of technology, promoting innovation, and fostering growth, thereby reinforcing India's position as a leader in the global digital landscape. The mission continues to be firmly rooted in pioneering breakthroughs that enhance the digital ecosystem and bolster the nation's position on the global stage.

Projects Contributing to 6G: R&D in earlier 5G and beyond projects helped for introduction of usage scenario of "Ubiquitous connectivity" for IMT-2030(6G) by India in the WP5D meeting held at Geneva in June 2023.

This usage scenario, coupled with the new capability of coverage, enables the development of 6G technologies.

Substantial efforts, including the formulation of proposals like Extreme MIMO, 6G Satcom and New Waveforms have been undertaken, and these contributions have been integrated into the 6G Vision document.

The vision of Bharat 6G Mission is to contribute significantly to 6G standards and intellectual property, with the goal 10% of the standard-essential IP in 6G to achieve 6G-self-reliant powered nation.

The following ongoing projects align with the above vision:

- Next Generation Wireless Research and Standardization on 5G and Beyond technologies
- 6G End-to-End Communication System
- 6G: Sub-THz Wireless Communication with Intelligent Reflecting Surfaces (IRS)

Next Generation Wireless Research and Standardization on Fifth Generation (5G) and Beyond Technologies: 5G technology is identified to have the potential to make a major societal transformation in India by enabling massive digital products. "Next Generation Wireless Research and Standardization on 5G and Beyond" project has been initiated with a broad objective to conduct collaborative research in the broadband wireless communication areas leading to standardization of 5G and Beyond technologies by utilizing the expertise available within the country. Further, the research outcomes have been taken to various standard bodies like 3GPP, ITU, TSDSI, IEEE, etc. to contribute to evolving the technologies for 5G and beyond.

In the IMT 2030 meeting Indian researchers from IIT, Hyderabad (IITH), Centre Of Excellence in Wireless Technology (CEWiT), IIT Madras (IITM), Indian Institute of Science (IISc) Bangalore and officials from private companies made significant contributions towards defining the framework for IMT 2030 and beyond. India introduced the usage scenario of "Ubiquitous connectivity" for

IMT-2030. This usage scenario, coupled with the new capability of coverage, enables the development of 6G technologies that provides affordable connectivity and broadband services with extended coverage to rural and sparsely populated areas. India also introduced another new capability called "Interface interoperability". It aims to enable open interfaces between different entities of the system and facilitate the deployment of open and interoperable radio access network systems. Energy efficiency, introduced by India, became part of the sustainability theme defined in the IMT-2030 document. It emphasizes the need for low-power consumption technologies, reduced greenhouse gas emissions, and the use of resources under the circular economy model to address climate change and contribute to sustainable development goals.
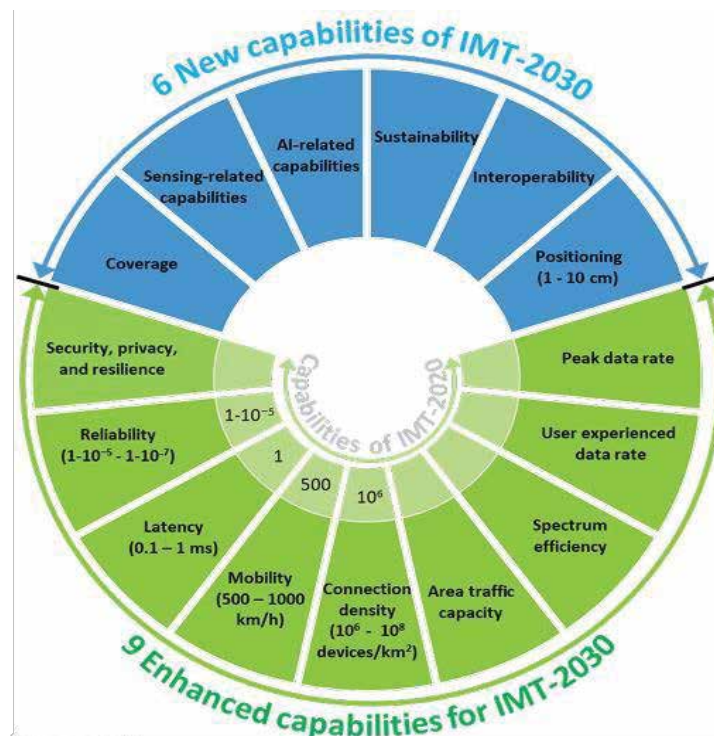
6G End-to-End Communication System: The project aims to advance technology in network coverage, operational frequencies, and wireless communication for 6G. Focused on enhancing data rates and reducing latency, the project seeks to create a 6G New Radio (NR) Modem and a relay-based communication system. Key objectives include early prototyping, generating Intellectual Property Rights (IPR), facilitating technology transfer, and fostering a skilled workforce. Progress includes the development of a 6G NR Physical Layer using Orthogonal Time Frequency Division Multiplexing (OTFDM), with lab testing expected in Q2 2024.

Figure: OTFDM HW Prototype

The project's contribution to the 6G White Paper on OTFDM and Structural MIMO technologies is gaining global attention, with potential implications for IMT 2030 standards development.
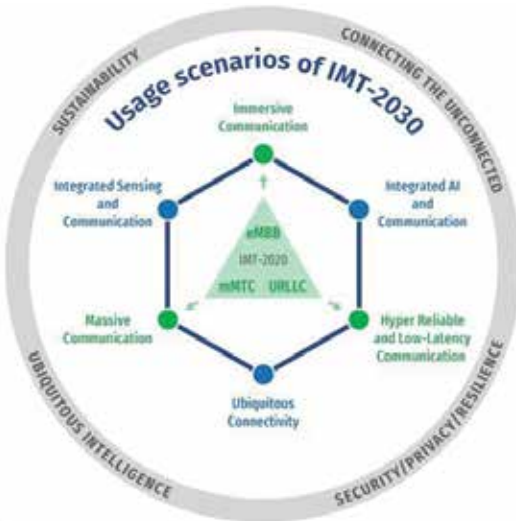
Figure Wheel Diagram-IMT-2020

6G: Sub-THz Wireless Communication with Intelligent Reflecting Surfaces (IRS): The project aims to design and develop control sub-systems for 6G systems, with key components such as sources, isolators, circulators, comparators, multipliers, mixers, waveguide adaptors, amplifiers, and Low Noise Amplifiers, essential for 6G communication applications. This activity includes R&D for 6G technologies, particularly focusing on higher mm-Wave and sub-THz bands to achieve self-reliant technologies under AtmaNirbhar Bharat (Self-Reliant India). They will handle the entire process from design, fabrication, packaging, to the integration of components at millimeter waves and sub-THz bands, addressing the future needs of 6G communications. Additionally, this includes the development of various beam forming configurations like switched beams and Intelligent Reflecting Surfaces (IRS) at 140GHz. The project will showcase a 6G wireless communication link operating at 140GHz.

As part of the collaborative research, it is proposed to develop and demonstrate a fully functional 6G high speed communication link incorporating various sub-systems at 140GHz which includes, sources, multipliers, waveguide components like comparators, vector modulators, isolators, multipliers, mixers, amplifiers, power distribution network, intelligent reflecting surfaces and transceivers.

As envisaged in Bharat 6G Vision, though the next generation of mobile connectivity still lies roughly a decade ahead, many 6G projects are being launched globally and the investments in 6G research provide an intriguing prospect for the future.

The proposed activity under this project, will facilitate an understanding of higher mmwave and subTHz deployment scenarios, and methods to implement 6G communication link along with novel research in intelligent reflecting surfaces. IRS aided wireless communication will be a revolutionary technique and is expected to be one of the main enabling technologies to implement 6G cellular systems. The IRS-enabled wireless communications can potentially uncover important opportunities that enhance future 6G communication technologies. Thus, the goal of this research is to develop innovative ways of using IRS to enhance wireless communications and creating new opportunities for future 6G cellular communications.

Quantum Communication: Quantum communication applies quantum principles in order to communicate via the transmission of quantum states. It is a field of applied quantum physics, closely related to quantum information processing and quantum teleportation, with the primary application of creating ultra-secure communication networks and quantum cryptography. Quantum communications use photons to transmit qubits

between remote places. This is because photons are very well isolated from perturbations, which translates into long-lived superposition states for photonic qubits. It can propagate with low attenuation (down to 0.2 dB/km at 1.55 μm) in optical fibers.

Metro Area Quantum Access Network (MAQAN): The project MAQAN has been initiated with a focus on the development of system components and establishment of a secured Quantum Key Distribution (QKD) access network connecting multiple nodes located at different places in a city. The aim of the project is Secure key generation, management, and communication over India's first Quantum Network, development of indigenous hardware, firmware, and software for MAQAN deployment; Study and assessment of well-known QKD protocols for suitability on MAQAN; and development of new protocols optimized for MAQAN. Establishment of MAQAN as a public test bed for QKD hardware validation.
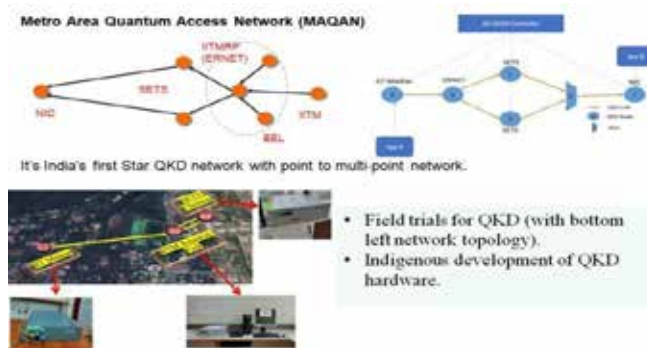
Quantum communication using entangled photons:

A quantum technology laboratory has been set up for the generation and detection of entangled photon pair. A study on QKD protocols and their use in establishing secure communication through public channel is being carried out with the objective to set up quantum communication link between two buildings.

Experiments are currently underway to generate entangled photons using the Spontaneous Parametric Down-Conversion (SPDC) process for secure communication. The two communicating sides, Alice and Bob, make use of a quantum channel to share the secret key. This key is used to encrypt and decrypt the message sent through the public channel, a fiber optic or a wireless link. This can be simulated through SPDC process as shown in figure below:
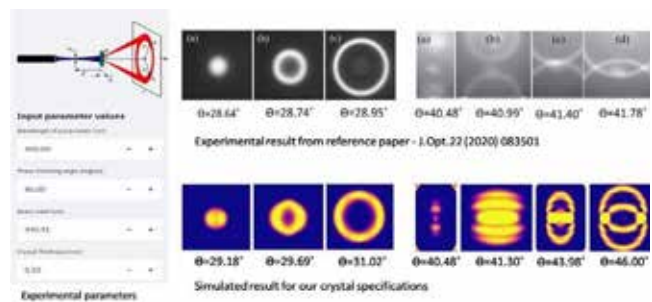
Figure: SPDC simulation results for designed BBO crystal @ 400 nm

Cognitive Radio for Strategic Applications: The project aimed to pioneer R&D initiative in the niche area of Cognitive Radio (CR) for strategic applications with core technology development in CR platform and CR waveform. The valuable expertise gained during the project has empowered the team to build their capabilities in strategically important technologies with the potential for large-scale implementation. Two major product concepts, namely the HF band CR and the Radio Monitoring System based on Spectrum Sensing, have emerged for consideration. With the successful implementation of the Proof-of-Concept (PoC) CR test bed to showcase the technology for potential end users and industry partners is ready, marking the beginning of the next phase of development. A workshop was conducted as a pivotal outreach activity, where the proof-of-concept model of CR was demonstrated. Moreover, the workshop provided a platform for detailed discussions involving various stakeholders

to outline a roadmap for the further advancement of this promising technology.

Development of Software Defined Networking (SDN) and Network Function Virtualization (NFV)-based agile Network Service Delivery Platform for Enterprise and Service Providers: The objective of the project is to develop a network service delivery platform including Network Function Virtualization Infrastructure (VNFI) comprising a Commercial off-the-shelf (COTS) Hardware platform and Hypervisor. The project has accomplished several significant milestones. These achievements include the successful development of an Orchestrator for the VNF (Virtual Network Function) platform and SDWAN (Software-Defined Wide Area Network) link provisioning. Additionally, the SDWAN has implemented overlay and underlay links with IP Security. VNF deployment on the edge platform was achieved, and its orchestration, including centralized configuration, was implemented. The project also saw the development of the VNF Management module within the edge platform application and orchestrator. Furthermore, a Software Defined Network (SDN) Switching Management system and hardware-based acceleration schemes for VNF has been created. To enhance knowledge and expertise, the project included training on Network Security Engineering and Architecture. Overall, the project successfully tackled multiple aspects of network infrastructure and management, resulting in significant advancements in virtualization and networking technology.

Real-Time Edge Computing Architectures for LiDAR based Intelligent Transportation Systems: The project aims to develop low-complex LiDAR data reduction and compression techniques to minimize data processing and communication while retaining essential information. It also focuses on creating efficient ground point removal methods deployable on edge GPUs. Object segmentation techniques will be proposed for real-time object detection and tracking in temporal point cloud data. Additionally, the project seeks real-time classification of obstacles into real-life objects and geo-referencing of LiDAR data. The development of low-complex AI frameworks capable of running on edge GPUs is a crucial objective. Ensuring highly secure data transmission and validation in collaborative sensing scenarios is another priority. The project will include real-time demonstration and test bed development at IIT Hyderabad for validating the proposed frameworks in Indian traffic scenarios.

Figure: Velodyne LiDAR HDL 64E is mounted on battery Vehicle (Roots) data Acquisition.
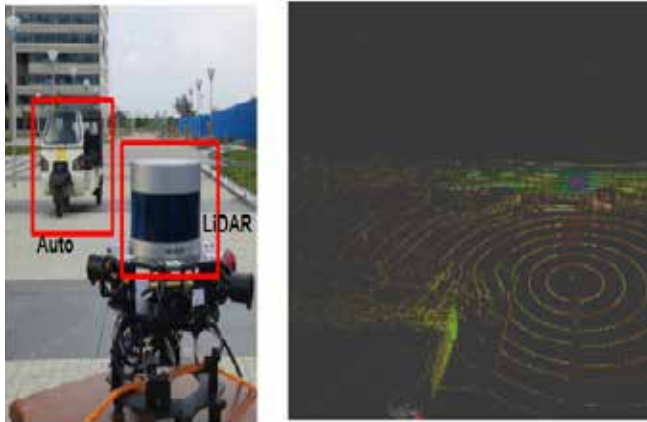
Figure: Static LiDAR data acquisition system

TribeConnect : Integrated Smart Tribal Eco-Platform

The vision of project is to decrease the woe of people residing in remote villages which are otherwise affected due to the unavailability of better services. It has been developed to transform the village into a smart full-grown village under three major verticals viz; Healthcare, Agriculture and Rural Services. A tribal village, Fulkara in Chhattisgarh has been identified for the field visit and implementation.

- Under the Healthcare area, following technologies ehave been developed:

  ➤ a non-invasive way of blood hemoglobin measurement and, subsequently, anemia detection technique

  ➤ a camera-based vital sign monitoring in a Swasthya stalls aimed to be used in Anganwadi centers

  ➤ a nasal auscultations-based continuous lung condition monitoring system

Finally, a TribeAid IoT platform has been designed which serves the purpose of an upgraded, smart and accessible primary health care center.

Figure: Field Testing, Training and Technology Transfer Initiation

- Under the Agriculture section, following technologies have been developed:

  ➤ an IoT Krishi-Node and Network prototype based on LoRa technology

  ➤ a "Hamar Kisaan" Mobile application prototype with features such as live farm monitoring, crop stress prediction, and growth monitoring

The implementing agencies highlighted the usefulness of this application to the farmers in the Fulkara village. usefulness of this application to the farmers in the Fulkara village.

- Under Rural Services, following technologies have been developed:

  ➢ an edge-based autonomous student conduct-cum-screening regulatory system for schools

  ➢ a blockchain-based agriculture food supply management system

Designing Reliable and Low-latency Networks for Tactile Cyber-Physical Systems: This project is for design and implementation of a Tactile Cyber-Physical System (TCPS) that can achieve real-time interaction between physical and virtual worlds in applications like remote surgery and AR/VR using ultra-reliable low latency communications (uRLLC). Configuration of WAN link between ERNET Chennai and IISc Bangalore with Differentiated Services (DSCP) Expedite Forwarding (EF) strategies for achieving bounded latency and QoS is completed. Experiments over WAN between Geomagic touch (at Chennai) and robotic arm (at IISc Bangalore) have been completed and contribution to standards through TSDSI on "Architecture to support Tactile applications with edge intelligence over 5Gs" has been completed.

Figure: Haptic application over WAN link between Chennai and Bengaluru

Multi Gigabit Wireless System (MGWS) at 60GHz for 5G and beyond: A mmWave beamforming system for enhanced broadband access with an efficient distribution network is proposed at 60 GHz frequency band. This will help the 5G small cell backhaul. In an urban scenario where broadband is needed to wirelessly connect small cells, it is more expensive or too slow to set up fiber optic backhaul connections. It is more flexible and practical as an alternative to fiber optic solution.

Figure: Fabricated Rotman lens

It enables beam steering to efficiently use the RF power and frequency spectrum. It's a broadband system with high throughput and offers higher data rate or higher connection density depending upon the application area.

Figure: Hybrid beamforming using Phased arrays

Acoustic Gunshot Detection System for Strategic Applications (AGDS) : The AGDS is designed to detect and communicate the location of gunfire through an array of acoustic sensors. The project has successfully completed the design, development, and integration testing of the Vehicle mount configuration of AGDS. Additionally, the Static configuration of AGDS has been designed, developed, and tested in the field. Furthermore, the preliminary design of the Soldier mount configuration of AGDS has been completed, indicating progress in expanding the system's applications.

Integrated system- stand alone static configuration-AGDS

Ongoing Indo-Dutch Projects

India and the Netherlands have built a collaborative relationship in research and innovation over many years. MeitY had earlier entered into a Work Agreement with the Netherlands Organization for Scientific Research (NWO) during 2013 for Collaborative R&D Projects in "Pervasive Communications & Computing" for a period of two years. Five projects were initiated in 2015 in the 1st Phase of R&D Collaboration with NWO, for a duration of four Years. Further, MeitY and NWO extended the work agreement for this Joint Collaboration to facilitate the completion of five projects initiated under 1st Phase of R&D collaboration and new projects initiated in the 2nd Phase of joint R&D collaboration on "Big Data and IoT". Three collaborative research projects were initiated in the 2nd Phase of joint R&D collaboration, which are under implementation.

DAREFUL (Data driven E-Commerce Order Fulfillment): The project's objective is to effectively utilize e-fulfilment data for optimization, focusing on minimizing missed deliveries, improving order allocation, reducing pick travel times, and optimizing packaging configurations. Noteworthy achievements include completed projects with outputs such as published papers in DSS and

EJOR, along with conference papers. Research progress includes ongoing work on packaging box optimization, completion of a benchmarking exercise, and an IP formulation. Additionally, a market survey has been conducted to comprehend e-commerce challenges. A pending automation project on robotic sortation has seen the development of a model, with numerical experiments currently in progress. These efforts collectively contribute to enhancing efficiency, reducing costs, and minimizing ecological impact in e-fulfilment processes.

DP-TRANS (Digital Twin for Pipeline TRANSport network): The project aims to construct a data-driven digital twin for the municipal water pipeline network in an urban setting, utilizing continuously collected data from sensors measuring flow characteristics. This digital twin is designed to identify abnormal flow characteristics indicative of leaks, employing a machine learning model to understand the hidden relationships between pipeline parameters and sensor observations. The deliverables include a methodology for creating an advanced digital twin predicting and localizing leaks, scalable software and algorithms for municipal use, knowledge-sharing workshops, and high-quality publications. The project is divided into three stages, involving the development and testing of a leak detection algorithm using the Hanoi test network, progressing to a more complex wastewater distribution network in the IISc campus, and concluding with work on a real water distribution network in Bangalore City. Project milestones achieved include the development of a simulation model, generation of flow characteristics, and the creation of machine learning-based algorithms, with associated code available for review. Notable activities involve workshops, identification of sensor locations, installation and configuration of sensors, and successful testing of the leak detection algorithm

in the IISc treated wastewater network. The future plan includes further experiments on the real network, method comparison using real datasets, software packaging, joint publications, and transitioning to the BWSSB dataset.

Personal health Train for Radiation oncology in India and Netherlands (TRAIN): The goal of the project is to enhance care for head and neck cancer patients in India and The Netherlands using Big Data and Machine Learning through the implementation of Decision Support Systems (DSS). These systems aim to predict optimal treatment outcomes based on individual patient characteristics and local diagnostic and treatment capabilities. The project focuses on improving data quality and interoperability, establishing infrastructure for data mining using a Personal Health Train Approach, applying distributed machine learning approaches, and implementing Findable, Accessible, Interoperable, and Reusable (FAIR) DSS. Deliverables include open-source prototypes for a FAIR DSS, a radiation oncology ontology, and a prediction model described in an open-access journal paper. The project encompasses the training of PhD students, radiation oncologists, and the creation of FAIR data archives. The approach involves making head and neck cancer patient data FAIR at specific centers, distributing machine learning applications, and implementing outcome prediction models as DSS. The project is structured into four work packages focusing on coordination, FAIR Big Data, DSS development, and clinical applications. The present status includes achievements in project agreement, communication, organization, software development, data extraction, workflow deployment, distributed learning infrastructure setup, model testing, dashboard development, and initiation of a prospective clinical trial for head and neck cancer DSS validation.

5.1.2.5 Artificial Intelligence & Emerging Technology

Promoting the Adoption of Cutting-edge Technologies to Create Significant Economic and Societal Impact

India is now prepping for cutting-edge technologies including 5G, AI, blockchain, augmented reality & virtual reality, machine learning & deep learning, robots, natural language processing, etc. These will be critical in the government and industry, for planning or decision-making, expediting development or analyzing deployment, issue solving or product creation, detecting new trends or drawing out linkages and associations.

The Emerging Technologies Division of MeitY is responsible for fostering and promoting the utilization of cutting-edge technologies in the country. The Division is supporting work for policy/ strategy papers in emerging areas like AI, AR/VR, IoT, blockchain, robotics, computer vision, drones, etc.

Initiatives by MeitY in Emerging Technologies

- **Centre of Excellence (CoE) for Internet of Things(IoTs) (Gandhinagar, Bengaluru, Gurugram & Vizag)**

  Under the Digital India initiatives, MeitY along with NASSCOM and state governments has set up CoE on IoTs at Bengaluru, Gurugram, Gandhi Nagar and Visakhapatnam. First Centre on IoT was established in Bengaluru in 2016 along with the Government of Karnataka and NASSCOM. One of the objectives of these centres is to enable India emerge as an innovation hub in IoT through democratization of innovation and realization of prototypes. The CoE, supported by Government and industry is a nationwide platform for innovation sandbox to enable technology adoption and innovation,

and to develop a culture of cocreation in Industry 4.0, manufacturing, automotive and transportation, life sciences and healthcare, Agri and other industry verticals and horizontals. More than 431 startups have been enrolled, 94 societal projects have been undertaken, and 106 IPs filed.

Centre of Excellence on Virtual & Augmented Reality (VARCoE) at IIT Bhubaneswar

Virtual & Augmented Reality (AR&VR) have massive innovation potential across a wide range of industries and research fields. With an objective to explore the opportunities in this niche area, Software Technology Parks of India in partnership with MeitY, Government of Odisha, IIT Bhubaneshwar and a philanthropist has established Centre of Entrepreneurship for VARCoE at IIT Bhubaneswar. It undertakes world-class research, develop state-of-the-art testing facility/ laboratories for advanced algorithms, applications and methods in aid of AR&VR for immersive visualization in areas including skill development, product design, healthcare, art & architecture, transport, construction, tourism, entertainment, education & productivity software. Presently nine major projects on AR&VR applications in various domains involving 12-15 highly qualified faculty and researchers of IIT Bhubaneshwar are in progress. VARCoE has also supported 14 startups so far.

- **Centre of Excellence on Gaming, VFX, Computer Vision & AI at Hyderabad**

  This CoE has been set up in collaboration with MeitY, STPI, the gaming industry and the Government of Telangana in Jan 2020 to provide resources such as mentoring, technology support and funding for gaming, animation, VFX, computer vision and AI start-

ups. It offers integrated programs, CVLAB and Game Lab for start-ups to scale up through its incubation facility. The centre has been branded as IMAGE. The IMAGE accelerator program includes premium plug and play co-working space for start-ups and offers access to the ecosystem which comprises IP owners, mentors, seed funding, investors and a platform to support Go-To-Market strategy. At present 43 start-ups have been on-boarded and so far, 74 products & 19 IPRs have been created.

- **Centre of Excellence on Blockchain Technology at Gurugram**

  The STPI APIARY, a Centre of Entrepreneurship in Blockchain Technology has been setup in collaboration with MeitY, STPI, Govt. of Haryana, Padup Venture Private Limited, IBM, Intel, GBA and FITT in March 2020. This is an initiative to identify and evaluate promising start-ups in the field of Blockchain technology that will be hosted in the STPI Gurugram incubation facility. The CoE is created to be an Incubation-cum-Accelerator Programme through which acute challenges faced by start-ups from validation of idea to initial investment will be addressed. Total 28 start-ups have been onboarded and so far, 10 products & 16 IPRs have been created.

- **Design, Development and Deployment of National AI Portal (INDIAai)**

  INDIAai is a joint venture by MeitY, NeGD and NASSCOM that has been set up to prepare the nation for an AI future. This has been implemented as a one stop online portal for AI related developments in India, sharing of resources, details of start-ups, investment funds in AI, companies and educational institutions related to AI in India, etc. The portal

currently has the following major sections - news, articles, case studies, research reports, listing of startups, listing of investment funds, colleges, companies, countries, people, videos, datasets, courses, and initiatives of states and central ministries. As on date, there are 2,806 national and international articles, 1175 news, 334 videos,164 research reports, 472 startups, 99 case studies, and 184 government initiatives listed on the National AI Portal.

- **POC for AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT)**

  The Government has initiated a project AIRAWAT for providing a common compute platform for AI research and knowledge assimilation. This AI computing infrastructure will be used by all Technology Innovation Hubs, research labs, scientific community, industry, start- ups and institutions under the NKN. The PoC for AIRAWAT will be developed with 200 petaflops mixed precision AI machine which will be scalable to a peak compute of 790 AI petaflops.

  The AIRAWAT has secured 75th position in Top 500 Global Supercomputing List declared at International Supercomputing Conference (ISC 2023), Germany putting India on top of AI Supercomputing nations worldwide.

- **Formation of Inter-Ministerial Committee for Development of Robotics Ecosystem in the country**

  MeitY has constituted an inter-ministerial committee with secretaries from DoT, DSIR, DST, DPIIT and NITI Aayog as members and secretary, MeitY as the convener. The committee shall be studying the best practices on role of government in supporting their

domestic robotics industry & suggest way forward to foster end-to-end ecosystem centred on robotics including research, design, manufacturing, prototyping and utilization in manufacturing. The document has been put up for public consultation.

- **National Program on Artificial Intelligence**

India AI program is envisioned as an umbrella programme by MeitY for leveraging transformative technologies to foster inclusion, innovation, and adoption for social impact. Pillars of India AI include Data for AI, Skilling, AI Ethics and Governance, Compute, AI Research and Development, National Centre for AI, among others. To actualize this vision of India AI, MeitY has undertaken the implementation of the "National Program on Artificial Intelligence" with the objective of establishing a comprehensive programme for leveraging transformative technologies to foster inclusion, innovation and adoption for social impact. It encompasses four broad pillars of the AI ecosystem, including Skilling in AI, Responsible AI, Data Management Office and the National Centre on AI.

- **IndiaAI Report**

MeitY envisions the IndiaAI programme as a mission-centric approach for leveraging transformative technologies to boost inclusion, innovation, and adoption for social impact. Pillars of IndiaAI include AI in Governance, AI IP & Innovation, AI Compute & Systems, Data for AI, Skilling in AI, and AI Ethics & Governance. As part of building 'AI in India and AI for India', MeitY has formed seven expert groups to collaboratively brainstorm on the vision, objectives, outcomes, and design for each of India's AI pillars.

The report comprehensively presents the objectives of the pillars of IndiaAI and recommends the next action items involved in harnessing the potential of AI for social development and achieving the goal of 'AI for ALL'.

- **Global Partnership on Artificial Intelligence (GPAI)**

GPAI is an international and multi-stakeholder initiative to guide the responsible development and use of AI, grounded in human rights, inclusion, diversity, innovation, and economic growth. India is a founding member of GPAI, having joined the multi-stakeholder initiative on June 15, 2020. Since then, India has significantly contributed to the GPAI goals and objectives and is working on various domestic initiatives for the responsible development, deployment, and adoption of AI. As one of the largest Global South economies leading the AI race, India nominated itself for the position of incoming council chair of GPAI. India received more than two-thirds of first-preference votes and was therefore elected as the Incoming Council Chair in November 2022. India will serve as the Incoming Chair in 2023, then subsequently Lead Chair in 2024, and Outgoing Chair in 2025. (https://gpai.ai/)

- **IndiaAI Mission**

The Government of India launched the IndiaAI Mission, a comprehensive national-level program to democratize and catalyze the AI innovation ecosystem in the country and ensure the global competitiveness of India's AI startups and researchers. The Mission aims to establish a robust AI ecosystem through strategic programs and

partnerships across the public and private sectors. By democratizing computing access, improving data quality, developing indigenous AI capabilities, attracting top AI talent, enabling industry collaboration, providing startup risk capital, ensuring socially impactful AI projects and bolstering ethical AI, it will drive responsible, inclusive growth of India's AI ecosystem. The Mission will be implemented by 'IndiaAI' Independent Business Division (IBD) under Digital India Corporation (DIC) and has the following components: IndiaAI Compute Capacity, IndiaAI Innovation Centre, IndiaAI Datasets Platform, IndiaAI Application Development Initiative, IndiaAI FutureSkills, IndiaAI Startup Financing, and Safe & Trusted AI. This Mission will propel innovation and build domestic capacities to ensure the tech sovereignty of India. It will also create highly skilled employment opportunities to harness the demographic dividend of the country and help India demonstrate to the world how this transformative technology can be used for social good and enhance its global competitiveness.

5.2 Translation R&D

5.2.1 Initiatives under Electronics Components & Material Development Programme (EMDP)

EMDP has been promoting R&D activity since 1986 to nurture electronics development in the country for boosting local manufacturing. EMDP's core areas of research are electronics materials, components and process technology, photonics, electronics waste recycling (e-waste) and additive manufacturing. EMDP supported National MISSION under National Policy 2012 on Electronics: **"Promotion of a vibrant and sustainable ecosystem of R&D design, engineering and innovation in electronics"**

during 2012 to 2018. EMDP is currently supporting National Policy on Electronics 2019 (NPE 2019): **"Encourage industry–led R&D and innovation in all sub-sectors of electronics".** The strategy under this objective is to adopt top-down approach or market pull R&D to cater for local manufacturing needs in the electronics sector. Under this objective EMDP's core areas of research are Electronics Materials & Components, Photonics (Photonic Integrated Circuits etc), Circular Economy & E-waste, IoT Sensors and Additive Manufacturing & 3D Printing. To cater to the objective, EMCD has focused on establishment of self-sustaining R&D centres or SRCs with industrial partnership where industry is playing key roles in technology road-mapping, administration, funding and self-sustenance of the R&D platform. Govt. is extending funding, knowhow, scientific manpower, laboratory access, and IPR (existing) for development of industry demanded product prototype, indigenous technology solutions and IPR generation with specific target plans for commercialization through ToT to industry & start-ups and create atmosphere for absorption of the technologies in Indian market.
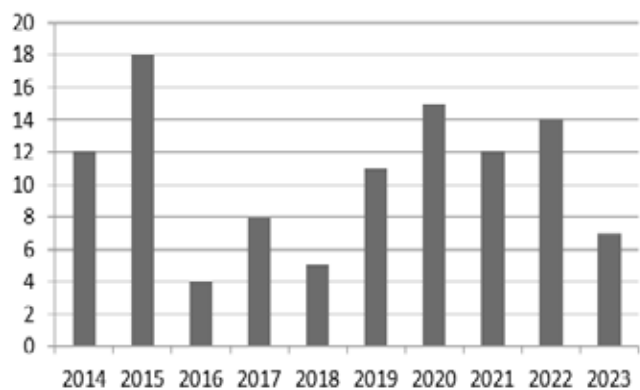
EMDP program has 106 filed patents (figure above) in last 10 years and has initiated 16 SRCs till date. Details of these centers have been included in

Centre of Excellence sections of this chapter. The other ongoing technology developments under EMDP are provided below:

- **Project Review & Information Management Electronics (PRIME) System for MeitY:**

  To promote transparency, efficiency, collaboration and data-based decision making an online portal "PRIME" System has been launched by MeitY. With PRIME, MeitY's vision is to ease the information sharing, strengthening of the research eco-system, developing a one-go dashboard for all, to enable sustained development and ease of doing business. At its core, PRIME is an end-to-end life cycle management system that streamlines the entire process of proposal submission and project management. It is a comprehensive system that strengthens Meity's project management workflow by offering a range of powerful components. The portal is designed and maintained by C-DAC, Noida.

  The portal can be accessed at https://www.meityprime.in/
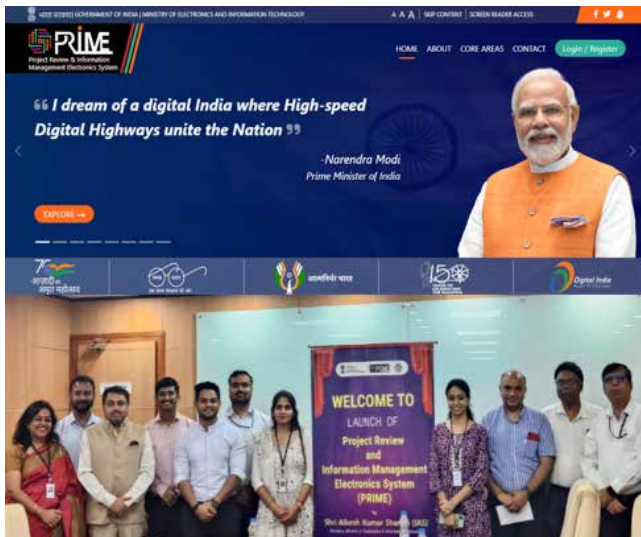
- **CW/Modulated Thulium Fiber Laser (TFL) System for Soft Tissue Vaporization/ Ablation:** Vaporization is a promising technique for faster treatments of benign prostate hyperplasia (BPH), eliminating the use of additional step for morcellation phase. Pulsed Holmium: Yttrium-aluminum-garnet (Ho:YAG; λ=2.12 µm) laser is a 'gold standard' clinical tool in urology. However, the limited pulsed operation of Ho:YAG laser is not very much applicable for the process of cutting or coagulation. In this respect, continuous wave (CW) operation of Thulium:Yttrium-aluminum-garnet (Tm:YAG; λ=2.013 µm) laser is an promising alternative laser for the surgical management of BPH. Over the bulk YAG based lasers, the recent technological advancement in fiber laser provides extremely high beam quality, high wall plug efficiency, and maintenance-free operation to integrate with a compact system for surgical applications. TFLs at 1.94 µm are becoming a promising energy source for high end surgery as the operating wavelength is more closely matching the water absorption peak, resulting in a lower ablation threshold and higher ablation rate over the Ho:YAG or Tm:YAG laser. A single mode beam of TFL allows a high-power delivery through a small-core fiber. Additionally, TFL can operate for a wide range of pulse properties and CW power levels, allowing use of a single system in different mode of treatment. MeitY through CGCRI in collaboration with M/s BioradMedisys Pvt. Ltd, Pune has now been able to design and develop CW/Modulated Thulium fiber laser (TFL) for pre-clinical validation in soft issue Vaporization/Ablation. The system is ready for its lunching in January 2024. The project

is at the stage of completion with ONE ToT, ONE Patent, FOUR research students training. The developed surgical system is unique not only as import substitution but for i) operating wavelength closely matches with cellular water absorption ii) minimally invasive surgery iii) wide range of TFL settings - use of same instrument to different mode of treatment, hence cost effective iv) minimum optical component architecture v) compact system with safety features and less maintenance. The development is jointly with industry hence all the protocols are maintained as per medical instrument certification requirement. The table top research on optimization of thulium fiber laser cavity such as efficiency, laser spectrum and Quasi-CW pulse temporal characteristic has been translated to a stable prototype which is under reliability testing as shown below.
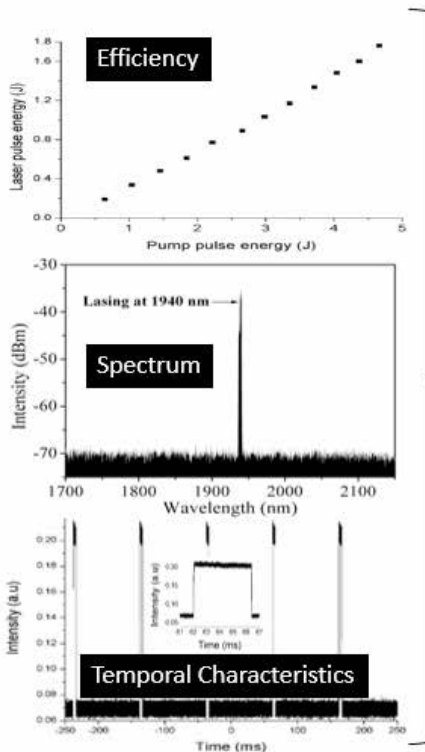
- **Development of Indigenous Antennas for Navigation with Indian Constellation (NavIC):** It is an indigenous satellite navigation system, which facilitates accurate real time positioning and timing services over India as well as the region extending up to 1500 km from its boundary. Considerable efforts have been done by MeitY for the development of NavIC modules locally which has tremendous application potential ranging from agriculture to road transport to homeland security. Utilizing the in-house knowledge base, C-MET has developed miniaturized planar antennas for NavIC antennas for various applications. C-MET has successfully developed L5, L1, Dual and tri-band antennas for NavIC receiver applications. The developed technology is at Technology Readiness Level (TRL) – 4 and ready for transfer to industries.

L5 Band Antenna | Dual Band Antenna | Tri Band Antenna | L5 Band Antenna | S Band Antenna

Indigenously Developed Products

Copper cladded substrates

Patch antennas developed on composite Substrate

High dielectric Ceramic substrates

Patch antennas developed on Ceramic Substrate
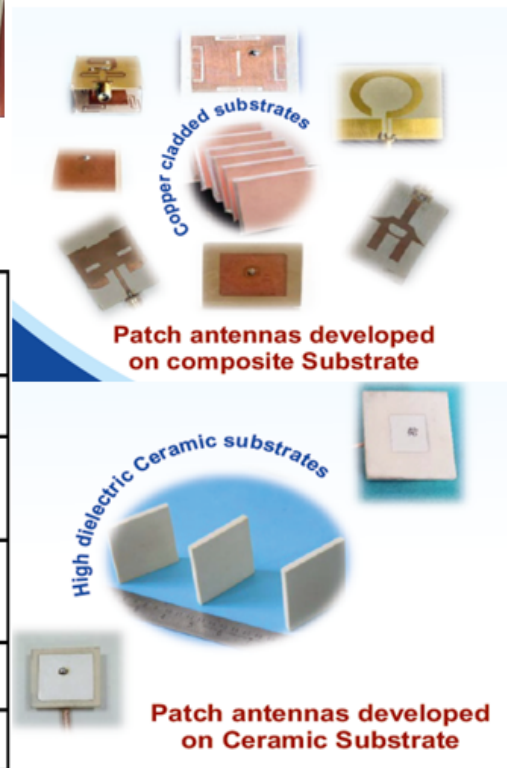
Products for Demonstration:

Types of Antenna	Frequency (MHz)	PeakGain (dBi)	Size (mm)
L5 band	1176.45	1	70x70x2
Dual-band (L5, L1)	1176.45, 1575.42	1.14,0	70x70x2
Tri-band (L5, L1 and S)	1176.45, 1575.42, 2492.08	1.87, 0, 2.27	70x70x2
Ceramic L5 band	1176.45	0	25x25x4
S band	2492.08	0.05	25x25x1.27

- **Metamaterials based Compact Broadband Tunable Modulator for Terahertz Photonics:** IIT Guwahati, in collaboration with Mahindra University, Hyderabad, has been working on developing a compact prototype device for broadband terahertz frequency modulation. The device will be capable of modulating and transmitting information at hundreds of gigabits per second (Gbps). To achieve this, a new class of electromagnetic metamaterial structures has been investigated. Currently, we are working on a multi-stacked metamaterial configuration for broadband tunable terahertz transmission. Through numerical simulations, we have achieved a bandwidth of 0.7 THz in our design. Efforts are being made to further fine-tune the broadband transmission, and the initial fabrication and characterization of the device have been completed. We have been developing a state-of-the-art experimental facility for characterizing devices at terahertz frequencies in transmission, reflection, and absorption modes at IIT Guwahati. We have fabricated the meta-device samples on a silicon substrate. We have used conventional photolithography process to fabricate the optimized samples. The micrographs of the fabricated samples have been shown in Fig. 2. To gain a better understanding of the working principles of the multi stacked metamaterial (MM), we are currently developing the circuit theory, which can be useful for further optimizing the MM.
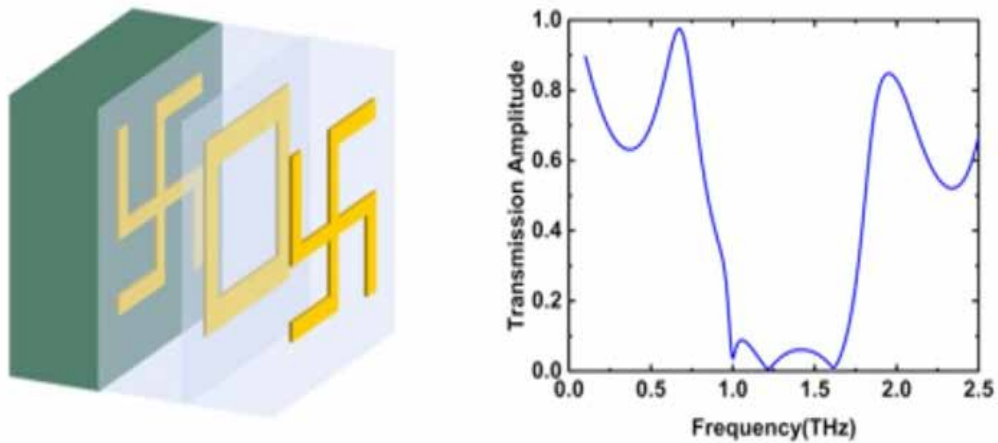
Figure 1a: Proposed three dimensional meta-device unit cell. (b) shows the simulated transmission spectra at terahertz frequencies. The spectra indicate broadband transmission response of more than 500 GHz.
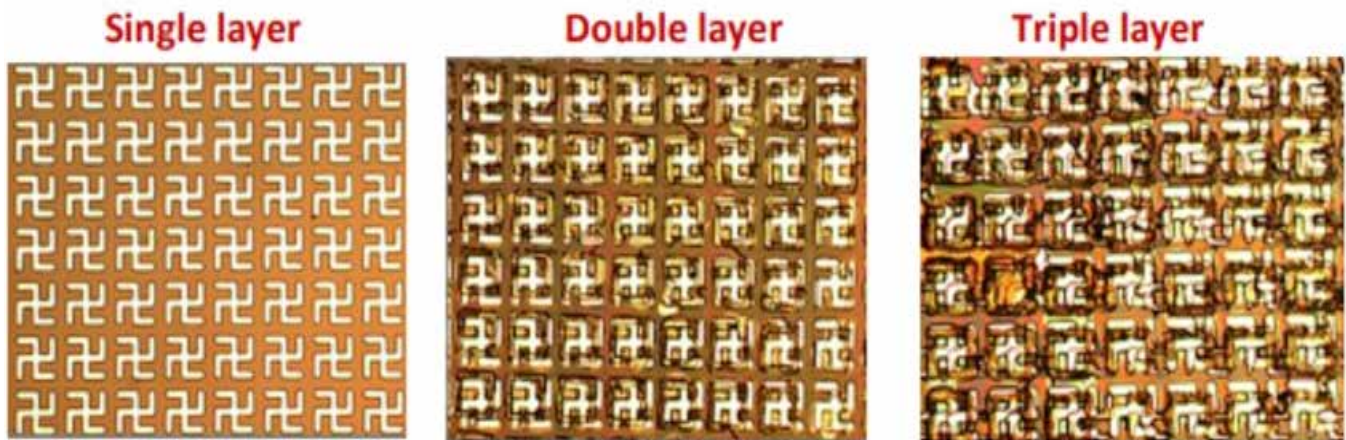
Figure 2: Micrographs of the stacked metamaterial sample with single, double and triple layer.

- **Hybrid battery power module with indigenously developed super-capacitor and Li-ion cell:** MeitY initiated a development work for hybrid battery module for utilization of abundant North-Eastern coal feed stock and provide a solution for the demand of large-scale graphene materials in power sector. The project was executed by CSIR-NEIST, Jorhat. The graphene optimized synthetic process consists of a simple chemical approach combined with the ultra-centrifugation/ ultra-filtration techniques.

This work also demonstrated that the low-grade and pollutive coal feedstock can have environmentally green and sustainable utilization as a suitable precursor for indigenous graphene derivatives in our country with excellent potential in power applications. The project demonstrated supercapacitor-battery hybrid module for e-rickshaw application. The application product technology has been transferred to M/s Anvaya Innovations, Jorhat, Assam.

- **Feasibility study for development of process technology to recover valuable materials from end-of-life (EoL) silicon solar modules:** The R&D project has been initiated at C-MET Hyderabad with an objective to develop an environmentally benign technology for recycling of EoL silicon solar modules. Accordingly, a process technology has been developed to recover valuable materials from the waste crystalline silicon solar panels, which are currently dominant with ~95% abundancy in the market. The R&D has reached a technology readiness level of 4 with 10 kg input per batch processing to final recovery of products. Silicon has been recovered as one of the major products with 99.999% (5N) purity. The developed technology has also been transferred to M/s Greenko, a world-renowned industry in the renewable energy sector. Further up-scaling of process is in progress.

RECOVERED MATERIALS FROM EOL PHOTOVOLTAIC PANELS

- **Development of electrically conductive adhesives for microelectronics packaging and flexible film circuits:** MeitY have funded IIT Ropar and NIT Warangal to Develop an electrically conductive adhesives for microelectronics packaging and flexible film circuits. The objectives of this initiatives are to production of nanoparticles in continuous microfluidics reactors for using as filler in electrically conductive adhesives for replacing the tin and lead based soldering materials with nanofiller filled polymer adhesives with least percolation threshold and applications on the flexible film circuits. During the past two years, the development of nanoparticles with microfluidics reactor and dispersing them in the thermoplastic and thermosetting matrix for the ink and adhesive applications. Further, the percolation threshold, curing and viscosity of the developed materials are being studied to compare with the commercially available alternatives.

- **Development of digital networking for preventive and predictive environmental and climatic warning solutions - Building an Entrepreneurial ecosystem for addressing Environmental Issues:** The primary focus of this proposal is to advance digital networking for proactive and predictive environmental and climatic warning systems. The project comprises two key components: the development of an intelligent sensor module to monitor and control environmental pollution and a smart water level monitoring system that includes flood alert capabilities. In addition, we are establishing a digital infrastructure for efficient local water level monitoring and management. Furthermore, the project aims to foster a startup ecosystem and promote skill development in the context of IoT solutions.

• **Polybutadiene/ ceramic composite laminates for Substrate Integrated Waveguides (SIW) applications:** Microwave substrates are extensively used for variety of high end microwave circuit applications such as high-power solid state amplifiers, patch antennas, missile guidance, mobile base stations etc. Polybutadiene based composite laminates provides high dielectric and low loss microwave substrates. More than 70% of the cost of any microwave device accounts for the base microwave circuit board and requirements of high frequency circuit boards are fully met through imports. Availability of Polybutadiene based composite laminates for microwave and millimetre wave circuit applications is going to reduce import cost and boost Indian manufacturing. C-MET with its industrial partner M/s Micropack Pvt Ltd, Bangalore has been able to develop 5 products till date of 8"X8" and 8"X6" with different dielectric constant (DK from 6 to 14.38 and loss from 0.0028 to 0.0045). Standard third-party testing has revealed the as developed products to be comparable to commercially available similar imported microwave substrates. Three different applications have been developed using the as developed materials based on substrate integrated waveguide technology. These technologies are now ready for transfer to industry.

Properties	Product No. 1	Product No. 2	Product No. 3	Product No. 4	Product No. 5
Dielectric constant @ 10 GHz	14.5±0.35	13.0±0.3	9.8±0.25	8.0±0.15	6.00±0.08
Loss tangent @ 10 GHz	0.002	0.0020	0.0022	0.0020	0.0021
Temperature Coefficient of dielectric constant (0 to 100°C) (ppm/°C)	±30	±25	±40	±20	±10
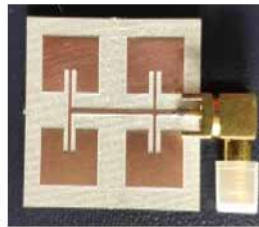
2X2 array of Patch antenna for 6 GHz

X-band band pass filter

SIW for Microwave frequency
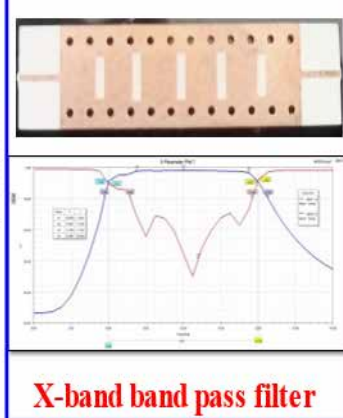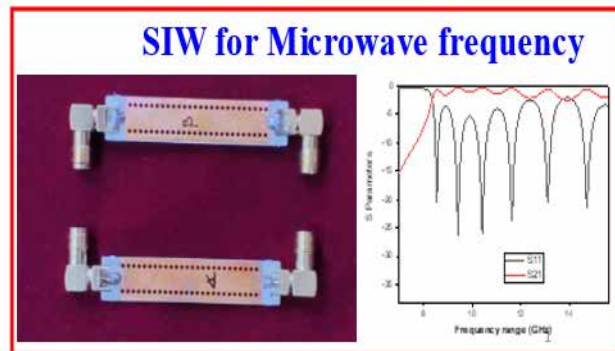
- **Early detection of pest on Tea plantation through Multispectral imaging from Unmanned Aerial Vehicle (UAV) :** MeitY through Tezpur University, Assam is developing low-cost, rapid and early detection system based on arrays of multispectral and thermal imaging sensors on UAV for pest infestation in tea crops to help the farmers to plan pest control strategies. Under the program development of thermal imaging system, hyperspectral imaging sensor on UAV and post processing deep learning algorithm has been completed and initial field testing has been completed. The system has now successfully demonstrated Red Spider Mite, Tea Mosquito Bug infestation on tea leaves. The project has now successfully developed multispectral imaging system to detect Looper caterpillar, Red spider moth and Tea mosquito Bug. Creation of deep learning algorithm and pest infestation data base is near completed. Various multirotor drone designs and multiple materials have been tested. A highly customized ultra high frequency telemetry trans – receiving modules are designed. Autonomous drone deployment mechanism is developed and tested. GPS based aerial mapping tool is developed and being tested. Obstacle detection mechanism has also been developed and is currently being tested. A real time data link system between drone and ground station has been constructed and development of Flight Control Software and field module is completed. The productization efforts with a smaller form factor drone and enhancement of accuracy of GPS location is underway. Field testing of developed system is also on-going.

RGB Channel wise map data

Merged RGB Channel

mapped data with detected infestations
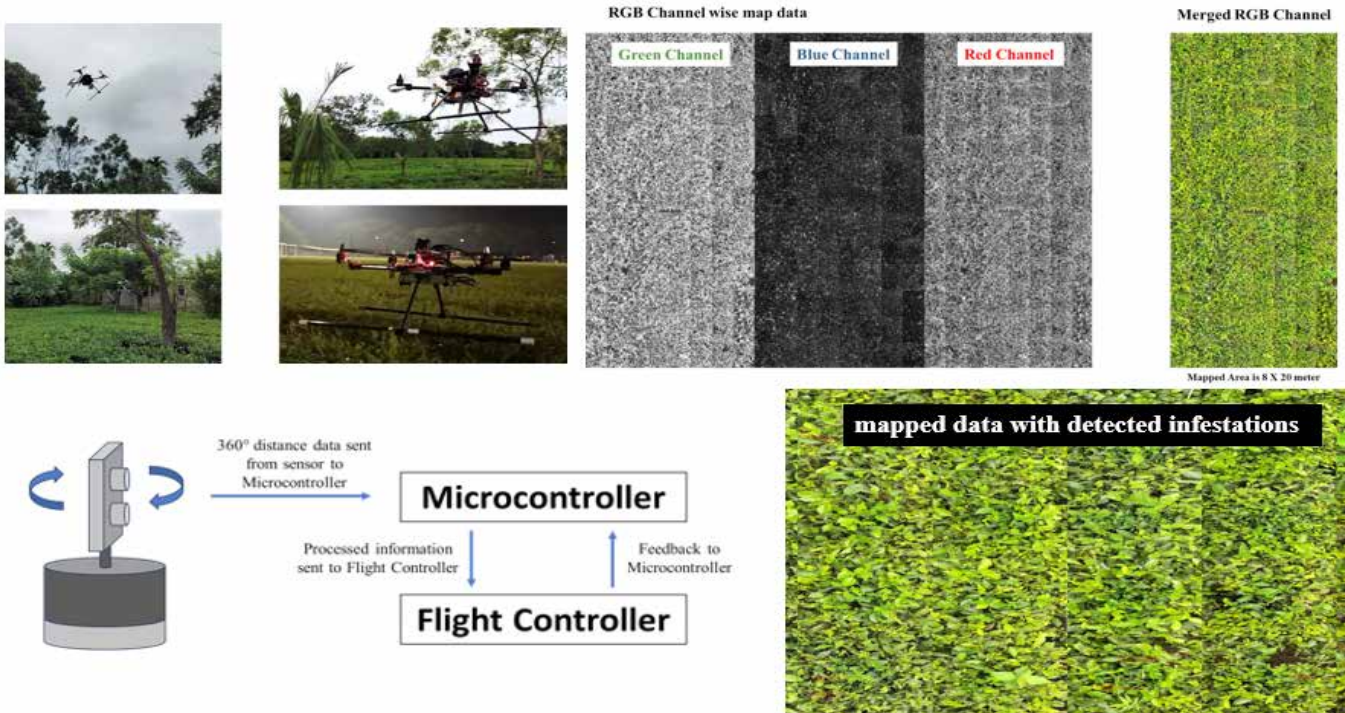
- **Assessment for Silicon Photonics & Diamond Chip Manufacturing Lines with Indian Machinery and Supply Chain**

Silicon Photonics and Diamond chip technologies has vast application space from 5G/ 6G broadband network photonics applications to power electronics to quantum technologies including quantum computing and quantum communications. These two technology platforms will become detrimental to India's economic growth and security in this decade. MeitY is encouraging these two sectors to bring up indigenous technologies to counter cost of IPR, monopoly and technology denial issues. In this direction, MeitY has initiated an assessment study to bring out techno-economical feasibility for development of photonics chip manufacturing lines with indigenous machinery and Indian supply chain for entire value chain which will

be vital for countering exorbitant cost and technology denials from foreign technology sources. The assessment is being carried out by Central Manufacturing Technology Institute (CMTI) Bangalore for turn-key solutions. The assessment will include business case development for such manufacturing lines.

5.2.2 Technology Development & Demonstration for Indian Industries

5.2.2.1 National Mission on Power Electronics Technology (Phase-III) (NaMPET-III)

NaMPET-III is an ongoing program with an objective to strengthen the power electronics technology base in the country by carrying out a multitude of activities like technology development, deployment, technology transfer, awareness creation & manpower development and strengthening the industry interactions with R&D and academic institutes through collaborative research projects.

So far, 39 sub-projects (06 sub-projects in the New Horizon Consortium Category, 13 sub-projects in the Exploratory Research Category, 09 sub-projects in the E-Mobility & deployment Category and 11 sub-projects in the Application-oriented R&D & SPQC) in the areas of Power Electronics and its applications in different sectors like Wide Band Gap (WBG), semiconductor-based PE systems, Power, e-Mobility, Food processing, Agriculture, Industry and Health etc., have been taken up and progressing.

Under the programme more than 20 academic institutions and industries are participating in the technology development and commercialization through Transfer of Technologies (ToT). So far 04 new technologies/products are developed/ deployed in field (LVDC power distribution in houseboat, AC Charger for EV, Transformer-less Dual Mode Power Conditioner for Microgrid, Planar Magnetics). Several products/technologies such as WBG material-based Magnetometer, GaN UPS, MEMS sensor for torque/vibration etc. are in the final stage of technical validations. ToT of Smart Energy Meter was done to M/s Pragati Electrocom Pvt Ltd, 3.3 KW EV AC Charger to M/s Electronics System Vadodara and M/s Vellore Electronics, and STATCOM technology to M/s Excel Tech for further commercialization in the presence of Secretary, MeitY. An MoU between C-DAC-T and Ministry of Railway has been signed regarding the technical support of Vehicle Control Unit for Locomotives.

| STATCOM | Smart Energy Meter | VCU | AC Charger |

TOT of VCU, STSTCOM, AC Charger and Smart Energy meter in presence of Secretary, MeitY

Short term courses are one of the identified vertical under NaMPET for providing training to the faculty/ Researchers in the niche Power Electronics areas.

So far, twenty short term courses on specialized applications of power electronics have been completed in different parts of the country and six new short-term courses have been initiated. Under awareness creation activities, 3 startup

meets were conducted at VNIT Nagpur, IIT BHU and IIT Guwahati, which were well received by the participants from the region and a two-day workshop was conducted jointly by C-DAC and IISc on planar magnetic technology.

Under NaMPET programme, C-DAC-T visited USA to showcase NaMPET products in the International IEEE Energy Conversion Congress and Exposition (ECCE) held from 27th October, to 4th November, 2023 at Nashville, Tennessee (USA).

Exhibition of NaMPET products at Nashville, Tennessee (USA)

During the Inauguration of India's first FutureLABS center in C-DAC Thiruvananthapuram on 12th March 2024, Union Minister of State for Electronics and IT, Skill Development, Entrepreneurship, and Jal Shakti announced the collaborations and Transfer of Technologies under NaMPET programme.

i. Traction Converter for Electric Locomotives: In line with the 'make in India' Initiatives of the government, under the Programme one of the high impact technology developments and its adaptation in user agency has been the Vehicle Control Unit (VCU) for Indian Railways.

During the past 5 years, the technology has widely accepted in all forms of 3 phase Locomotives and so far, deployed in more than 1500 locomotives. Indian Railways has shown immense confidence on NaMPET forum and came up with the challenging requirement of developing the 5MW propulsion system development. The announcement on initiation of indigenous technology development for the full propulsion system for Indian Railways with the identified industries i.e., Daulat Ram Engineering, Bhopal, JMV LPS, Noida, Electro-waves Electronics, Himachal Pradesh and Autometers Alliance, Noida. Collaborating in the technology development will indigenize

the whole propulsion system under the AtmaNirbhar Bharat

ii **Renewable Energy based Green Microgrids:** The Microgrid technology is gaining widespread adoption globally to cater to the energy requirements of remote communities and critical infrastructure. C-DAC has successfully developed and engineered Renewable Energy Microgrids under NAMPET, which have been deployed in multiple locations. Recognizing the vast potential of Microgrids in India, M/s Tata Power has launched a specialized entity named 'Tata Power Renewable Energy Microgrid Limited' with an objective of establishing Microgrids in rural and remote areas of India. The MoU was between C-DAC and M/s Tata Power to collaborate on diverse technological aspects of Microgrids, aiming to create optimal, efficient, cost-effective, and reliable Microgrid solutions tailored to the needs of rural India.

MoU signing between C-DAC-T & TATA Power

iii **EV Wireless Charger:** Wireless charging technology has immense potential considering convenience, reduced wear and tear, safety and futuristic applications. VNIT Nagpur and C-DAC has jointly developed Proof of Concept wireless charger of 1.5kW at 48V DC and successfully evaluated and demonstrated the same. M/s Belrise shall engineer and commercialize the technology as a product. The EoI for the technology package is available with Technology Promotion Centre at C-DAC, Thiruvananthapuram.

5.2.2.2 Autonomous Last Mile Vehicle (ALIVE)

In order to have our own technology for Autonomous vehicles suitable for Indian traffic conditions, this project has been taken up at IIIT Delhi. The deliverable of the project is the field demonstration of a prototype self-driving vehicle capable of providing pick-up and drop-off services using LiDAR, cameras, and on-vehicle computing while obeying traffic rules and avoiding obstacles. Prototype development has been completed and ToT is in process.

Autonomous Last Mile Vehicle (ALIVE) with GUI Based interface with Android App

5.2.2.3 AgriEnIcs: National Programme on Electronics and ICT Applications in Agriculture and Environment

MeitY has initiated a national level programme to reform the agriculture and environment sectors with the interventions of IoT, ICT, machine learning and robotics technology. The objective of this umbrella programme is to encompass the industry, users, academia, R&D institutes working in the allied domains of the thematic areas to develop user friendly and market viable technology. The programme is being implemented by C-DAC, Kolkata in consortium mode on pan India basis.
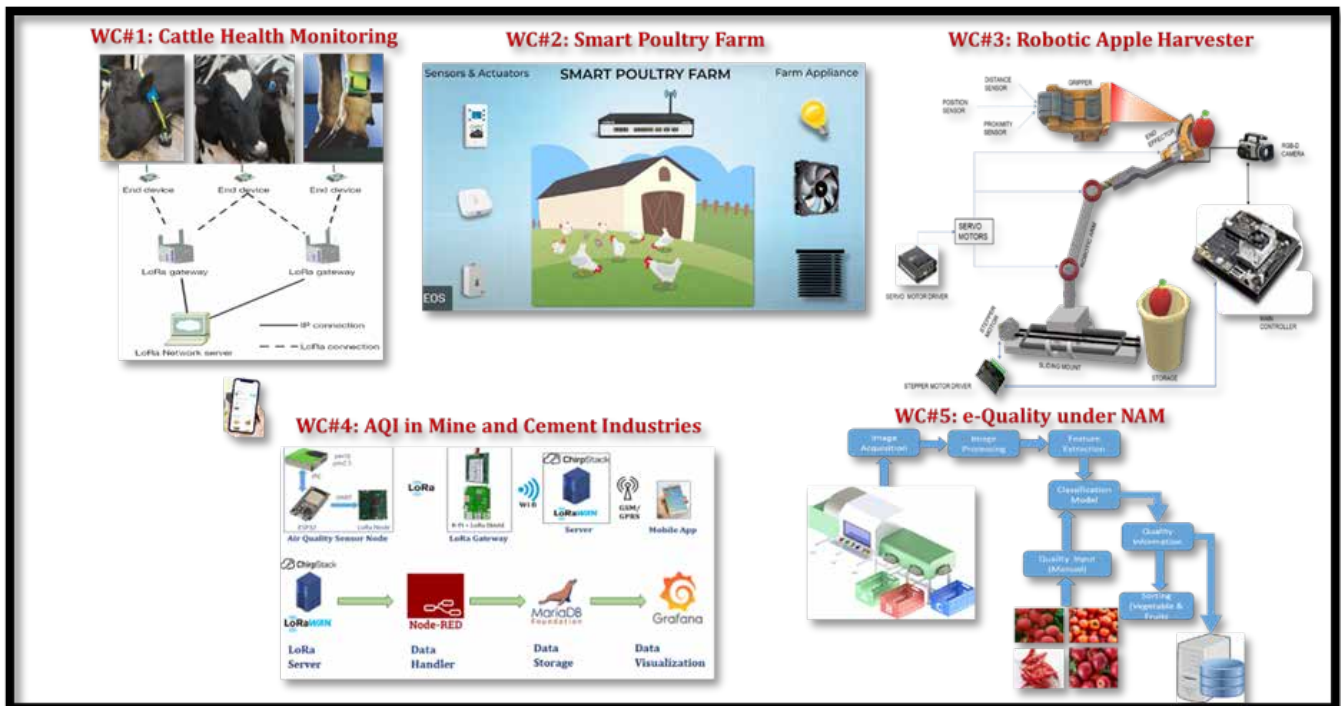
5.2.2.3.1 AQ-AIMS: AI based Air Quality Monitoring System

AQ-AIMS is developed by C-DAC, Kolkata under the AgriEnIcs programme in collaboration with TEXMIN Foundation, IIT(ISM), Dhanbad and industrial partners. The developed AQ-AIMS is a hybrid sensor array(s) with appropriate signal conditioning and data acquisition electronics to acquire real time air quality data. The acquired data processed through AI enabled a pattern recognition engine to signal air quality status on a temporal basis. In addition to monitoring individual pollutants, the overall air quality index can be estimated through the developed solution.

Presently the system is capable of monitoring environmental pollutants PM1, PM2.5, PM10, SO_2, NO_2, CO, O_3, ambient temperature, and relative humidity. The developed technology has been transferred to JM Envirolab. Further, M/s JM Envirolab has given an order of 10 sets of updated version of AQ-AIMS developed by C-DAC, Kolkata.

Air Quality Monitoring Systevm and its transfer to JM Envirolab

5.2.2.3.2 Grain-Ex

Grain-Ex is an AI based Expert Solution for Quality Analysis of multiple Crops developed by C-DAC, Kolkata under the AgriEnIcs programme in collaboration with ICAR-IARI. The developed product has a bench-top mini conveyorized sample feed system, electronic vision and digital image processing based rapid and non-invasive inspection, crop specific software with user-friendly graphical interface for online image capturing and analysis, along with report generation facility. Grain-Ex has been launched by MeitY and is currently under certification stages, which would revolutionize the e-NAM markets.

GrainEx Conveyorized Machine

5.2.2.3.3 Product Design Centre

C-DAC, Kolkata has created a Product Design facility in an area of approximately 1600 sq ft. and equipped with appropriate hardware and software tools. This facility would be utilized to support design and prototype fabrication with the goal of developing marketable products. For proper functioning of this facility, it be being run in collaboration with the Design Department of IIT, Guwahati. This facility would also assist the Start-up companies, Entrepreneurs and MSMEs in their product design and prototype fabrication endeavors. This centre has facilities like a design lab equipped with CAD, analysis and simulation tools; a mechanical workshop equipped with CNC and other mechanical tools; a fabrication facility with 3-D printers and PCB prototyping machines; and an assembly zone equipped with testing and measurement equipment's for assembling and fabrication of prototypes.

Product Design Centre Inaugurated by Additional Secretary, MeitY

5.2.2.4 Development of DLMS/ COSEM (Device Language Message Specification/ Companion Specification for Energy Metering) testing tool for Smart Energy Meter

The project is being implemented by CPRI, Bangalore in association with C-DAC Thiruvananthapuram. The project aims at "Development of an automatic test tool of DLMS/ COSEM for Smart Energy Meters of different variants like NAN & WAN communication modules as per standard (IS 15959 series) requirements". The said software tool is named Smart Meter Integrated Testing and Higher Analysis (SMITHA). Most of the major Indian Meter manufacturers like M/s Genus, M/s Secure meter, M/s HPL, M/s Bentek etc. have shown their willingness to use indigenous test tool being developed under the project. Testing, Validation & bug fixing/ updates are going on.

SMITHA: Software tool for testing and verifying smart-meter communication protocols

5.2.2.5 e-GUNA: Sensory assessment for quality of fermented foods from North-Eastern

The project is being Implemented jointly by C-DAC, Kolkata with Institute of Bioresources and Sustainable Development, Imphal, NIT Nagaland and IIT Hyderabad. The broad objective of the project is to development and deployment of point of analysis device for the detection of bacterial pathogens and toxins in fermented food. So far, the nano probes has been synthesized and characterized towards cyanogenic glycoside detection with the development of the electrochemical sensing platform CG-STATv1.0 prototype. Under the programme the Grand Challenge activity has been successfully completed with development of 04 prototypes by the awardees. The Food Patho Chip data has been successfully developed and field trail of CG-STATv1.0 and certification is underway.

CG-STAT

5.2.2.6 Development of Electric Vehicles (EVs) Sub System (EVSS-01)

MeitY has initiated a program on "Development of Electric Vehicles (EVs) Sub Sysvuct has to be cost effective, quality competitive and ready for commercialization. The EV sub-systems

development is being taken up in consortium mode consisting of Government institutes/ R&D organization for design and development, industry to commercialize it and vehicle manufacturers to use the developed product in the manufacturing. The government institutes/ R&D organization would lead the project and participating agencies are expected to contribute in the said development. Technology of 1.2 KW Motor/controller for eRickshaw, 5KW Motor/controller for eAuto and 1KW BLDC motor/controller for eRickshaw has been developed, tested and transferred the technology to M/s Alphasine, M/s Amber Group, M/s Brushless Motor and M/s Lithion Power for production /commercialization. Currently 14 technology development activities catering the needs of 4W/Heavy vehicle are progressing under the programme. As an outcome of the programme, technology of 2KW charger developed by CEET, IIT Madras has been launched by Secretary, MeitY. Keeping in view of the technological capacity of the EVSS-01 programme, MeitY is planning to launch phase 2 of EVSS programme.

Launching of 2KW Portable EV Charger by Secretary, MeitY

Mobile EV Fast charger developed by Log9 under EVSS programme

Union Minister of State for Electronics and Information Technology launched Mobile EV DC Fast Charger that has been designed and developed by M/s Log 9 Materials, Bengaluru on 12th March, 2024 at C-DAC-Thiruvananthapuram. This EV sub system can be used as a roadside assistance, bridging the gap in charging infrastructure. This technology is now ready for Transfer of Technology and deployment.

Another technology launched at the same event was a high voltage, high power 3 kW DC-DC automotive grade converter that has been designed

and developed by M/s Kalyani Powertrain Ltd, which is a subsidiary of Bharat Forge, Pune, under EVSS programme.

5.2.2.7 Smart Food Grain Storage System

The Smart Food Grain Storage System which includes conveyorized loading and unloading of grain bags having RFID for traceability, online weight and moisture measurement with Radio Frequency Based Removal of Moisture from Grain (in case of higher moisture which is not safe for storage) has been developed by SAMEER under the aegis of MeitY. It is step towards Innovation, Science and Technology theme of Viksit Bharat @2047 of Prime Minister's initiative. The technology has been transferred to M/s Paras Defense and Space Technology Ltd. for manufacturing and supply of the systems during the "Digital India FutureLABS Summit 2024" held at IIIT- Delhi on 05th February, 2024. The system has capacity to handle almost one truckload (approx. weight: 28 tons) of grains in 40 minutes/ 250 tons of grains per day. The exchange of technology transfer documents was made in the presence of Minister of State for Electronics & Information Technology, Skill Development & Entrepreneurship and Jal Shakti.

Inauguration of Smart Food grain Storage System

5.2.2.8 Three Indigenous developed Technologies transferred to Industries as a step towards Innovation, Science and Technology theme of Viksit Bharat @2047

During the launch event of "Digital India FutureLABS Summit 2024" held at IIIT- Delhi, three Indigenous Technologies - Thermal camera, CMOS camera and Fleet Management System designed and developed by C-DAC Thiruvananthapuram under InTranSE Program of MeitY were transferred to twelve (12) Industries. It is step towards Innovation, Science and Technology theme of Viksit Bharat @2047 of Hon'ble Prime Minister's Initiative.

Thermal Camera: The thermal Smart camera has an inbuilt DPU to run various AI based analytics. The indigenised technology is targeted for applications across multiple domains including Smart cities, Industries, Defence, Health & others. The field implementation, testing and validation of this camera was done for Road traffic applications.

The technology was transferred to the following eight industries simultaneously.

i.   RRPS4E Innovation Pvt.Ltd

ii.   SCITA Solutions

iii. TAK Technologies Pvt.Ltd

iv.   AABMATICA Technologies

v.   Prama India Pvt. Ltd

vi.   Samriddhi Automations Pvt Ltd

vii. Norden Research and Innovation Centre

viii. Vehant Technologies Pvt Ltd

CMOS camera: Industrial Vision Sensor iVIS 10GigE is a CMOS based vision processing system with a powerful on-board computing engine to perform the next generation industrial machine vision applications.

The technology is transferred to one industry i.e. M/s Spookfish innovations Pvt. Ltd.

Fleet management System: FlexiFleet aims to optimize operations and enhance the efficiency of fleet operators and transit agencies. In addition to vehicle location tracking, it provides alerts for different conditions like over speed, geofence, ignition, idle, halt, and rash driving. Personalized Transit Route Guidance System is a mobile app that aims to improve the travel experience for passengers as it offers passengers the option to choose the most efficient or personalized routes of his choice. Operational Strategies for Headway Reliability serves as a dynamic scheduling decision support tool for transit operators, aiming to enhance the reliability of public transit services by minimizing instances of bus bunching.

The technology is transferred to three industries simultaneously –

i.   Atulya Abhinav Tech Private Limited
ii.   Unidad Techno Labs(P) Ltd
iii. IBI Group India Private Limited

The exchange of technology transferred documents were made in the presence of Hon'ble Minister of State for Electronics & Information Technology, Skill Development & Entrepreneurship and Jal Shakti, Government of India Sh. Rajeev Chandrasekhar, Smt. Sunita Verma, GC R&D in E&IT, E. Magesh, DG-CDAC, Kalaiselvan A, Director - CDAC Trivandrum, Senior officials in Government, CEO & CTO of Industries

5.2.3 Initiatives under Microelectronics and Nanotechnology areas

5.2.3.1 Some of the technologies developed/ are being developed indigenously under the R&D projects initiated in Microelectronics area

(i) **Chips to Start-up (C2S) Programme:** C2S programme has been initiated by MeitY on 1st January 2022, which aims to train 85,000 number of Specialized Manpower at 100 organizations (including academic institutions, R&D organizations, start-ups, MSMEs) over a period of 5 years in the area of VLSI and Embedded System Design and leapfrog in ESDM space by way of inculcating the culture of Chip/ System-on-Chip (SoC)/ System Level Design at Bachelors, Masters and Research level and act as a catalyst for growth of Start-ups involved in semiconductor design in the country.

113 organizations including 100 academia/ R&D originations and 13 Start-ups/ MSMEs have been selected for financial support and chip design infrastructure support for implementing R&D projects resulting in generation of industry-ready manpower and ASICs/ SoCs/ IP Cores.

(ii) **Microprocessor Development Programme:** Family of 32-bit/ 64-bit Microprocessor indigenously designed using Open-Source ISA (Instruction Set Architecture) along with reusable IP Cores by C-DAC, IIT Madras & IIT Bombay are being explored for their usage by strategic organizations and companies.

Following successful tapeouts were earlier carried out of – (a) 32-bit/ 64-bit SHAKTI Processors at 180nm, SCL foundry & 22nm, Intel foundry by IIT Madras, (b) 32-bit AJIT Processor at 180nm, SCL foundry by IIT

Bombay (c) 32-bit VEGA Processors at 130nm, Silterra foundry by C-DAC.

Following ARIES Development baords developed and commercialized using 130nm VEGA Processors (details at https://vegaprocessors.in/devboards/):

a). ARIES v2.0, b). ARIES Micro v1.0, c). ARIES IoT v2.0, d). ARIES v3.0, e) ARIES DOT v1.0

(iii) **Design & development of NavIC Receiver**: For effective use of Navigational services based on Indian Constellation of Satellites, named NavIC (Navigation with Indian Constellation), M/s Accord Software and Systems developed integrated NavIC and GPS Chipsets; which has been qualified by ISRO for deployment. About 4.5 Lakh Baseband Chipsets and 10 Lakh RF Chipset fabricated for deployment in civilian applications.

5.2.3.2 Some of the Products/ prototypes/ technologies developed and MoU signed/ collaboration in Nanotechnology area

- A point of care device named "Mobilab" (erstwhile magic box) has been developed for the detection of amylase, lipase, ALP, ALT, and AST at IIT Guwahati. The prototype for Amylase is under field trials in AIIMS New Delhi, GNRC Guwahati, GMCH Guwahati, IIT Guwahati Hospital, and Government Hospital in Kanpur. The device is IoT enabled and got CDSCO certified for amylase.

- Around 50 prototypes of the nanostructure based miniaturized and flexible rechargeable lithium batteries for flexible electronics have been developed at C-MET, Pune for RFID

applications and wrist watches.

- Technology for the production of Ultra-high pure Hydrogen for flexible Hydrogen Fuel Cells have been developed at IITG and an in-house low-cost Fuel-Cell Stack has been fabricated.

- L&T Technology Services and CeNSE, IISc Bangalore have joined hands for the innovation in nanotechnology and sensors.

- Large area ultralow permeable packaging films (Size: 2.5″ X 12″ and Material: graphene embedded polymer) have been fabrication tested successfully at IISc Bangalore for food and electronics packaging.

- MIM based OTP Memory platform have been demonstrated successfully by IITB for the hardware encryption for secure authentication and communication and has been selected for R&D Fair organized by the PMO.

- A 400W and 1kW fiber lasers has been developed, packaged, and demonstrated in a tabletop form factor and the technology has been transferred to M/s BEL.

400W and 1kW fiber lasers

- Soil moisture sensors have been developed and tested by IIT Bombay in collaboration with and Proximal Soilsens Technologies Pvt. Ltd. with Coromandel Fertilizers in their fields at Hyderabad. An MoU has been signed between Proximal Soilsens Technologies Pvt. Ltd. and FARMER organization. API development of

the first version of the software (Dashboard) has been developed by Proximal Soilsens Technologies Pvt. Ltd. So far 140 deployments have been made across geographic locations in India. The sensor and complete system are available now on the GeM portal.

(a)Soil moisture sensors; (b) Soil moisture sensing device

- Prototype of Monolithic Microwave Integrated Circuits (MMICs) and RF modules for strategic and high-end applications using GaN High Electron Mobility Transistors (HEMTs) has been developed at IITB.

- Fabrication of SQUID, Magnetometer has been completed. Field testing for Rock Samples is being carried out at Geomagnetic

Lab, Allahabad in collaboration with Indian Institute of Geomagnetism, Mumbai. Portable cryocooler is being tested for the SQUID.

SQUID based Magnetometer system

- A prototype sensor system (Spirometer) for the detection of sleep apnea and monitoring of COPD with Android software has been developed at IIT Kharagpur. Clinical validation process is going on at Savitha Medical College, Chennai and Darpan Uttaran, West Midnapore (NGO). Validation web portal is ready at www.senflex.in.

Spirometer

- **Startups incubated:**

  a. **AGNIT Semiconductors Pvt. Ltd.** For the commercialization of the GaN Semiconductor technology developed at IISc Bengaluru for strategic applications.

  b. **Theranautilus Pvt. Ltd.** For nanorobotics from lab to clinics for healthcare applications at IISc Bengaluru.

  c. **SenFlex Innovation Pvt. Ltd.** For Sleep Apnea at IIT Kharagpur.

  d. **H2DC12 Avenue Pvt. Ltd.** For microfluidic devices at IIT Delhi.

  e. **Numelo Technologies Pvt. Ltd.** To transfer the MIM based OTP memory to product enablement like smart sim & e-passports at IIT Bombay.

- **Publications and Patents**

  More than 46 research papers have been published in National and International journals. Some of the National/International Patents published/ filed this year are as follows:

  i. Kumar, A.; Yasmin, E.; Dhole, S.; Wagh, T.; PCT Patent Application; May, 2023; Group (VIII) catalysts for production of green hydrogen and acetic acid from ethanol and its mechanism thereof.

  ii. Prathu Raja Parmar, Saurabh Dubey, Jiwajyoti Mahanta, and Dipankar Bandyopadhyay National Patent Filed with Ref. No. 202331031908, Application no. TEMP/E-1/36319/2023-KOL dated 04th May 2023; real-time glycemic index sensor comprising enzymatic biosynthesized gold nanocomposite.

  iii. "Portable Energy-Efficient Optothermal Temperature Cycler for Small-Volume Chemical Reactions" R Poorna, SS Gorthi, BJ Toley. Indian Patent: 202041016123.

  iv. Suman Mandal, and Dipak K. Goswami, (2018), Organic field-effect transistor-based temperature sensor for different temperature sensing applications, Application No: 201831004408 – GRANTED (2023).

v. A Method for High Throughput Lithographic Patterning of Reduced Graphene Oxide Thin Films (# 328723).

vi. A Method for Deterministic Transfer of Reduced Graphene Oxide Thin Films (#345100).

vii. Membrane-less microfluidic reactor with asymmetric electrolyte for water splitting and process for producing the same. Application number: 202011022122.

viii. Membrane-less two-phase flow microfluidic electrolysis cell – fuel Cell tandem operation Application number: 202111016631.

ix. MiCroreactor with permeable electrodes for pure hydrogen generation. Application number: 202111055555.

x. Smartphone based blood hemoglobin estimation system. (WO2021019553, Patent file no.PCT/IN2020/050617 and Indian – 201931030430).

5.3 Centres of Excellence (CoE)

5.3.1 Nanotechnology Centres

Nanotechnology Initiatives Division at MeitY has established several CoE in Nanotechnology to take the basic R&D outcomes to the prototype and then to manufacture Nano devices, sub-systems, systems for the social benefits.

(a) Nano Fabrication Prototyping Facility for SMEs and Start-ups in the area of Micro Electromechanical Systems (MEMS) & Nano Electromechanical Systems (NEMS) at IIT Bombay.

A National Prototype facility has been created, commissioned & fully operational to enable researchers and industrial partners/ incubator companies to fabricate and manufacture nanoscale devices. This facility aims to provide facilities for scaling up of nano-manufacturing operations in contamination and quality-controlled environments. Also, it is an accessible platform to bring technologies from Technology Readiness Level TRL 4 to TRL 9. Fabrication unit processes have been optimized for silicon to release diaphragms, fabrication of microcantilevers and micro-heaters.

(b) Smart Wearable Advanced nanoSensing Technologies in Healthcare ASICs (SWASTHA) at IIT Guwahati

For the upscaling and commercialization of the technologies developed under the Centre of Excellence in Theranostics Devices at IIT Guwahati, a project entitled "SWASTHA" is being supported by MeitY.

Many projects including the development of an array of wearable, microfluidic and nanoelectronics technologies integrated with Application Specific Integrated Circuits (ASICs) for the detection of various diseases is being developed under SWASTHA.

In addition, a few therapeutic strategies are in process to develop a pilot-scale Primary Healthcare ecosystem which can later be scaled up based on the need of the country, especially in the North-East (NE) region of India.

5.3.2 CoE on E-waste Management

C-MET has established CoE on E-waste Management, in the country under Public Private Partnership (PPP) model. The facility has the capacity of recycling 1000 kg PCBs/day for the recovery of gold, silver and copper as major final products. The CoE has indigenously developed automated de-populated system and rotary tilting furnace (RTF) unit. The PCB recycling technology developed by CoE is at Technology Readiness Level 6 stage and now ready for commercialization. C-MET has not only developed recycling technologies but also designed and fabricated necessary processing equipment for

the same. The centre has also developed varieties of e-waste recycling technologies such as spent PCB, Li-Ion Battery, Permanent magnet, Si-solar cells etc. Overwhelming response from the different industries has been received to absorb the Li-Ion Battery recycling technology developed under CoE. In the current financial year, the technology has been transferred to 14 different industries and technical handholding is being extended to industries for setting up their recycling plant within the country. The PCB recycling technology and solar panel recycling technology

have been transferred to M/s Greenko Energies Pvt. Ltd., Hyderabad, who is the industry partner of the CoE project.

Another innovative content of the CoE activities is creation of expert manpower and/or human resource development through M. Tech programme in E-waste Resource Engineering and Management jointly with IIT Hyderabad since July 2020. Regular classes for M. Tech. course in "E-Waste Resource Engineering and Management" are being conducted.

5.3.3 CoE on Rechargeable Battery Technology (Pre-cell)

Lithium-Ion (Li-ion) batteries are ideal power source for consumer electronics, e-mobility and power sectors. These batteries are also expected to find

niche applications in e-governance electronics such as VVPAT machines. Current energy storage market in India includes applications such as mobile handsets and their accessories, solar rooftop, grid solar integration, wind integration,

electric vehicles, inverter back-ups, telecom, UPS, rural micro-grid and off-grid applications, diesel replacement, railways etc. India has vibrant Lead Acid battery manufacturing industry and needs to augment Li-ion battery cell manufacturing to meet current and future demands of energy storage. India primarily imports Li-ion cells and manufactures battery packs of different capacity for various applications. Government support in form of R&D funding for development of cost-effective end-to-end indigenous technology for manufacturing of rechargeable battery (Li-ion and post lithium) suited for Indian environment is vital for meeting the future demands. The support for R&D is expected to lower upfront investment cost, utilize Indian supply chain, improve profit margin and bring SMEs into play for manufacturing industrial units of rechargeable battery cell manufacturing ecosystem. In this direction, MeitY has initiated a self-sustainable

R&D center entitled "CoE on Rechargeable Battery Technology (Pre-cell)" at C-MET, Pune for scale up and transfer of indigenous technology on Li-ion battery and Sodium-ion battery (post lithium) to Indian SMEs for manufacturing of battery cells. The center provides R&D services to industry and indigenous technology solutions from material to cell manufacturing. Till date, the centre has developed active material production technology related to Li-ion technologies up to pilot plant scale (500g batch scale) such as Lithium cobalt oxide ($LiCoO_2$), $Li(NiMnCo)O_2$ (NMC) and Li-iron Phosphate ($LiFePO_4$). Additionally, Sodium-ion technology [$Na_3V_2(PO_4)_3$] has been developed and demonstrated for mobile handset applications. This technology is now undergoing optimization and scale up. The centre has till date filed 12 patents and published 16 journal papers. Seven start-ups have joined the centre for transfer of technology.

5.3.4 CoE on Additive Manufacturing-Optoelectronics Sector

Additive Manufacturing (AM) is disruptive set of technologies which are bringing fundamental change in how manufacturing is carried out in many sectors due to its ability for mass customization. AM is enabler for digital manufacturing which has capability in producing products directly from design data by adding layers of material to obtain the final shape with minimal waste, supporting Industry 4.0. MeitY has initiated a Centre of Excellence on Additive Manufacturing at C-MET, Pune in collaboration with Central Institute of Plastics Engineering & Technology (CIPET),

Bhubaneswar. The objectives of the centre are to support Indian Additive Manufacturing Eco-system through focused and coordinated research, design and development in collaboration with 3 participating industries. In current phase of the project, 4 technologies with 4 different machines, 13 materials and 4 different electronics application products are slated to be developed. The project is also bringing opportunities for Indian companies to develop their own AM material and machine technologies for global market at much reduced R&D cost for any sector (not limited to electronics) such as aerospace, medical, automotive etc. The centre is also training manpower to support growth of AM economy in India.

5.3.5 Centre for Programmable Photonic Integrated Circuit and Systems (CPPICS)

Field programmable photonic gate array (FPPGA) core technology is a multipurpose photonic processor platform which can cater to multiple sectors with multiple applications such as quantum computing, quantum communication, 5G/6G communications, IoT, radar and avionics etc. MeitY

has initiated CPPICS at IIT Madras in collaboration with industry to design, manufacture and develop applications based on FPPGA cores using Silicon Photonics. The centre is slated to become self-sufficient in 5 years time, commercialize the products through Start-up and train manpower to boost the ecosystem of such manufacturing. The centre is collaborating with M/s Si2 Microsystems, Bangalore for System-in-Package solutions for

the proposed silicon photonics FPPGA cores which will create commercially viable products for proposed start-up. The centre has till date demonstrated various programmable photonic integrated protoypes such as RF filter, Differential Phase Shift (DPS) QKD transceiver, Quantum Random Number Generator (QRNG), and optical & electrical packaging.

5.3.6 Additive Manufacturing based Fabrication of Low Cost Optical Computing Chips

Optical computational chips and photonic devices finds application in various fields of technologies such as communication, computation, healthcare, automation, sensor and defence. However, although they have shown plethora of applications, their industrial viability is mainly limited by their fabrication process which involves presence of foundries, numerous process-equipments and steps. In recent years, Additive Manufacturing (AM) processes are bringing fundamental change in how manufacturing is carried out in many sectors due to its ability for scalable, cost effective and sustainable fabrication process. AM is an enabler for digital manufacturing which has capability in producing products directly from design data by adding layers of material to obtain the final shape with minimal wastage. MeitY

has initiated a centre on Additive Manufacturing based Cost Effective Optical Computing Chips at Indian Institute of Science, Bangalore (IISc) in collaboration with C-MET, Pune. The objective of the centre is to design and fabricate global state-of-the-art 3D printer to achieve sub-micron resolution, indigenous materials for printing and to design & fabricate optical devices for computation. The centre is expected to achieve self-sustenance and focus on developing indigenous materials and

machine technologies for photonics manufacturing sector. The centre is also bringing opportunities for Indian companies to develop their own AM material and machine technologies for global market at much reduced R&D cost for any sector (not limited to photonics) such as aerospace, medical, automotive etc. Till date the centre has designed and developed state-of-the-art DLP light engine for a full 3D printing machine and formulation of TiO_2 nanocomposites for low resolution printing.

Examples of printed structures
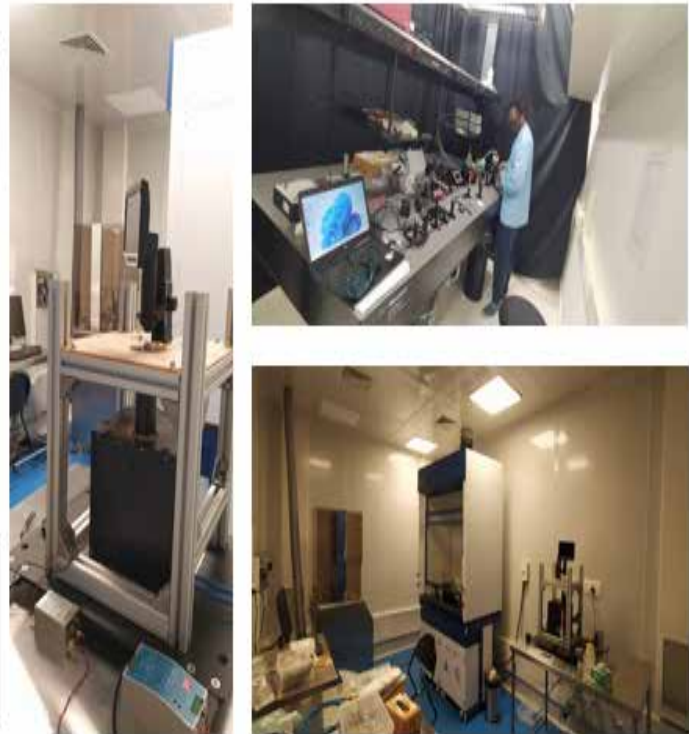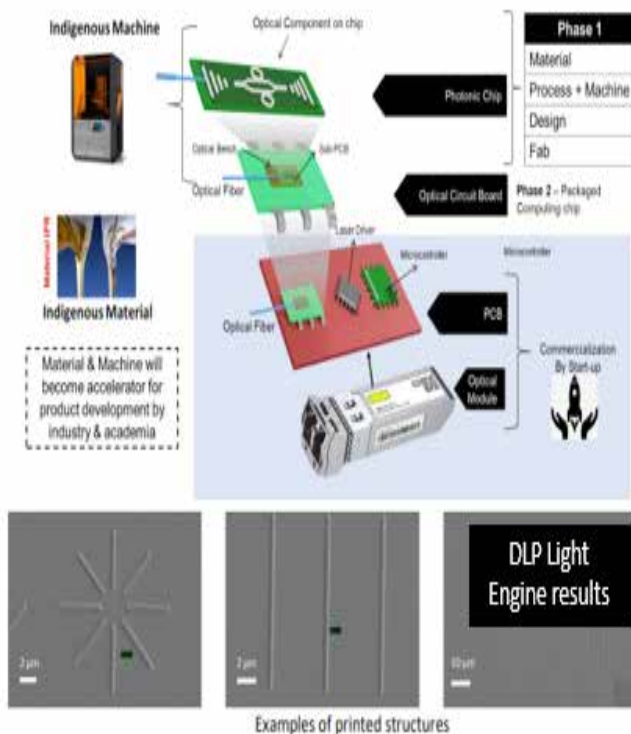
5.3.7 CoE for products based on Li-ion (Post Cell)

Lack of design capability in Indian mobile handset and accessories manufacturing severely hampers domestic companies to introduce new models, customize features for the customers which leaves the market wide open to competitors having this coveted ability. India is also losing valuable foreign exchange to international design hubs in

other countries. Thus, for long term success of Indian electronics manufacturing, research and innovation supporting design centre needs to be based in India. The setting of industrial parks, creation of ecosystem for electronic industries may be the only solution to reduce the import dependency.

To make India self-reliant and AatmaNirbhar in this sector, a CoE on Post-cell value chain for

power bank technology is proposed to be set up at C-DAC, Noida with the requisite infrastructure, equipment, R&D facilities etc. The CoE is expected to seed a design hub for SMEs in the power bank industry and other Indian mobile handset and accessories ecosystem products based on Li-ion cells, leading to reduced foreign exchange outgo and employment generation. Presently, the CoE has envisaged designing and developing of products related to mobile handset accessories and other electronic application products based on Li-ion cells like Power Banks, Chargers, Wireless Chargers, Bluetooth Speakers, Smart Lighting Systems, Digital Radio, Headphones, Wearables, Solar Inverter, GPS Tag using NaVIC, UPS System for IT Access, Power Tank, Access Control using RFID/Biometric. Besides this, a fully functional testing lab has been established at CoE which is proposed to be used by Bureau of Indian Standards (BIS) for certification and to provide testing support for in country and global needs. Also, the CoE hosts facility for skill development in electronic system design to bridge the gap in skilled manpower requirement of the country including the development of SMEs in the mobile industry & other electronic domains. Till date the center has designed 7 products [USB Charger – 18W QC 3.0, 65W GAN PD charger, 15W Wireless Charger, 10W Bluetooth Speaker, Power Bank, Smart LED light, Access Control using RFID (Hardware), Neckband (co-developed with boAt]; conducted grand challenges for 7 mobile handset accessories products, signed MoUs for co-development of products with BoAt and Gizmore for co-development of products like Power adapters, Headsets, Bluetooth Speakers etc., Prezence Solutions for RFID based Access Control Systems, Celium Devices Pvt. Ltd., for Wi-Fi & BLE modules, Microchip Technology for UPS development, DTS Licensing System for Digital Radio, HIVE Electronics LLP, Brainwave Technologies Pvt. Ltd., SK Enterprises, Technopedia Systems LLP; and provided commercialization services to Westway Electronics Pvt. Ltd., and Reliance Retail Ltd.

5.3.8 CoE on Additive Manufacturing- Medical Device Sector

Additive Manufacturing (AM) is disruptive set of technologies which are bringing fundamental change in how manufacturing is carried out in many sectors due to its ability for mass customization. AM is enabler for digital manufacturing which has capability in producing products directly from design data by adding layers of material to obtain the final shape with minimal waste, supporting Industry 4.0. MeitY has initiated a CoE on AM at Andhra Pradesh MedTech Zone (AMTZ), Vishakhapatnam, Andhra Pradesh which is supporting Medical Device Sector. The vision of the centre is to make COE at AMTZ a hub (common facility for local AM industry which will offset disabilities for competing with global peers) for medical device innovation in India by nurturing various medical device start-ups through AM technology. The CoE has shown good results till date; both in skill development and technology development. The CoE has accelerated new product development for 9 startups. A wide range of products ranging from customized dental aligners, Endotracheal tube, Enteral feeding tube and many more. More than 1000 of manpower in various aspects of AM has been trained such as in Medical Device Design, Prototyping and Testing. Centre has filed 5 Patents till date. CoE had carried out significant research activities in orthotics, prosthetics, medical implant grade materials, surgical instruments and supported collaborations. It has also facilitated research, development, and collaboration between industry, academia, and healthcare professionals, contributing to the rapid evolution of additive manufacturing techniques for medical applications. CoE also have initiated activities to see how the expertise established through this MeitY's Centre can bring innovations in critical medical devices like pacemakers and cardiovascular stents.
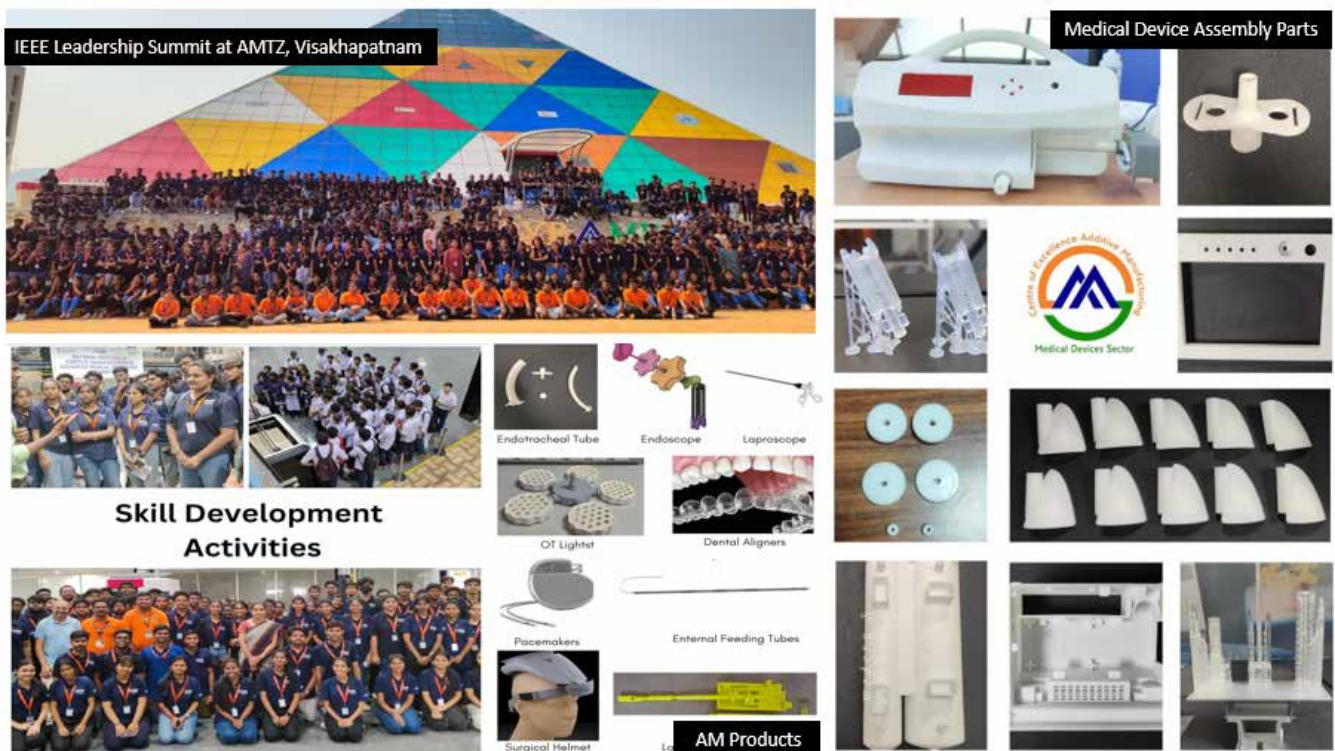
5.3.9 National Centre on Additive Manufacturing (NCAM)

NCAM has been formed by MeitY, Telangana State Government & Industry at Hyderabad. The NCAM is a company registered under section 8(1) of the Companies Act 2013. The vision of NCAM is to develop a comprehensive Additive Manufacturing ecosystem in the country and position India as a Global AM Hub. The centre is incubating a batch of 6 start-ups with a focus to generate IPR. NCAM launched the National Skill Development Awareness Marathon and conducted Training Programmes across various cities in India impacting 5,000+ individuals; and conducted International events & trade shows attracting 5000+ individuals.

5.3.10 National Centre for Quantum Manufacturing Technology (NCQMT)

NCQMT at C-MET, Pune has been initiated on March 2022 by MeitY. The aim of the National Centre is to address the materials challenges that will be needed to make the country self-reliant in the area of Quantum Technologies. Self-reliance in materials technologies is necessary to develop state-of-the-art technologies which are vital for the national security. The centre conducted first symposium on Quantum hardware and Software for Quantum Technologies to brainstorm the needs for the development of indigenous Quantum hardware and technologies in India. The motive of this symposium was to find out the open avenues and status of Indian Industries in the area of Quantum Technologies. Also, to establish the open consortium for developing Hardware and software for Quantum Technologies in India. During the program a survey for 47 companies/ startups working in the domain of Quantum Technologies in India was presented.

For the synthesis of quantum-grade diamond, indigenous MPCVD machine has been developed. The facility will be utilized to synthesize Quantum Grade Diamond substrates apart from four other types of quantum materials (2D material, quantum dot material, SNSPD and nHBn).

Microwave Plasma Chemical Vapor Deposition system for Quantum Grade Diamond Substrates
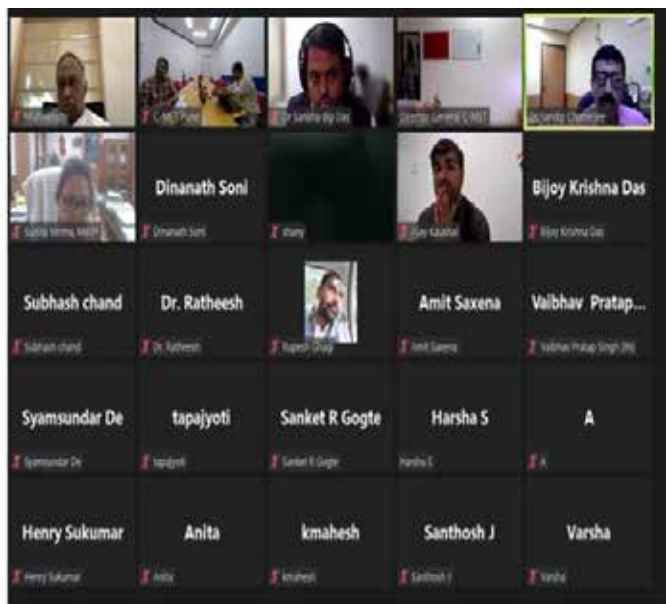
First Symposium on Quantum Hardware and Software for Quantum Technologies

5.3.11 Centre of Excellence (CoE) in Intelligent Internet of Things (IIoT) Sensors

CoE in Intelligent IoT Sensors is the joint initiative of MeitY, Government of Kerala and being established by C-MET, Thrissur and Indian Institute of Information Technology & Management Kerala (IIITM-K) at Kochi. The main objective of CoE is to establish state-of-the-art facilities for sensor manufacturing, intelligent sensor system hardware, AI software development etc. The infrastructure and central facilities required for sensor manufacturing, Printed Circuit Board (PCB) manufacturing and system integration, followed by testing for pre-compliance are established. The CoE has already provided incubation facilities/consultancies/ technical services/ mentorship support for many start-ups/industries. the CoE is promoting innovation and entrepreneurship through grand challenges. Indigenization of IoT sensors is done by developing various indigenous sensor technologies and solutions. The CoE bench-marking the products to national and international standards. The centre has already transferred a few technologies on sensors and IoT integrated products. The center has initiated training programmes/ testing facilities in IoT sensors.

5.3.12 India Innovation Centre for Graphene (IICG)

MeitY, Government of Kerala and Tata Steel Limited is jointly establishing the IICG at Kochi, Kerala to investigate the science and technology of rapheme and other 2D materials. The setting up of the centre is implemented by C-MET, Thrissur, Digital University Kerala (DUK) and Tata Steel Limited (TSL). This centre envisages partnering effectively with industrial-R&D institute-academic activities to promote innovative and adventurous research emphasizing applications. IICG will attract internationally leading research on rapheme into India and bridge the gap between

scientific development and industrial applications of Graphene in our Nation. The institute is under the process of creating class 100 clean room facilities. The sophisticated equipment/ other infrastructure is already established to promote research in alignment with industry requirements. The section 8 company got incorporated on 14th September, 2023. IICG is fostering research, development, and commercialization of Graphene technologies through various grants including research grants, innovation grants and grand challenges.

5.3.13 Centre for Promotion of Additive Manufacturing - Agri & Food Processing (CPAM – A & FP)

The CPAM – A & FP has been established at the C-DAC, Kolkata, under the 'Additive Manufacturing (AM)' initiative of MeitY in collaboration with Central Manufacturing Technology Institute (CMTI) Bangalore, CSIR - Central Food Technological Research Institute (CFTRI) Mysore and IIM Calcutta Innovation Park (IIM-CIP) Kolkata. A new concept of Agri-factory is being introduced through this unique R&D program where Agri-produce lines will be developed as back integration to the value-added Agri-product lines. These Agri-product lines will provide quality, quantity, and cost control, the output of which will feed the value-added Agri-product lines. As a final step in the product line food items will be printed through indigenously developed 3D food printer. To improve time to market, market resilience, and product-independent manufacturing lines for value-added Agri-products, AM will be introduced in this sector by implementing this national initiative. Additionally, AM will be used to produce some of the supply chain components (Agri-product line modules and Agri-photonics components) to reduce the production cost. The centre will indigenously develop the Agri-Factory concept, AM machines and materials to take the global lead in the Agriculture and Food Processing sector.
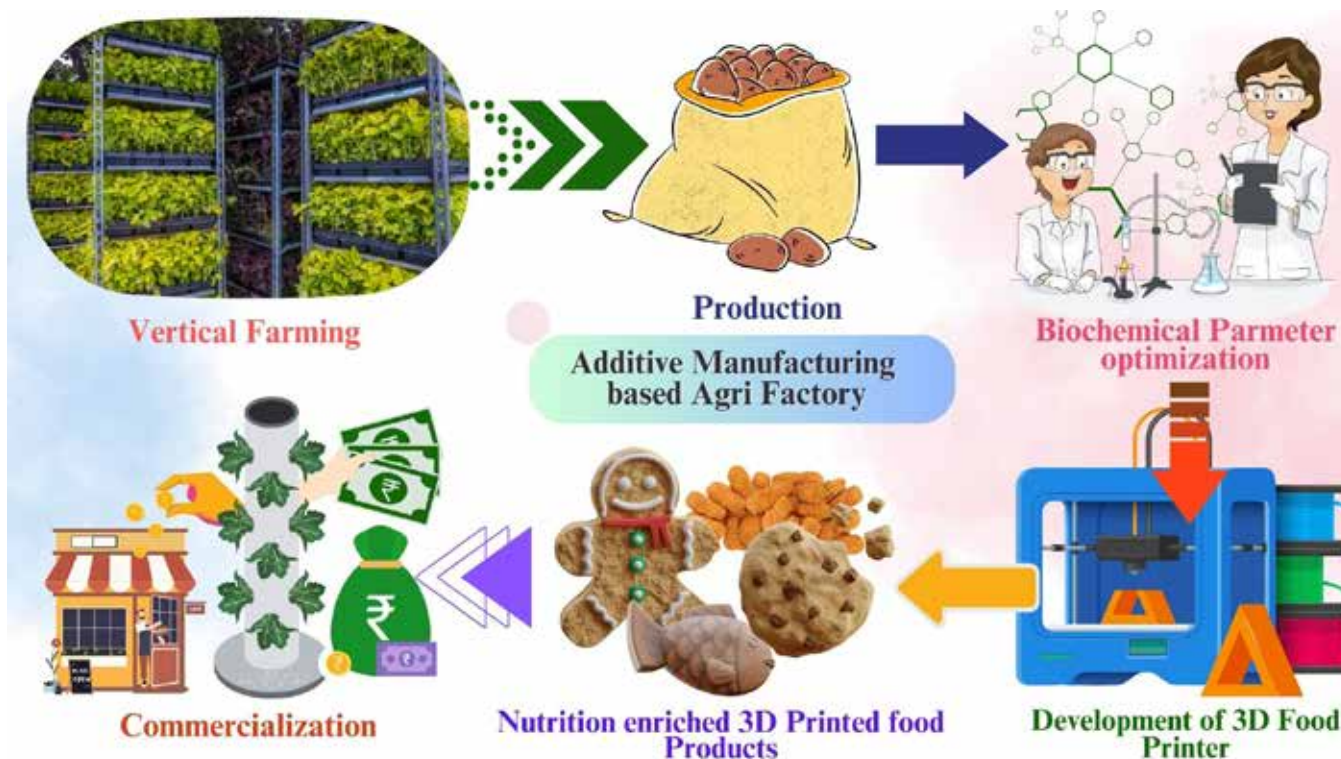
5.3.14 Graphene-Aurora – India Graphene Engineering Innovation Centre (I-GEIC)

MeitY, Government of India in collaboration with Govt. of Kerala initiated a project on setting up of self-sustain Section 8 (not for profit) company called "I-GEIC" to nurture the deep/emerging Graphene technology & innovation ecosystem that can guide, develop, implement, and support SMEs and startups to commercialize developed graphene technologies for scale adoption. The sub-objectives of the project shall be as follows:

- Establishing world class Graphene material lab centre.

- Launch targeted translation Graphene research program in collaboration with Industry and academia developing new application and human intellect in Graphene-Aurora graphene research lab.

- Build global and local collaboration with the OEMs, Industry players, Academia, SMEs, and startup for targeted research projects.

- Build democratized commercialization route across Tier cities of state working with SMEs, Startups, and industry players with the help of State Government to accelerate technology absorption.

- Supporting startups and spin out startups in creating value through commercialization of Graphene technology and engaging in deep tech research.

- Create a Graphene Technology & Commercial bridge (hub) for business and thought leadership between different stakeholders.

- Facilitate the Government's vision by developing deep tech solutions around SDG challenges for sustainability and industrial impact.
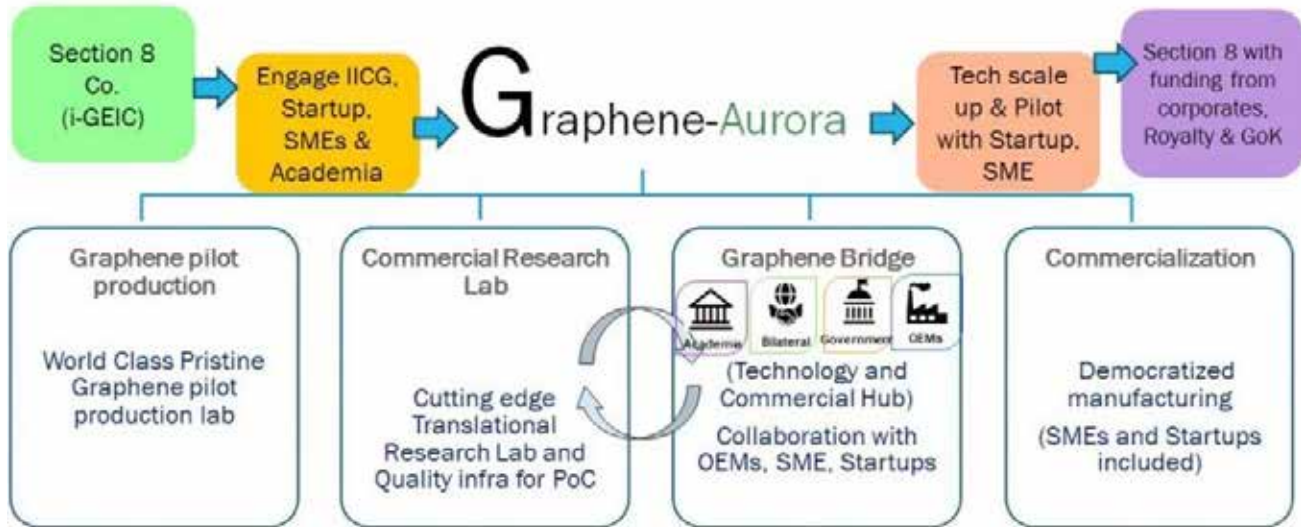
5.3.15 Establishment of process facilities for pilot scale preparation of Neodymium (Nd), Praseodymium (Pr) metals, Neodymium Iron Boron (NdFeB) Alloy and Magnet

The main goal of the R&D project is to establish process facility for the pilot scale preparation of high purity Ne metal, Pr metal, NdFeB alloy and fabrication of NdFeB magnet from indigenous/ secondary rare earth sources and to achieve indigenous capability. C-MET Hyderabad is the implementing laboratory to accomplish the production facility. Discarded permanent magnets are a rich source of rare earths. Recycling of these magnets has become essential for sustainable utilization of rare earth metals under circular economy. Accordingly, the work has been initiated with recovering the rare earths from waste NdFeB magnets and subsequently uses the recovered materials as secondary raw materials for development of magnets. ~ 150 kg of waste permanent magnets from hard disk drive have been converted into the powder form by Hydrogen Decrepitating (HD) process and then consolidated to cubic shape pellets.

Waste NdFeB magnets   **NdFeB alloy powder**   **NdFeB powder pellets**

5.3.16 National Additive Manufacturing Centre West (NAMCW)

3-D printing/Additive Manufacturing (AM) is the next generation of digital manufacturing technologies. It is providing the necessary impetus to the Industry 4.0 transformation. MeitY has released a National Strategy of Additive Manufacturing (NSAM) in February 2022 for the development (R&D) and deployment (manufacturing) of AM in India for the next generation digital manufacturing with an aspiration to add $1 Billion by 2025 to Indian AM market. A program for implementation of NSAM is ongoing at MeitY focusing on the deployment of AM in its traditional AM sectors and development & deployment in new AM sectors where Indian Manufacturing can benefit with the adoption of AM. The NAMCW at Ganpat University, Gujarat – India has been initiated in partnership with the State Govt of Gujarat and industry. The primary aspiration of NAMC-West is to increase AM adoption by Indian manufacturers in six western states of India (Gujarat, Maharashtra, Madhya Pradesh, Haryana, Punjab, and Rajasthan) which will assist in achieving NSAM's aspiration to add $1 Billion by 2025 to Indian AM market. The NAMCW to be a company registered under section 8(1) of the Companies Act, 2013.

5.3.17 Content on 'Startups Innovation & IPR' Division for Annual Report 2023-24

- India has evolved as the 3rd largest startup ecosystem in the world with more than 1,13,000 startups operating in the country and 109 unicorns with a total valuation of more than $340.79 Billon. Notwithstanding the raging global pandemic economic duress and other equally precarious challenges, the tech startup and the entrepreneurial ecosystem in the country have shown exemplary resilience and willingness to go beyond the norm. India now also boasts of more than 3,000 deep-tech start-ups operating in different segments of emerging technology areas.

- MeitY in tandem with the well-laid down efforts to fast-track the tech startup ecosystem has also been relentlessly supporting the cause for IP commercialization. So, some of the flagship initiatives from the Ministry that includes Technology Incubation and Development of Entrepreneurs (TIDE 2.0), CoEs in diverse areas of national interest, MeitY Startup Hub (MSH), 'Gen-Next Support for Innovative Startups (GENESIS)' etc.

- New generation of start-ups emanating from these initiatives have taken up the cudgel of solving myriad problems ranging from governance to education, agriculture to healthcare in the country. Backed by robust efficiencies in the backend and exploiting cutting edge emerging digital technologies such as AI, IoT, Data analytics, machine learning augmented and virtual reality, advanced automation, robotics and mobility among others, these startups are creating new benchmarks for themselves and for the world with wide scope for IP based solutions and products.

- MeitY has put in a well laid down mechanism to incubators and accelerator levels to sensitize, identify, protect and maintain the IP assets being generated in the country. So apart from creating funding opportunities for the startups it is also prioritizing sensitivity towards the need for IP generation in the country and has adopted a multi- pronged approach.

- The Startups Innovation and IPR Division of MeitY has unleashed a slew of initiatives for the benefit of technology startups dealing in IT/ITeS and Electronics domains. These initiatives range from TIDE 2.0 Scheme, domain specific CoEs, SIPEIT for supporting filing of IPRs, etc. for benefitting startups and MSMEs. Some

of the recent initiatives have been elucidated here:

- **GENESIS (Gen-Next Support for Innovative Startups):** MeitY has recently approved an overarching 'GENESIS' Scheme with a budgetary outlay of ₹490 Crore for a duration of 5 years to accelerate and enhance the fast-rising tech startup ecosystem. The Scheme aims to boost the startup ecosystem in Tier-II & Tier-III cities and upcoming towns in the country with emphasis on collaborative engagement among startups, government and corporates. GENESIS envisages further scaling up and sustaining the tech ecosystem especially to discover, support, grow and make successful startups. The platform envisages impacting and consolidating 10,000+ tech start-ups over the course of the next 5 years to pave the road for an equal startup ecosystem. Various outreach activities and awareness sessions in leading startup events were conducted to broadly disseminate information about the scheme pan India. Also, applications of eligible implementing agencies were invited for execution of the GENESIS scheme through MSH portal.

- **MeitY Start-up Hub (MSH):** To give wings to MeitY's vision of promoting technology innovation, start-ups and creation of Intellectual Properties, a nodal entity called MSH has been setup under its aegis. MSH is a dynamic, singular and collaborative platform for tech startup community towards building meaningful synergies in the Indian startup space. MSH's quick value additions to domestic tech startups in terms of improving scalability, market outreach and domestic value addition and setting up innovative partnerships with various stakeholders has been a key differentiator in MSH's efforts to catapult the tech startup ecosystem in the country. MSH also has a mandate for capacity building of different tech incubation centres pan India, capitalizing on strengths of different centers to pull out moderately weaker centres into mainstream activity. MSH is acting as a hub and ensuring synergies among all the TIDE 2.0 Centres, theme-based incubation centres, domain specific Centre of Excellences on Emerging Technologies and other existing platforms for facilitating criss-crossing of technology resources, sharing best practices and ideas across the entire gamut of innovation and startup ecosystem. MSH has seen a consolidation of over 3365 startups, 482 incubators, 424 mentors and 22 state-of-the-art CoEs, successfully conducted/ being conducted 143 challenges in different technology areas encouraging development of innovative products/ services to address current and pressing challenges.

- **TIDE 2.0 Scheme:** MeitY had initiated TIDE 2.0 scheme in 2019 with an outlay of ₹264.62 Crore over a period of 5 years to promote tech entrepreneurship through financial and technical support to incubators engaged in supporting ICT startups primarily engaged in using emerging technologies such as IoT, AI, Block-chain, Robotics etc. in seven pre-identified areas of societal relevance. The

Scheme will be implemented through 51 incubators through a three tiered structure with an overarching objective to promote incubation activities at institutes of higher learning and premier R&D organizations, eventually leading to handholding of approximately 2000 tech start-ups over a period of five years. Towards this end TIDE 2.0 has been able to provision an empowering mechanism to establish necessary collaboration among the different actors of tech startup ecosystem to grow and benefit them through complementary strengths. As of now 51 TIDE 2.0 Incubation Centres have been approved and made operational.

Point-wise Key Achievements:

➤ 950+ startups supported across 51 Incubation Centres.

➤ 74 startups are having customers.

➤ 150+ startups attracted investments of more than 300 Crore.

➤ 339 products/ working prototypes developed.

➤ 280+ patents filed.

➤ 170+ copyrights/ trademark registered.

➤ 70+ awards/ prizes/ recognitions received by the startups.

➤ 3700+ employments generated.

➤ 500+ start-ups engagement activities conducted including 60 hackathons, 15 challenge grants, 50 Deep and 230 Low Engagement Programmes and 200 thematic workshops for startups.

➤ Additional 1000 startups will be supported under the scheme in the next two years duration.

- **Domain specific Centres of Excellence (CoEs):** To improve and transform innovation-led ecosystems in the country MeitY in partnership with various stakeholders has opened a clutch of domain specific CoE in order to create cohesive technology solutions built around the emerging technologies and support the next wave of budding entrepreneurs on pan India. A brief of such initiatives is put forth below:

  (i) CoE on FinTech at Chennai: MeitY has initiated a CoE on FinTech at STPI, Chennai to provide infrastructure, resources, coaching/ mentorship, technology support and funding to emerging start-ups in the FinTech sector. The proposed CoE would establish ecosystem around FinTech with the latest trends and technologies in the financial services sector through a collaborative approach including NPCI, UIDAI and Partner Banks. The purpose of the FinTech CoE is to create holistic ecosystem so as to enable start-ups to experiment their innovative financial products or services within a well-defined space and duration. The project aims to support 58 start-ups over a period of 5 years.

  (ii) IoT OpenLab - a CoE for Internet of Things (IoTs) at STPI Bangalore: An IoT OpenLab in partnership with Arrow Electronics at STPI Bangalore has been initiated to provide academic and business mentoring of the startups in the IoT emerging technology area for developing products and/ or services around IoT along with networking opportunities for the startups. The IoT

OpenLab intends to support and nurture 100 start-ups per year with an overall target to support 500 startups over a period of 5 years.

(iii) ESDM Incubation Centre at Bhubaneswar by STPI: MeitY has approved ESDM Incubation Centre with the objective of creating a holistic eco-system to promote ESDM innovation, R&D and create Indian intellectual property in the Eastern Region of the country. The centre will be operated through STPI, Odisha in collaboration with Government of Odisha, IIIT Bhubaneswar and IESA. It aims to leverage 40 start-ups over the period of 5 years. This ecosystem is necessary to develop, promote, incubate, mentor and create breakthrough innovations towards development of product and IP creation in the ESDM sector.

(iv) CoE on Medi-Electronics & Health Informatics at Lucknow: MeitY has initiated a CoE on Medi-Electronics & Health Informatics at Lucknow to stimulate the establishment and growth of technology-based start-ups in the field of medical electronics and health informatics by providing the necessary infrastructure, mentoring, marketing, funding and eco-system required for their success and growth. The Medi-Electronics & Health Informatics CoE is being setup at SGPGI, Lucknow with Department of IT and Electronics, UP Govt. as funding partner, AiMED as industry partner, AMTZ as industry and seed funding partner and Kalam Institute of Health Technology as academic partner. The project aims to support 50 start-ups over a period of 5 years.

(v) CoE in Intellectual Property (CoE-IP): A robust ICT-IPR ecosystem can help capitalize on the growth-enhancing effects of innovation vis-à-vis ICT. MeitY recognizes the importance of creating a conducive framework for IPR protection and has unleashed a slew of initiatives over the years to protect intellectual assets emanating from our country. CoE-IP forms the fulcrum of all MeitY IPR initiatives. It was setup essentially to support independent inventor community, academicians, MeitY societies, SMEs and startups with a clutch of IP related services. CoE-IP offers a gamut of IPR related services like IPR queries Prior Art searches, Patent filing assistance, invention analysis, Patent Landscape reports etc. especially curated for ICT based innovators. These service along with handling IPR queries and landscape reports is offered free of cost to the user community.

- **Theme based Incubation Centres:** With an aim to support the economic development of local region through supporting start-ups and businesses that will lead to creation of a more vibrant local entrepreneurial ecosystem, theme-based incubation centres under the aegis of MeitY has been setup across India. MeitY has initiated the following state-of-the-art Theme based Incubation Centres:

(i) **Establishment of Incubator for Electronics Start-ups in Delhi-NCR (Electropreneur Park):** The Electropreneur Park established in collaboration with Software Technology Parks of India (STPI), India Electronics

& Semiconductor Association (IESA) and Delhi University (DU) with state-of-the-art facilities at South Campus, Delhi University. The project aims to support 50 start-ups. As on date, the Electropreneur Park has supported 57 startups till date out of which 45 startups were incubated physically while 12 were incubated virtually. Till date, 28 startups have graduated out with 18 in the revenue generating phase. As an outcome, 52 new products, 90 working prototypes have been developed, 59 patents filed out of which 10 patents granted, ₹66.3 Crore VC/ Grants/ CSR received by the onboard startups, ₹114 Crore revenue generated by startups with a valuation of ₹440 Crore and 680 number of employments generated by the startups.

(ii) Electronics Incubator by IIITM-Kerala and KSUM at Cochin, Kerala: The project for setting up of Consumer Electronics Incubator at Cochin, Kerala by Indian Institute of Information Technology and Management Kerala (IIITM-K) and M/s Kerala Startup Mission (KSUM) aims to creation of new enterprises focused on Consumer Electronics through a holistic incubation ecosystem. This Incubator will incubate 40 startups over a period of 4 years. Infrastructure setup is completed. Testing and Equipment/ IoT, Robotics Lab and Prototyping Room for SMT Assembly Line completed. As an outcome, 170 startups are incubated in the IC out of which 55 startups have reached productisation stage, 52 startups graduated, 91 products and

48 working prototypes generated, 76 Patents filed out of which 17 patents granted in addition 39 copyrights and 34 trademarks registered, 44 companies have got its 1st order, 806 employments generated, 63.4 Crore funding VC/ Grants/ CSR received and ₹74.4 Crore revenue generated by the onboard startups till date.

(iii) Setting up of Incubation Centre in the area of ESDM with focus on Medical Electronics at IIT Patna: The incubation facility developed through MeitY and State Government partnership aims to incubate 50 startups over a period of 5 years. The primary objective of this is to promote innovation and entrepreneurship with the aim to identify, nurture and translate technological ideas and innovation in the broad area of ESDM sector with a focus in Medical Electronics. Till date, 75 start-ups have been supported out of which 33 startups are on-board at present including 14 in healthcare and 19 in ESDM sector. As on date, 25 patents have been filed by the startups out of which 7 patents were granted, 25 products and 17 working prototypes have been developed and 250+ employments were generated by the startups excluding their founders.

- **Support for International Patent Protection in E&IT (SIP-EIT) Scheme for SMEs:** MeitY had initiated a scheme titled SIP-EIT that encourages international patent filing by Indian MSMEs and start-ups so as to encourage innovation and recognize the value and capabilities of global IP. Reimbursement provided under

the scheme is upto a maximum of ₹15 Lakh per invention or 50% of the total expenses incurred in filing and processing of patent application upto grant whichever is lesser. A significant component of the SIP-EIT scheme is to provide financial support to academic institutions, industry bodies and MeitY's autonomous societies for conducting IPR awareness workshops pan India in ICT domain which aims to sensitize about IPR and their protection among various stake holders consisting of students of engineering colleges, academia, startup community and business fraternity.

During the scheme tenure SIPEIT had supported a total of 75 applications from MSMEs and tech startups for international patent filing. With respect to the IPR awareness component, 84 IPR Awareness workshops were conducted pan India in total including 2 International workshops.

- **IPR facilitation programme:** Under IPR facilitation programme of MeitY, Innovation & IPR Division, MeitY has been supporting its R&D societies and grantee institutions under various R&D projects for filing of different IPRs namely Patents, Trademarks, Copyrights and Industrial designs. The support includes end-to-end facilitation including prior art search, filing and maintenance of the IP assets in the form of annuities. The assignee ownership of IPRs is as per terms & conditions governing the GIA for particular R&D project. MeitY IPR Patent facilitation has resulted in securing more than 700 IPRs nationally and in other patent offices across geographies.

5.4 Cyber Security Research and Development

Cyber Security R&D Group of MeitY undertakes R&D towards strengthening India's indigenous research and development capabilities as well as capacity building, setting up of mechanism for cyber security assurance and compliance. This has helped in establishing an ecosystem for the startups/ cyber security industry which had resulted in production of indigenous state-of-the-art tools for forensics, device and end-point security, IoT Security, Threat Intelligence tools. These tools and technologies are being used by cyber security and cyber-crime handling agencies in line with objectives of ministry to provide open, safe, trusted and accountable Internet. R&D is carried out in the thrust areas of cyber security including (a) mobile device security, (b) SCADA security, (c) end-point security, (d) cryptography and cryptanalysis, (e) network and system security, (f) cyber forensics, (g) threat intelligence and AI based threat modelling. 70 major projects (including 15 projects in North-East) have been initiated at 38 institutions (including 12 institutions in the North-East).

New roadmaps and projects are formulated/ initiated in thrust areas identified on continuous basis to enable enhancement of expertise/skills in R&D for cyber security in the country. This ensures strengthening of security posture through generation of near real-time situational awareness at national level for enhancing cyber security in the country. Accordingly, R&D projects in the area of cyber security have a special focus and emphasis on R&D infrastructure creation, capacity building and enhancement of skills and expertise in the interest of a conducive R&D ecosystem in the country as shown in figure-1. In addition, specific efforts have been made to nurture institutions and capacity enhancement in the entire North-East Region.

Figure 1: MeitY Cyber Security Thrust Areas

Cyber Security Projects, outcomes and Achievements:

During the year 2023-24, R&D efforts were continued and strengthened. New projects have been initiated which includes: (i) Malware and Malware-based attack Detection Using Statistical and Machine Learning Approach (Tezpur University), (ii) Network Telescope Feed for Threat Intelligence Generation by CSIR-4PI Bangalore, (iii) Detecting adversarial machine learning, (iv) Secure Networks and Edge-Computing Hardware for Industry 4.0 (v) LogIT: A Federated Learning and Fog-Computing based framework for IoT

Security" be implemented jointly by Indian Institute of Information Technology (IIIT) Guwahati and Central Institute of Technology Kokrajhar (CIT Kokrajhar) (vi) Design and Development of Advanced Forensics Data Analytics Tool" to be implemented jointly by C-DAC Thiruvanthapuram, C-DAC Bangalore and IIT Palakkad.

Ongoing projects were reviewed periodically and follow up actions were taken. Efforts in the ongoing projects have resulted in the development of certain indigenous security solutions and technologies which are deployed / being deployed at various user organisations as depicted in Fig- 2.
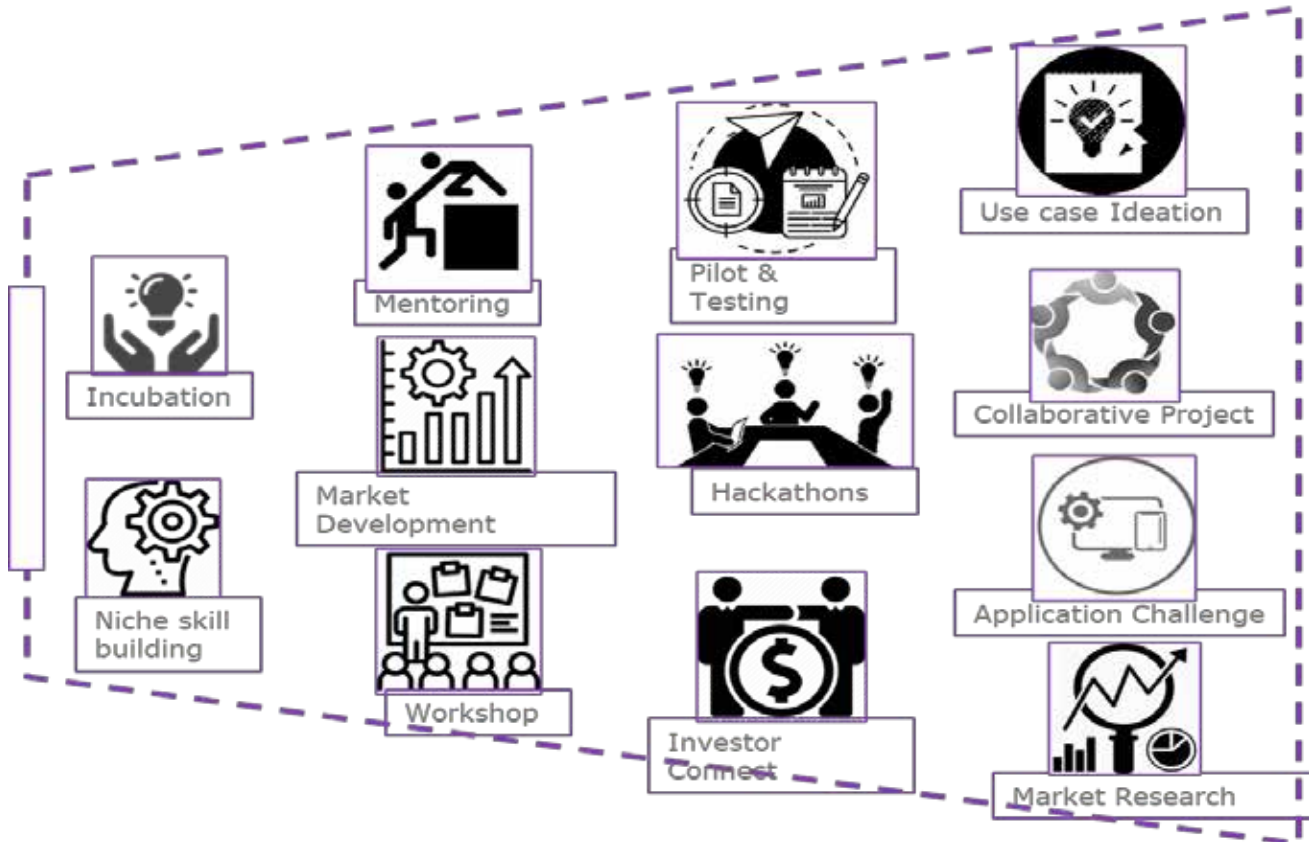
Figure 2 – Stages of indigenous security solutions and technologies

New projects initiated in the area include:

A. Malware and Malware-based attack Detection Using Statistical and Machine Learning Approach

This project aims to counter the escalating threat posed by malware and malware-based attacks on the Internet and its services, extending beyond traditional devices to include IoT networks and critical infrastructures. The focus is on leveraging machine learning for defence solutions. The project is organized into seven modules: establishing test-beds for experimental analysis and visualization of malware, generating benchmark malware datasets for Android and Windows platforms, defending against known malware using supervised learning, integrating malware defence by combining grey level and feature data, enhancing the prototype with early responses for unknown malware on CPU-GPU platforms, detecting malware-based attacks on critical infrastructure, and supporting the prototype with a dynamic signature-based mitigation technique for fast and accurate detection of both known and unknown malware. The overall goal is to address the evolving nature of cyber threats by developing dynamic defence mechanisms through machine learning techniques.

B. Network Telescope Feed for Threat Intelligence Generation

The proposed project aims to advance the development and deployment of a Network Telescope, emphasizing improved performance and expanded features. Tasks include refining the existing prototype with additional functionalities, deploying the Network Telescope to collect real-time Internet Background Radiations generated by malicious activities like scans, worm propagation, password cracking attempts, and botnet operations.

Development of tools/APIs for sharing Network Telescope data with CERT-In/NCCC will facilitate query-based extraction of protocol fields, country of origin, Autonomous System Numbers, timestamps, and Internet Service Provider information from the collected data. Efforts will focus on enhancing the visibility of the Network Telescope by expanding it to cover larger IP blocks.

The project aims to supply CERT-In/NCCC with data feeds to support comprehensive threat intelligence generation and to create a repository of Internet Background Radiations for future trend analysis. Additionally, research will concentrate on Network Telescope-centric Threat Intelligence, exploring techniques such as TI scoring, analysing malicious patterns in packet payloads, detecting singletons within other sources of threat intelligence, and investigating the application of AI and ML techniques for identifying unique security patterns and emerging trends.

C. Detecting adversarial machine learning

This project facilitates smart applications such as smart homes and smart manufacturing, energy constrained devices are inter-connected through bandwidth-constrained communication protocols to form the internet-of-things (IoT). Due to such constraints, an IoT network fails to employ conventional security protocols, which makes them vulnerable to security threats. One resource-efficient way to secure the IoT network is to deploy a comprehensively trained machine learning (ML)-based intrusion detection system (IDS). However, the existing IDSs are vulnerable to adversarial machine learning (AML)-assisted attacks that occur during the inference phase of the ML model, i.e. when the IDS employs the ML model for analysing specific network traffic to determine the presence/absence of a malicious attack. In an AML-assisted attack, the attacker makes carefully crafted perturbations in the network packets with the goal to evade detection by the IDS. In this project, our objective is to resolve this issue by developing an AML-resilient IDS for detecting AML-assisted attacks in IoT networks. We also plan to set up an IoT testbed and conduct extensive experiments to evaluate the effectiveness of the proposed IDS.

D. Secure Networks and Edge-Computing Hardware for Industry 4.0

This project involves two work packages, focusing on secure network technologies and secure edge computing. Work Package 1 (WP1) encompasses a feasibility study on implementing reactive adversaries on a wireless testbed, the design of key management protocols for crypto-primitives under reactive threat models, exploration of integrity issues in next-generation networks with a focus on provenance recovery algorithms, and addressing signal design problems for countering denial-of-service attacks. Work Package 2 (WP2) builds on WP1, emphasizing

the design of edge computing hardware for simultaneous encryption and compression of neural network data, fast malware detection at the edge through a combination of string matching and ML-based algorithms, scalable secure enclaves for edge-computing systems, and extending these technologies for secure applications in augmented reality, computer vision on drones and smart cars, and secure test pattern generation.

A smart factory in the industry 4.0 paradigm will be equipped with thousands of sensors and smart edge computing nodes. There will be a need to secure the computation and communication at all levels starting from the devices to edge computing nodes to the gateways. This project aims to create a secure appliance stack that involves secure ML inferencing on the devices, scalable enclaves on the edge computing nodes and novel LLM-based malware detectors at the network switches. The scope of work will additionally involve the creation of a state-of-the-art testbed for characterizing malwares and reactive adversaries. This project is being carried out in partnership with four startup companies.

E. LogIT: A Federated Learning and Fog-Computing based framework for IoT Security

This project aims to create a robust security framework for IoT devices by integrating Federated Learning and Fog Computing. It focuses on developing a decentralized threat detection system using Federated Learning, allowing collaborative model training without sharing raw data. Additionally, the project aims to implement a privacy-preserving malware detection framework using Fog Computing, ensuring secure and localized data processing. The technological outcomes include advanced

federated learning algorithms, secure communication protocols, and a fog computing infrastructure. The project seeks to enhance IoT security by providing decentralized threat mitigation and privacy-centric malware detection mechanisms.

F. Establishment of STEaLTh

Security Testing and Evaluation Lab for IoT Devices & Embedded Systems. Handbook of IoT Device Security Testing Procedures.

G. Design and Development of Advanced Forensics Data Analytics Tool

The project's primary objective is the development of cyber forensic tools, with a specific focus on Fintech Forensics and IoT Forensics, driven by user feedback. Key goals include enhancing features of existing tools developed by C-DAC Trivandrum, creating an Advanced Forensics Data Analytics tool for evidence correlation, and building indigenous tools for FinTech Forensics and IoT Forensics. The specific aims involve improving capabilities of existing cyber forensic tools, designing a sophisticated analytics tool for evidence correlation, developing tools for FinTech and

IoT forensics, and seamlessly integrating these tools for a comprehensive approach to digital forensics. The project aims to address evolving cyber threats in Fintech and IoT through an integrated suite of tools for effective forensic analysis.

H. Efforts / activities in North-Eastern (NE) States

MeitY, Govt. of India has taken initiative as per NE Vision, 2023, with the broad vision of providing cyber-crime investigation skills effectively. Major projects in NE states are:

i. **Initiative for Cyber Security (ICSAS) Aware Society in NE States -**The Kohima centre of the National Institute of Electronics and Information Technology developed an interactive mobile app named "ICSAS". The app was launched at the G-20 summit held in Bangalore by MeitY Secretary, Government of India. Designed to be user-friendly and interactive, this educational cybersecurity app caters to a diverse audience by accommodating various languages. Its content comprises pertinent cybersecurity messages and advisories in local languages, amplifying its impact on the general public.

ii. **Development of Cyber Forensic Training cum Investigation Labs in North-Eastern States and Cloud based Centralized Cyber Forensics Lab Infrastructure:** The project objective is of Setting up Cyber Forensics Training cum Investigation Labs in 8 NIELIT Centre of NE states. Various stake holders of criminal justice system like Police officers, Prosecutors, Judges, and Investigation Officers of all LEAs have been provided training. So far more than 4000 stake holders are trained.

I. **Cyber-Security Risk Management Frameworks Through Cyber Insurance**

Malicious attackers globally resort to cyber-attacks like Distributed Denial-of-Service (DDoS) and Ransomware to disrupt operations of organizations and also resort to exfiltration of personally identifiable information (PII) data and sale it on the dark web. These attackers primarily resort to exposing insecure networks and software vulnerabilities in organizations IT systems to carry out these attacks. Our study aims to propose a comprehensive, holistic assessment, quantification, and mitigation of cyber-attack on organizations. Using AI-based risk assessment, we intend to identify the traits of these attacks, vulnerabilities exposed and find out the probability of a malicious attack impacting an organization. Then using the concepts of collective risk model, we will quantify the expected impact or loss due to the cyber-attack to an organization. Then we will help the Chief Technology Officer to classify an organization's "as-is" state of cyber-readiness on a 2x2 heat-matrix (i.e., likelihood of a cyber-attack and the impact). Finally, we propose cyber-risk mitigation strategy for organizations using a combination information Technology and financial tools. Firms in the (high, high), (low, high) and (high, low) quadrant of the heat

matrix are proposed to invest in self-protection by deploying security technologies more to reduce the likelihood of the attack. As a result, these firms would eventually move towards the (low, low) quadrant of the heat- matrix. While those, firms in the (low, low) quadrant can pass their residual cyber-risk to a cyber-insurer.

J. National CoE Cybersecurity Technology Development and Entrepreneurship

"Cyber Security Technology Development and Centre of Excellence" commenced its journey on 30th March, 2019 as a joint initiative of MeitY, Govt of India and Data Security Council of India. It was established with an overall objective to establish India as a leading cybersecurity hub by accelerating, identifying and developing cybersecurity technologies in the country, catering to existing market demand, and driving future readiness. The NCoE founded on three pillars of Entrepreneurial Acceleration, technology development and market development of Indian Cybersecurity ecosystem has contributed by accelerating 110 startups in various domains of cybersecurity including white space areas like OT Security/ IoT security etc. Recognizing the importance of the Triple Helix model and bringing academia, industry, and government together through multiple initiatives like road shows, Crypto challenges etc., NCoE acted as a catalyst to translate successful research outcomes into commercial products in domain of IDS for OT security, offline authentication etc. Building a closer association with around 25 institutes and identifying a network of 378 professors across various domains of security and facilitating their access to industry has built momentum for collaboration. The CoE effort towards technology development and innovation in cybersecurity has witnessed filing of 31 patents by startups in different areas of cybersecurity. It

has encouraged multiple women entrepreneurs, facilitated entrepreneurial journey of industry veterans working for leading tech giants and ignited entrepreneurial spirit in fresh engineering graduates attempting to build solutions which are being recognized globally.

K. Centre for Hardware Security Entrepreneurship Research and Development (C-HERD)

C-HERD is a MeitY, India funded national-level initiative of the Data Security Council of India (DSCI) in partnership with the IIT-Madras and IIT-Kharagpur.

Achievements:

- C-HERD incubated startup, SecurWeave, a startup that provides solutions to detect threats from APTs using Hardware Primitives, has been granted several patents, one of which has been recognised and appreciated by MoS Shri Rajeev Chandrasekhar.

- C-HERD is productising research out of IIT-Kanpur in collaboration with Jisasoft on building Hardware Cores on FPGAs for Existing Cryptographic, and Post Quantum Cryptographic algorithms to be incorporated into indigenous HSMs.

L. JARA – a hybrid opensource deployment-ready intrusion detection system that includes both emerging-threat signatures and the

pre-trained proposed neural-network model for knowledge-based and behavior-based intrusion detection The USP of the product is deployment centric threat detection which is light-weight and maintenance of the product is very easy which will result a long product life after deployment.

5.5 Societal Reach R&D

5.5.1 Medical Tools, Equipments and Software

(i) Design and Development of 1.5 Tesla Magnetic Resonance Imaging (MRI) System:

The objective of the proposed project is to design, develop and test an indigenous 1.5 Tesla MRI System for medical imaging to provide a cost-effective solution and accessible MRI for people of our country. The complete hardware and software system has been developed and integrated with procured magnet. Initial trials on animal phantoms were conducted and after performing preliminary trials on animals, the human subject trials on volunteers were initiated this year and first human image was obtained. Collaborating with C-DAC-T, several image fine-tuning processes were performed, including tests on various sequences (IGRE, ISE, IIR) and experiments with different slice selection techniques. Ghosting effect is now completely removed. SAMEER, with third-party assistance, has developed another set of 15kW RF Power Amplifier and multi-channel spectrometer.

Integrated MRI subsystems + Procured Magnet (System -1)

The magnet and cryostat integration reached completion in March' 23, followed by the MRI magnet's testing at IUAC. The indigenous magnet system design successfully achieved the desired field, demonstrating proficiency in avoiding training quenches, maintaining homogeneity, minimizing 5G stray field, implementing a reliable quench protection system, optimizing EIS coils performance, and ensuring short-term stability. Several innovative technologies within the magnet system proved effective, promising streamlined manufacturing processes for future production.

IMRI Magnet (System -2)
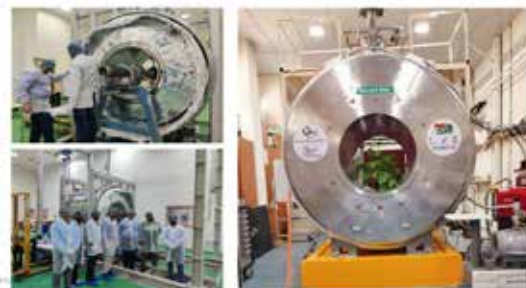
An Expression of Interest (EOI) was initiated to commercialize MRI technology, drawing interest from numerous companies. Out of these, 7 companies, including two consortiums, submitted responses that underwent thorough examination as per the EOI guidelines. Following approval from the EOI committee, a Request for Proposal (RFP) was sent to the 7 companies. The received RFP responses were evaluated and approved by EOI committee.

(ii) High energy 30 MeV Linear Accelerator (LINAC): The objective of the project is to design & develop a 30 MeV electron LINAC with 5-10kW beam power. The proposed LINAC will generate Medical isotopes (Molybdenum -99) which will be used to elute radioisotope Technetium (Tc-99m). It is envisioned that the High Energy Linear Accelerator (HEL) to be housed at INMAS would produce Mo99, which would then be transported to hospitals for medical diagnostics, industrial applications or for non-destructive testing in strategic sector. The advantages will be production of isotopes without involving hazardous, explosive or fissile materials, almost no nuclear waste and with normalized capital costs. Various sub systems have been designed, fabricated and tested.

First and second LINAC tube are tested at 3.1 MW beam power facility at Powai and beam is observed. The radiation hall at Kharghar is built for 15 MeV with 0.1% duty cycle. As the proposed activity is to run linac at much higher duty cycle. It was proposed to have local shielding structure to offer maximum protection for shorter run. Dedicated local control and monitoring System for radiation area is designed, fabricated and under installation. The system takes care of all the entry-exits and various functions required for safe operation. Following interlocks/monitoring and actions are part of the new local console. Integration of the High Energy LINAC system at INMAS is expected by March 2024.

(iii) Development of Low-Cost Automated Screening System for Cervical Cancer (CerviSCAN-II): Technology features:

The project targets the development of indigenous AI based technology for cost effective, affordable and automated screening for cervical cancer. The development of a complete ecosystem for screening of cervical cancer includes Cyto-Centrifuge, Automated Slide Stainer, Slide Digitizer and AI assisted system for cervical cancer screening has been completed.
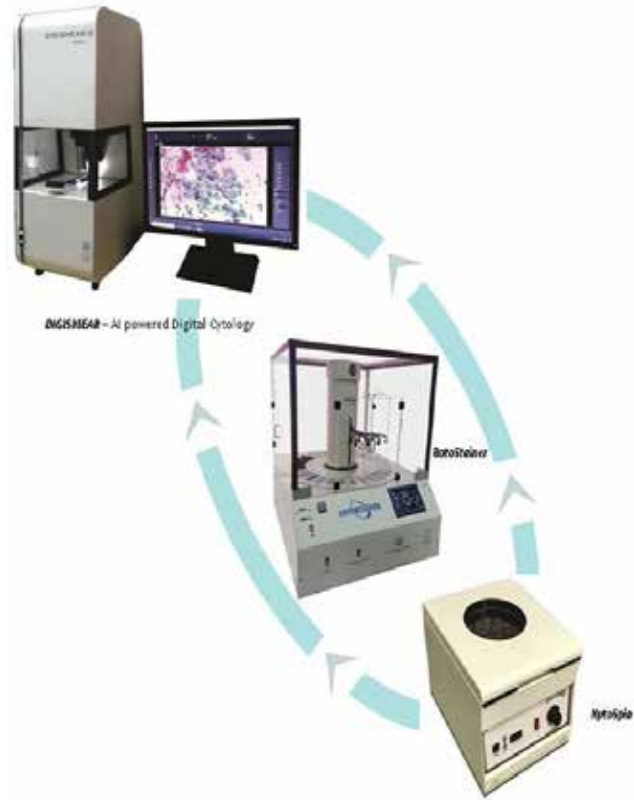
Figure: CerviSCAN Systms Workflow

CerviSCAN product suite automates the screening workflow right from preparation of cervical smear to AI assisted diagnosis. CerviSCAN suite of products reduces screening cost by 1/5th and improves the screening efficiency of human experts by 8 times and makes screening of cervical cancer practical in India and also for other countries. Systems developed as part of the project were installed at four premier cancer care centres RCC-Thiruvananthapuram, ICMR-NICPR-Noida, Dr. BBCI-Guwahati and ABV-RCC-Agartala. A total of 9367 slides were collected as part of this project.

Technology is available with C-DAC-Trivandrum for Transfer of Technology (ToT) and first ToT agreement made with M/s Sertel Electronics Pvt. Ltd., Chennai, Tamil Nadu.

(iv) ColOSENS: An Affordable Colorimetric Diagnostic Instrument and Field Validation at Imphal: A MeitY-funded project has successfully developed a sensing system for detecting bacterial diarrhea. Additionally, the CoLOSENS prototype Gen 1.0 underwent form factor modification, specifically in the sample holding tray. The CoLOSENS device's validation took place at RIMS Imphal, involving over 200 patients, revealing a highly promising outcome with a 92.5% accuracy compared to conventional testing systems. To facilitate technology transfer, C-DAC, Kolkata, has initiated the process by establishing a Technology Transfer (ToT) committee and publishing an Expression of Interest (EOI) on the C-DAC website and in daily newspapers.

ColOSENS prototype

(v) Digitally Connected Tribal Colonies (DCTC): The project's objective is to develop and implement technological solutions for screening prevalent Non-Communicable Diseases (NCDs), such as Oral and Cervical cancer, Diabetic Retinopathy, and other retinal diseases. Digital Pathology services are employed for remote diagnostic assistance, and a robotics system is utilized for slide digitization. The project also aims to establish ICT infrastructure to digitally connect tribal colonies in Wayanad District, Kerala, providing healthcare and education services. To achieve this, the project is developing a robotics system for slide digitization and an indigenized Fundus camera. The first prototype of the Fundus camera, along with AI for Microscopy and Fundoscopy, is ready. CDSCO certifications for the developed products are currently in progress. Discussions for the Technology Transfer (ToT) of the project are underway with industry partners who have expressed interest in the slide digitizer and Fundus camera.

The project has successfully recruited 12 staff members, including nurses from tribal settlements in the Wayanad district. These staff members underwent a three-week training program on cancer screening at the Regional Cancer Centre in Thiruvananthapuram. The project has conducted various cancer awareness classes and an NCD screening camp in Wayanad district. Additionally, a door-to-door health survey has been initiated, facilitated by the trained project staff, to identify high-risk tribes for NCD screening.

(vi) Design and Development of Ultrasonic Transducer Probes for Medical Imaging: The project focuses on the indigenous development of Ultrasound (US) Probes for Medical Imaging. Given the substantial market for Medical Imaging and India's current reliance on imported US probes, there is a pressing need to establish in-house technology for various US probe designs. This initiative is crucial in contributing to self-reliance, aligning with the Government's flagship programs such

as "Make-in-India" and "AtmaNirbhar Bharat". The project operates as a collaborative effort involving multiple institutions, including C-MET in Thrissur, NIELIT in Calicut, MCC in Kannur, and various industry stakeholders.

The project has achieved significant milestones, including:

a) Successful development of all essential materials required for the Ultrasound (US) probe, ensuring they possess the necessary properties for medical imaging.

b) Optimization of materials, such as the Piezo electric layer, backing layer, and matching layer, specifically for a central frequency of 3.5 MHz. This frequency is crucial for curvilinear probes used in abdominal imaging.

c) Design and fabrication of a two-layer flexible Printed Circuit Board (PCB) for the 3.5 MHz probe, achieved indigenously.

d) Development of a prototype single-element transducer featuring a 3.5 MHz central frequency with the desired acoustic properties.

e) Successful optimization of conditions for dicing 128 elements and transforming them into a curvilinear probe.

(vii) Self-contained X-ray blood irradiator system: The project aims to replace high activity radioactive sources that could pose a risk with non-radioisotope-based technologies. Radioisotope disposal is also becoming a big challenge throughout the world. Advanced nations have already migrated to these systems. The project is being implemented by SAMEER, Mumbai.

The technologies involved in engineering and development of self-contained X-ray blood irradiator (BI) system are heterogeneous and have major hi-tech components like orthovoltage X-ray tube, High voltage power supply, Dosimetry and dose delivery, Control electronics and interlocks, Irradiated products database management system, Water cooling system, Pb shielding etc. The integrated X-ray system testing including X-ray tubes, High voltage power supplies and water-cooling system is completed at Radiation Shielded facility, SAMEER, Mumbai. The first BI system including mechanical sub-assemblies of irradiation chamber, Pb shielding, cabinet X-ray has been fabricated and assembled. The carbon fibre canister for holding blood products has also been fabricated. The development of control software and Irradiated products database management system including bar code scanner, label printer is in final stages.

(viii) Design & Development of EEG Based Real-Time Depth of Anaesthesia (DoA) Monitoring System: The project aims to develop a machine learning model which will be trained using a locally compiled clinical database of Electroencephalogram (EEG) recordings. Since, the proposed DoA monitor will work on a large amount of EEG recordings as well as on the patient specific data, it will improve the accuracy of the DoA estimation without any restrictions on the type of anesthetic drug used or the patient's age. The machine learning model will then be realized on Field Programmable Gate Array (FPGA) to validate the software simulation results on hardware. The proposed DoA system will be an indigenous EEG based Real-Time Depth of Anesthesia Monitoring System. Development

of the preliminary Machine Learning Model for DOA Estimation is started with online available data from open source.

The R&D work was initiated using publicly available EEG data taken during surgical procedure from vitalDB.net. Programs are developed to pre-process the EEG data and twenty-five numbers features are extracted. Four Nos of machine learning models are developed to estimate the DoA state. Clinical EEG data for 504 patients are taken during surgical operation through the participating hospitals. Cross validation of machine learning models and programmes are underway using clinical and open access data. Architecture Development of pre-processing, Features Extraction and Classifier Units are in good progress.

(ix) **Development of focused Compact Microwave Hyperthermia Applicator for small cancerous tumors:** The project aims to develop microwave-based hyperthermia applicator. Hyperthermia is a therapeutic cancer treatment technique that has received increasing attention in recent years. In this tissue or organs are exposed to temperature in a range between 41°C and 45°C in controlled manner by use of radio waves and microwaves. This project involves designing and developing a noninvasive focused applicator operating in the ISM band (2.45 GHz). The purpose is to treat superficial melanoma lesions or small tumors located on the face, neck, and nose. The focused treatment and monitoring introduced by this project offer a novel approach for addressing such medical conditions. A prototype applicator featuring a double spiral antenna and a reflector structure was developed, constructed, and assessed.

This involved experimentation with two distinct measurement setups, incorporating the applicator and a simulated liquid (HSL) within the ISM band at 2.45 GHz. The primary objective was to measure SAR at various depths.

(x) **Setting up of Medical Electronics Laboratory for Calibration and Maintenance of Medical Electronics Devices & Equipment:** The aim of the project is to set up a Medical Electronics Laboratory at NRTC, Parwanoo to facilitate the hospitals, clinical laboratories, medical institutes and manufacturers of medical devices at Himachal Pradesh and nearby region and to generate skilled manpower by providing training to youth of the state for maintenance of medical electronics equipment. Medical Electronics laboratory has been accomplished by procuring, installation and Commissioning of equipment. Training of laboratory personnel by manufacturers/ supplier of medical equipment has been conducted. Process for getting NABL Accreditation of Laboratory as per ISO/IEC 17025: 2017 has been completed for Discharge Equipment/ Devices, Patient Conditioning/ Maintenance, Monitoring Unit and Imaging/ Plotters. Successfully demonstrated the technical competency in front of Assessor from IIT Madras. Assessment completed on 22nd July to 25th July 2023. National level assessors assessed the competency of the laboratory. Model curriculum has been prepared and submitted to NIELIT for obtaining NSQF compliance.

(xi) **Development of Indigenized Digital Dentistry Solutions:** targets development of indigenized and cost-effective solutions for Digital Dentistry which can streamline clinical workflow of

dental procedures and benefit patients and clinicians alike. The project targets to develop entire ecosystem for Digital Dentistry which being (1) Cone Beam CT Scanner (b) Extra Oral Scanner (c) Intra Oral Scanner and (d) Virtual Dental Treatment Planning software. The project activities have been initiated with C-DAC, Thiruvananthapuram being nodal implementing agency with support from Centre for Dental Education & Research, AIIMS, New Delhi and IIT - Madras. C-DAC has floated an EoI for Industry participation from the project planning phase aiding better Technology Adoption by industries.

5.5.2 Agriculture

5.5.2.1 Development and deployment of Knowledge based Integrated Sustainable Agriculture Food Network (KISAN) cloud using Electronic Soil Nutrients Analyzer (ESNA)

This project has been initiated under special budget provision made for ST community for development and deployment of soil tester, skill development and entrepreneurship creation. So far, the development of ESNA device and its integration with KISAN cloud has been completed. The developed system has user-friendly Human Machine Interface. 25 types of tablets in dehydrated from were also developed for use of soil testing. So far more than 1000 tribal youths have been trained and around 450 skilled entrepreneurs have been established through the different course modules. Certification of ESNA kit, deployments of ESNA in the field, and Transfer of Technology (ToT) are underway.

Fig. Electronic Soil Nutrients Analyzer (ESNA)

5.5.2.2 Development of IoT and Drone based Agricultural Monitoring System with Objective of Skill Development of Deprived Community

The project has been initiated under special budget provision made for SC community for development and deployment of IoT and drone based agriculture with Madan Mohan Malviya University of Technology (MMMUT) in the area of IoT and Drone. Training has been imparted to a total of 400 students of deprived communities. Two start-ups of deprived community students have emerged from this project. A total of 10 drones including 02 Agricultural Spraying drones of 10 Litre, 01 agricultural drones of 05 Litre and other surveillance drones and data collection drones have been deployed. AI controlled drones have been designed and surface level modeling has been used for class A surfacing in the drones. The drones have been designed with structural analysis for strength for tomato disease detection, crop prediction system based on machine learning and weed identification system therefore, reducing the cost of Labour charge and increasing the quality of soil. Consecutively, 6-week summer training focused on this project, has been provided to students about drone design, IoTs on Drones, AI and Machine learning.

Fig. Agricultural Spraying drone, surveillance drone and Agro sensing display and unit

5.5.3 Training Programmes for Scheduled Caste (SC) & Schedule Tribe (ST) Communities, and North-East Communities of India

EMDP programme has been building knowledge on electronics manufacturing for last several decades and as part of its outreach for weaker sections of the societies EMDP has initiated several projects on manpower training among SC/ST and NE communities. These projects are supporting entrepreneurship programmes in the areas of E-waste management, Circular Economy and Resource Efficiency and RoHS laboratory manpower. State governments are also taking active participation in these projects through State Pollution Control Boards (SPCB) and Institute of Human Resource Development (IHRD). Many batches of entrepreneurship programmes have passed out. Details of these programs are provided below:

- **Capacity building through skill and entrepreneurship development on e-Waste management PU Chandigarh**

  In order to develop skilled manpower and entrepreneur in the area of E-waste dismantling and segregation, a project on "Capacity building

through skill and entrepreneurship development on e-Waste management" is being implemented by Punjab University Chandigarh with the active participation of industry partner M/s Exigo Recycling Pvt. Ltd, under the Circular Economy in EEE sector initiatives of MeitY, Govt. of India. A standard content on e-waste dismantling and segregation has been developed to provide training to the candidates of nearby states/ UT i.e. Haryana, Punjab, Himachal Pradesh and Chandigarh. An E-waste segregation and dismantling training centre also has been set up at Punjab University, Chandigarh for national benefit. Handholding, capacity building and entrepreneurship development by providing training with Industry recognized skill-sets leading to better employability prospects are the main objective of this project.

E-waste lab (Dismantling and segregation) setup at UIET, Punjab University Chandigarh

- **Skills development training program for SC and ST students on E-Waste recycling technologies and testing of Restricted Hazardous Substances**

Under this project, SC/ST students from various colleges were provided training on RoHS and E-waste management. In total, 526 SC students and 487 ST students were trained for RoHS and E-waste dismantling. Conducted RoHS and E-waste dismantling awareness programs to 192 SC students. Trained 334 SC graduate and post graduate students of Telangana social welfare residential junior colleges and also on PAN India basis on E-waste dismantling and RoHS testing at C-MET, Hyderabad.

- **Informal Sector Capacity Building Upgradation with Formation of Recycling Clusters and Enabling Technology for Recovery of Resources from Electronic Waste thereby Promoting Resource Efficiency and Circular Economy**

The major objective of the project is to upgrade the informal sector operators engaged in e-waste recycling to enhance capacity building, skill sets and assist them with indigenous technologies to process e-waste in environmentally sound manner and informal sector will be facilitated with MSME cluster formation scheme (CFC) to create cluster through respective State Government. The idea is to generate an interest within the state governments and thereby initiating proposals wherein land can be provided by the state governments to set-up eco-parks which can house the formalized informal sector allowing them to dismantle e-waste in a scientific manner. Accordingly, technical support for setting up eco-parks will be provided so that they can access technology and operate the same at industrial scale to provide benefits of circular economy in extraction of precious metals from e-waste and recycling of plastics from e-waste. Another objective is to operate the technology at industrial scale and facilitate other state governments to adopt the same and formalize the informal sector in their states thereby securing their livelihoods. Through this project, it is envisaged that around 15000 persons engaged in e-waste management will be trained for scientific methods of dismantling, segregation and identification of value chain and converting them to micro entrepreneurs. The project will be implemented at different states of the country through state government supports and technical support on various technologies will be provided by C-MET Hyderabad, NML Jamshedpur and CIPET, Bhuvneshwar.

5.5.4 Healthcare

- CoE at IIT Guwahati has resulted in a Nanotechnology based multi diagnostic kit named "Mobilab" (erstwhile magic box) has been developed for the detection of amylase, lipase, ALP, ALT, and AST at IIT Guwahati by using a single drop of blood at an affordable low cost. The kit for Amylase is under field trials in AIIMS New Delhi, GNRC Guwahati, GMCH Guwahati, IIT Guwahati Hospital, and Government Hospital in Kanpur. The device is IoT enabled and got CDSCO certified for amylase.

- A nanotechnology based painless drug delivery system has been developed at the Centre of nanotechnology at IIT Kharagpur to deliver the drugs like insulin, etc., painlessly. Also, a book entitled, "Novel Trans (Dermal) Drug Delivery Strategies" has been published on the technology in Springer.

5.5.5 Strategic

MIM based OTP memory developed by IIT Bombay has been selected for R&D Fair organized by the PMO.

5.5.6 Societal Misc.

5.5.6.1 Collaborative Intelligent Transportation Systems Endeavour for Indian Cities

Intelligent Transportation System (ITS) program of MeitY under InTranSE Phase-II project was aimed at developing field deployable ITS products and solution suitable to Indian traffic conditions having high level of heterogeneity.

The following products were realized under this project:

i C-DAC & IIT Madras designed and developed Onboard Driver Assistance and Warning system (ODAWS) for deployment in automotive

vehicles to assess driving behaviour and to enhance safety under various scenarios of traffic conditions. The product was field trialed by more than 1000 km of test runs. Transport Minister Shri Nitin Gadkari experienced the driving and functioning of warning assistance system in a vehicle mounted with ODAWS.

ii C-DAC & IIT Madras designed and developed Bus Signal Priority Strategies using DSRC based V2X technologies aimed at minimizing overall person delay at an isolated signalized traffic intersection and evaluated the same in a microscopic simulation environment using real time field data. The developed strategy is integrated with the C-DAC Traffic signal controllers making them Bus Signal Priority ready.

iii C-DAC & IIT Madras designed and developed a reliable Departure time Planner mobile app in Indian traffic conditions using DSRC based V2I & V2V communication technologies that predicts Travel time information in advance which helps commuters plan their travel efficiently. The system was successfully field trialed in the three selected study corridors (28 km) in Chennai - Anna Salai, Airport Road, and GST Road.

iv C-DAC, IIT Madras & IISc designed and developed Decision Support tools for Advanced Public Transportation Systems (APTS) under demand variability and operational uncertainty present in Indian cities. These tools assist passengers and transit operators in selecting decisions to improve transit service and reliability. Two products developed include- (1) Mobile app for optimal passenger transit route guidance system based on reliability and other criteria, & (2) Operational software tool for headway management and

reliability improvement. As an offshoot, Fleet Management System was developed as a backend system to provide end-to-end solution to any transit operator. The system was field trialed in Chennai and Bengaluru.

v C-DAC designed and developed General Purpose Thermal SMART camera, Thermal camera suitable for embedded Road Traffic application like vehicle presence detection, traffic & pedestrian count, CMOS SMART camera for Industrial applications, Online Sucro crystal Imaging System (OSIS), 10 GigE CMOS camera & Machine vision and Imaging software.

vi C-DAC developed an IOT middleware software "COSMIC", a M2M based global standard for M2M communications and the IoTs. It provides a common framework to enable seamless interoperability among diverse IoT devices and applications. The COSMIC platform was successfully integrated and tested for Adaptive Traffic Control System (ATCS) real time application in Hubli and also with different type of sensors like level sensor, air quality sensor, energy meter and Vehicle tracking unit for interoperability and data sharing among the various applications.

vii C-DAC and IIT Bombay designed and developed a driver-centric Desktop based Driving simulator integrated with a general-purpose traffic simulator representative of non-lane-based traffic systems. The driving performance of each driver can be evaluated by extracting various driver behavioral and vehicular parameters at the end of the run by trainee drivers. The authorities can evaluate the competence of the driver using the results and graph generated based on their performance in each scenario and suggest improvement

for better performance. This desktop-based driving simulator shall be a valuable resource to the RTO authorities responsible for issuing driver licenses and driver training centers.

As an outcome of this project, 18 products were developed, 9 patents filed, 54 publications were made in reputed international journals and conferences and 10 copyrights registered. Almost ten field deployments successfully completed to demonstrate the developed technologies in various cities and around 65 engineer manpower

(B. Tech, M. Tech and PhD levels) trained in various domains of ITS.

Dr. S Krishnan, Secretary, MeitY launched three products – Thermal Smart camera, CMOS Smart camera & Online Sucro Crystal Imaging System during the Smart Mobility Conference and Expo 2023 organised by Traffic Infra Tech at New Delhi.

EoIs were floated for the ToT of products developed. Six vendors responded for Thermal camera, three vendors for CMOS cameras and two vendors for ODAWS.

Product launch of thermal camera, CMOS camera & OSIS

OSIS   *CMOS Smart camera-iViS*   *Thermal Smart camera-TvITS*

Driver Assist console

mmWave Radar

Navigational sensor

Passenger Transit Route Guidance
System (PTRGS) Mobile app

Desktop Driving Simulator
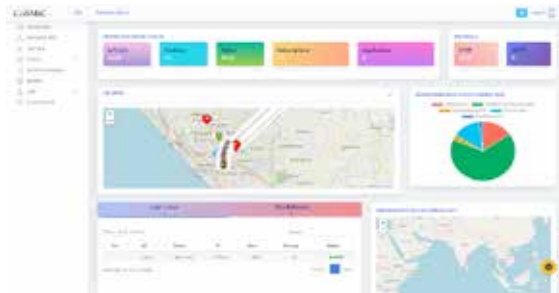
CoSMIC Dashboard

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Chapter 6

Internet Governance and Security of Cyber Space

6.1 Internet Governance Overview

Internet Governance, broadly defined, is the development and application by Governments, the private sector and civil societies, in their respective roles, of shared principles, norms, rules, decision making procedures and programmes that shape the evolution and use of the internet. It includes development and coordination of technical standards, operation of critical infrastructure and public policy issues.

Conceptually Internet Governance includes following layers:

- Physical Infrastructure Layer
- Code or logical layer
- Content layer
- Security layer

Internet Governance involves IP addressing,

Domain Name System (DNS), Routing, Technical Innovations, Standardization, Security, Public Policy, Privacy, Legal Issues, Cyber Norms, issues pertaining to Intellectual Properties and taxation.

6.1.1 Achievements

Some of the significant achievements of MeitY includes representation of India's Public Policy concerns on global platforms, creating awareness on Internet Governance, encouraging greater participation in Internet Engineering Task Force (IETF) working groups, engagement with Internet Society (ISOC) promotion of Multistakeholder model of Internet Governance in India etc.

6.1.1.1 Engagement in International Forums/Meetings

The Internet Governance Forum (IGF): Serves to bring people together from various stakeholder

groups as equals, in discussions on public policy issues relating to the internet. India's concerns on the issues of public policy of the internet and its governance are appropriately voiced in meetings of the IGF through regular participation, multi-lateral and bi-lateral meetings. With the renewal of its mandate by United Nations in December 2015, the IGF consolidates itself as platform, to bring people together from various stakeholders' groups as equals. While there is no negotiated outcome, the IGF informs and inspires those with policy making power in both the public and private sector at their annual meetings, delegates discuss, exchange information and share good practices with each other. The IGF facilitates a common understanding on how to maximize internet opportunities and address risks and challenges that may arise.

Shri Alkesh Kumar Sharma, Secretary MeitY has been appointed to the inaugural IGF Leadership Panel on 16th August 2022, to serve a two-year term during the 2022–23 IGF cycles. The United Nations Secretary - General has established the IGF Leadership Panel as a strategic, empowered, and multi-stakeholder body, to address strategic and urgent issues, and to highlight Forum discussions and possible follow-up actions, in order to promote greater impact and dissemination of IGF discussions.

6.1.1.2 Engagement with Internet Corporation for Assigned Names & Numbers (ICANN)

MeitY is actively involved with the activity of ICANN and participates in its proceedings through Government Advisory Committee (GAC) and other public engagement fora. The GAC's key role is to advise ICANN on issues of public policy and especially where there may be an interaction between ICANN's activities or policies and national laws of international agreements. Shri Sushil Pal, Joint Secretary, Government of India is currently GAC representative from India.

6.1.1.3 India Internet Governance Forum (IIGF)

IIGF is a multi-stakeholder forum wherein representatives from various internet stakeholder groups convene together to discuss public policy issues pertaining to the Internet. It plays a pivotal role in representing Indian interests at the larger international policy and stakeholder discussions. This is a national initiative of the United Nations IGF. The third edition of IIGF was held on 5th December 2023, with the theme "Moving Forward - Calibrating Bharat's Digital Agenda".

6.1.1.4 Multi-stakeholder consultations

India supports multi-stakeholder model of Internet Governance, which would involve all stakeholders and helps to preserve the character of the internet as unified, dynamic engine for innovation and which encourages equity and innovation.

6.1.1.5 Promotion of Universal Acceptance

MeitY is Working towards the implementation of a multilingual internet to enable all Indians to connect to and use the internet by ensuring that Internet domain names in languages other than English (Hindi, Marathi etc.) can be issued and used by all Internet enabled applications, devices and systems. भारत-(Internationalized Domain Name) is now available in 10 scripts covering 22 scheduled languages of India. With the launch of .Bharat, end users may book domain names in all scheduled Indian languages.

Universal Acceptance (UA) is a global effort to drive a more inclusive and multilingual internet. MeitY in support from NIXI hosted the first UA day on 27th and 28th March 2023 in India through a mix of virtual, in-person and hybrid sessions. India, which is fast-turning into a digital economy, has been chosen as the flag bearer to promote and promulgate UA for

digital inclusion. The event was a serious effort to initiate thought-provoking, meaningful and result-oriented dialogues to raise awareness, break the language barriers and make the internet accessible to a larger population and bring every citizen in the ambit of economic progress.

6.1.1.6 The Research, Development and awareness agenda under Internet Governance

Various projects have been initiated to have evidence-based research which will build capacity for India's participation in multiple international fora and also strengthening domestic policy related to internet. The projects would lead India to become a model Centre and provide thought leadership in DNS and DNS security related technologies, conducting high-end research in DNS Security, building internal competencies in DNS Security by offering advanced training programs and establish a test-bed of DNS for research and training. The outcomes of the projects in IG would enable meaningful and sustained engagement in internet governance institutions (International) and processes with particular focus on the ICANN, IETF etc.

Projects under Internet Governance Division:

A. **Advanced Internet Operations Research in India (AIORI) by Software Technology Parks of India (STPI):** Project seeks to improve the security, stability, and understanding of the Internet's DNS infrastructure in India by advanced Internet Operations research and it plans to do so by:

- Building relationships among its community of members and facilitate an environment where information can be shared confidentially.

- Enabling knowledge transfer by organizing workshop.

- Research with operational relevance through data collection and analysis.

- Increasing awareness of the DNS's significance.

- Offer useful, publicly available tools and services.

B. **IG SIM- Internet Governance Structured Implementation Module by C-DAC, Delhi:** The objective of the project envisages providing technical and policy support to conduct research, training workshops and preparation of white paper, technology reports on various Internet Governance policy and Technology related issues. This will include providing ongoing implementation support to IG related activities of the Government of India, MeitY and review the global Internet policy and Technology landscape and provide assistance w.r.t. structured implementation on matters related to Internet Governance, taking into account rapid technical developments and dynamically changing needs.

C. **Centre of Excellence in DNS Security by C-DAC, Bangalore (Funded by NIXI):** Objectives of the project are:

- To become a model Centre and provide through leadership in DNS and DNS security related technologies

- To conduct high-end research in DNS Security

- To build internal competencies in DNS Security by offering advanced training programs.

- Establish a test-bed of DNS for research and training

6.2 National Internet Exchange of India (NIXI)

NIXI is a not-for-profit organization set up under section 25 of the Companies Act, 1956 (now section 8 under Companies Act, 2013) for peering of ISPs among themselves and routing the domestic traffic within the country, with seed funding from Department of IT. NIXI is performing the following three activities:

- Internet Exchange
- .IN Registry and Internationalized Domain Names (IDNs)
- National Internet Registry (NIR)

Internet Exchange: 77 Internet Exchange Nodes are functional across the country. The Internet Exchange nodes have been successful in ensuring peering of ISPs among themselves for the purpose of routing the domestic traffic within the country, instead of taking abroad, thereby resulting in better quality of service (reduced latency) and reduced bandwidth charges for ISPs by saving on International Bandwidth. The maximum volume of Internet traffic being handled by NIXI at present is 1.53 Tbps with 330 members.

Recently NIXI has introduced Bilateral peering along with existing Multilateral peering. CDNs are allowed to connect at NIXI exchange points free of cost (zero port charges). Once CDNs are onboard, more and more ISPs shall connect at Exchange points. All functional NIXI nodes are IPv6 ready.

.IN Registry and Internationalized Domain Names (IDNs): Since 2005, NIXI also manages the .IN Registry (www.registry.in). At present, 205 Registrars have been accredited to offer .IN domain Name registration worldwide to customers. This has helped proliferation of web hosting in the country and promotion of Indian language content on the Internet. Over 4.07 million .IN Domain names have been registered till date.

IDN's in all 22 official languages are launched and over 0.31 million IDNs domain names have been registered till date. Following schemes are launched to ensure adoption of IDN domains and inclusive growth of internet in India: -

- Free IDN (.Bharat) to academia
- Bundled free email with every .Bharat domain
- Free IDN with every .IN

National Internet Registry (NIR): Since March, 2012, NIXI is also running the NIR for India named as Indian Registry for Internet Names and Numbers (IRINN). IRINN is responsible for delegation of IP addresses and AS Numbers within the country. Over 4,420 affiliates have joined IRINN. NIXI has delegated over 13.80 billion IPv6 and over 11.27 million IPv4 addresses till date.

NIXI also undertakes training and workshop for Network managers and other Technical engineers in co-operation with Asia Pacific Network Information Centre (APNIC). NIXI has also prepared an audio visual of comparison of IPv6 with IPv4 and launched it in various social media platforms. NIXI has also hired a training agency for providing training on IPv6 fundamentals by way of video recordings which gets published on NIXI Academy (training.nixi.in) for mass level capacity building.

6.3 Security of Cyber Space

6.3.1 Introduction

Cyberspace refers to the virtual computer world and more specifically, is an electronic medium used to form a global computer network to facilitate online communication and dissemination of information. It is a complex environment of people, software, hardware and internet. Today, cyberspace is the common platform being used by citizens, civil society, businesses and Governments for

messaging, communication and dissemination of information online, e-services, e-transaction, etc. As the cyberspace is virtual, borderless and offers complete anonymity, attacks can be launched from anywhere in the world with limited possibility of trace back and positive attribution. Emerging technologies such as IoTs, Machine Learning (ML), AI, 5G, etc., are going to add various connected devices in cyberspace in near future. Cyberspace has been facing many security challenges due to emerging cyber threats, widespread use of social media and increasing e-transactions.

MeitY has taken several legal, technical and administrative policy measures for addressing Cyber Security. This includes National Cyber Security Policy (2013), Guidelines on Information Security Practices for Government Entities (2023), enactment of IT Act, 2000 and setting-up of Indian CERT-In for 24×7 cyber incident response under the IT Act, 2000, Cyber Security R&D and Capacity Building in Cyber Security.

6.3.2 National Cyber Security Policy (NCSP)

NCSP, 2013 was released for public use in July 2013. The policy caters to the cyber security requirements of Government and non-Government entities as well as large, medium & small enterprises and home users. The policy recognises the need for objectives and strategies that need to be adopted both at the national level as well as international level. The policy aims at facilitating creation of secured computing environment and enabling adequate trust and confidence in electronic transactions and also guiding stakeholders' actions for protection of cyber space. Considering the developments in cyber technology, delivery of services online and the changing nature of cyber threats over the years, Government of India has formulated the National Cyber Security Strategy (NCSS), which will enhance the objective and implementation of NCSP, 2013. Presently, NCSS is under the process of approval.

6.3.3 Guidelines on Information Security Practices for Government Entities

Guidelines on Information Security Practices for Government Entities have been circulated to all Central Ministries/Departments, State/UT Governments and government organisations for compliance in order to strengthen cyber security. The purpose of these guidelines is to establish a prioritized baseline for cyber security measures and controls within government and their associated organisations. The guidelines shall assist security teams to implement baseline and essential controls and procedures to protect their cyber infrastructure from prominent threats. These guidelines shall also act as baseline document for administration and audit teams (internal, external/ Third-party auditors) to evaluate an organisation's security posture against cyber security baseline requirements.

6.3.4   Cyber Surakshit Bharat (CSB)

The CSB programme was initiated in partnership with industry consortium in Public-Private-Partnership (PPP) with the objective to educate & enable the Chief Information Security Officers (CISOs) & broader IT community of Central/State Governments, Banks and PSUs to address the challenges of cyber security. The technical content of the training was developed after intense discussion with industry consortium and knowledge partners. So far, total 42 batches of deep dive training have been conducted in cities namely, Delhi, Gurgaon, Mumbai, Kolkata, Bangalore, Hyderabad, Chennai, Chandigarh and Bhopal. A total of 1,574 CISOs/IT officials from Government, PSUs, Banks and Government organisations have been trained **till February 2024.**

40th Batch of CISO Deep Dive Training Program on Cyber Security 4-8 Dec 2023 inaugurated by Secretary, MeitY

6.3.5 Cyber Security Grand Challenges for Start-ups

To promote innovation and entrepreneurship spirit in the country, the first version of Cyber Security Grand Challenge (CSGC) for Start-ups was launched on 15th January 2020 which was concluded in November 2021. Based on the success of CSGC version 1.0, CSGC version 2.0 has been initiated.

6.3.6 Public Procurement (Preferential to Make-in-India) Order for Cyber Security Products

In furtherance of the Public Procurement (Preference to Make-in-India) Order 2017, notified by DPIIT (erstwhile Department of Industrial Policy and Promotion) vide notification No. P-45021/2/2017-B.E.- II dated 15.06.2017 and partially modified Order No.P-45021/2/2017-PP(BE-II) dated 28.05.2018 to encourage 'Make-in-India' and to promote manufacturing and production of goods and services in India with a view to enhancing income and employment, MeitY notified an order on 6th December 2019 for promoting indigenous Cyber Security products giving details of (a) indicative categories of cyber security products and (b) a format for self-declaration regarding 'local supplier'. A revision of Public Procurement (Preference to Make-in-India) Order, 2019 for cyber security products is under process in line with the DPIIT Order No. P-45021/2/2017-PP(BE-II) dated 16.09.2020.

6.3.7 Government officials Online Training in Cyber Security

MeitY initiated two types of Cyber Security training courses online for officials of Central Government Ministries/ Departments to create awareness about cyber security in Government employees:

- Online Generic Training in Cyber Security (Awareness training) of about 6-8 hrs duration for all the officers/staff of Government of India

- Online Foundation Training in Cyber Security (Advance Level) for technically qualified or with requisite aptitude in Cyber Security/IT.

43 batches of Generic training have been conducted till October 2023 in which 12,646 officials have been trained. Also 11 batches of Foundation training have been conducted in which 656 officials have been trained till July 2023.

6.3.8 Notification of Forensic Labs as 'Examiner of Electronic Evidence' under Section 79A of the Information Technology (IT) Act, 2000

Section 79A of the IT Act, 2000 mandates the Central Government to notify Examiner of Electronic Evidence for the purpose of providing expert opinion on electronic form evidence before any court or other authority. For identification and selection of Examiner of Electronic Evidence, MeitY has designed and developed a scheme, initially to access and notify Examiner of Electronic Evidence on the pilot basis. So far, 15 Cyber Forensics Labs have been notified by MeitY which are available at https://www.meity.gov.in/notification-forensic-labs-'examiner-electronic-evidence'-under-section-79a-information-technology.

6.3.9 G20-Stay Safe Online Campaign

The G20-Stay Safe Online Campaign was launched in December 2022 during India's G20 Presidency with an objective to raise awareness among citizens to stay safe in online world on the widespread use of social media platforms and rapid adoption of digital payments. The target groups of users are Children/ Students, Women, Sr. Citizens, Teachers/ Faculty, General Public, Specially-abled and Government officials. The campaign has been

actively promoted by States, UTs, Google, META, CSC, DSCI, CSI, Paytm, NIC, MyGov, NeGD, etc. from their respective social media handles. 24,194 posts in English and 6,402 posts in Indian languages are published till 29th October 2023. So far, 7,145 posts are published in G20 Countries by tagging the respective High Commissions and Embassies in all G20 country languages. Digital Financial Security and Social Networking Security awareness e-mails are delivered to 14.19 Crore e-sampark users. Awareness materials are disseminated through the www.staysafeonline. in website & social media handles, States and academic institutions, quizzes, emails, SMSs, etc.

6.3.10 Indian Computer Emergency Response Team (CERT-In)

CERT-In is a Government organisation under MeitY, Government of India. It has been designated to serve as National agency for incident response under Section 70B of the Information Technology Act, 2000. It operates 24x7 incident response Help Desk for providing timely response to reported cyber security incidents. It provides Incident Prevention and Response services as well as Security Quality Management Services. It performs the following functions in the area of cyber security:

a. Collection, analysis and dissemination of information on cyber security incidents

b. Forecast and alerts of cyber security incidents

c. Emergency measures for handling cyber security incidents

d. Coordination of cyber security incident response activities

e. Issue guidelines, advisories, vulnerability notes and white papers relating to information security practices, procedures, prevention, response and reporting of cyber incidents

f. Such other functions relating to cyber security as may be prescribed.

CERT-In creates awareness on cyber security issues through dissemination of information on its websites (https://www.cert-in.org.in and https://www.csk.gov.in) and operates 24x7 incident response Help Desk. CERT-In provides Incident Prevention and Response services as well as Security Quality Management Services.

The activities carried out by CERT-In during January 2023 to March 2024 comprised of the following:

Activities	Numbers (January 2023 to March 2024)
Incidents handled	16,54,028
Security Alerts	814
Advisories	73
Vulnerability Notes	495
Trainings	29
International cyber security drills/exercises	08
Domestic Cyber security drills/exercises	18

6.3.10.1 Cyber Security Assurance

Under Security Assurance Framework, CERT-In has created a panel of 'IT security auditing organizations' for auditing, including vulnerability assessment and penetration testing of computer systems, networks & applications of various organizations of the Government, critical infrastructure organizations and those in other sectors of Indian economy. CERT-In has empaneled **176** Information Security Auditing organizations, on the basis of stringent qualifying criteria, to carry out information security audit, including the vulnerability assessment and penetration test of the networked infrastructure of government and critical sector organizations. This list of CERT-In empanelled auditing organizations is being consulted frequently by the entities in Government and critical sectors for their auditing requirements. CERT-In also completed technical skills re-verification of already empanelled auditing organizations.

6.3.10.2 Cyber Crisis Management Plan (CCMP)

CERT-In, MeitY has formulated CCMP for countering cyber-attacks and cyber terrorism for implementation by all Ministries/ Departments of Central Government, State Governments/ UTs and organizations under their administrative control. Along with the CCMP, CERT-In has developed "Guidance Framework for CCMP "which may be used as a template by various entities including Central Government Ministries/ Departments/ States/ UTs and entities under their administrative control to prepare and implement their own CCMP. CCMP outlines a framework for dealing with cyber related incidents for a coordinated, multi-disciplinary and broad-based approach for rapid identification, information exchange, swift response and remedial actions to mitigate and recover from malicious cyber incidents. CERT-In has conducted 32 workshops from January 2023 to March 2024 to appraise various organizations under the Central Ministries/ States/ UTs about the implementation of CCMP and cybersecurity best practices and all necessary assistance is being provided to them with regard to implementation of CCMP. Till March 2024, 179 CCMP enabling workshops have been conducted.

6.3.10.3 Cyber Security Exercises

Cybersecurity exercise is an effective tool to help entities in assessing cybersecurity preparedness to counter cyber-threats and building cyber-resiliency. CERT-In regularly conduct Cyber Security Exercises for critical sector organizations.

a) **Table Top Exercises**

(i) A cyber security Table Top Exercise (TTX) was successfully conducted for Thermal Power Development Corporation of India Ltd. (THDC) on 13th April 2023. The theme of the exercise was "Countering ICS/OT specific cyber threats".

(ii) A cyber security operational table top exercise for various organizations of Delhi Government was successfully conducted by CERT-In on 20th September 2023. The theme of the exercise was "Cyber Crisis Exercise & Drill (CCED) on building cyber resilience".

(iii) CERT-In successfully conducted TTX on Building Cyber Resilience for Higher Education Institutions on 27th October 2023.

(iv) CERT-In successfully conducted Cyber Security Operational & Strategic Table Top Exercise (TTX) for Multi Commodity Exchange (MCX) on 02nd August 2023 & 19th March 2024, respectively.

Till date, CERT-In has conducted **91** Cybersecurity exercises of different complexities, including table top exercises, with participation from about **1250** organizations covering various sectors of Indian economy from Government/ Public/ Private i.e. Defence, Paramilitary forces, Space, Atomic Energy, Telecommunications (ISPs), Finance, Power, Oil & Natural Gas, Transportation (Railways & Civil Aviation), IT/ ITeS/ BPO sectors and State Data Centres.

b) **Sectoral Cyber Security Drills**

(i) CERT-In successfully conducted a Technical Cyber-Security Drill "CySec-2023" on 19th May 2023 for 20 organizations targeting BFSI, Energy, Transportation sectors. The theme of the drill was "Detecting & Responding to Targeted attacks".

(ii) CERT-In and Securities and Exchange Board of India (SEBI) successfully conducted an operational cyber security exercise for CISOs/CTOs and technical leads of Market Infrastructure Institutions (MIIs), Qualified Registrars to an Issue and Share Transfer Agents (QRTAs) and brokerage firms on 22nd June 2023 in Mumbai.

(iii) CERT-In in collaboration with SEBI successfully conducted Strategic Table Top cyber security exercise for Board & Top Management of SEBI regulated entities on 31st August 2023 in Mumbai. The theme of the exercise was "Building Cyber Resilience: Safeguarding against Cyber Threats and Disruptions". 17 SEBI regulated entities participated in this drill.

(iv) CERT-In has successfully conducted Technical Cyber Security Drill 'RiskAware-2023' for organizations from various sectors including BFSI, Energy, Ports & Shipping and Petroleum & Natural Gas on 26th October 2023. The theme of the drill was "Building Cyber Resilience– Preparing for the Unknowns".

(v) CERT-In successfully conducted an Operational Table Top Exercise (TTX) along with CCMP workshop for organizations under MeitY on 16th February 2024. Officials from 14 organizations participated in the event.

(vi) CERT-In in collaboration with Google successfully conducted a Cyber Security Strategic & Operational Table Top Exercise (TTX) on 12th March 2024 at Delhi for various Government Departments including Power & Energy sector.

c) International Cyber Security Exercises

(i) CERT-In in collaboration with RBI successfully conducted "G20 Cyber Security Exercise for Banking sector" under India's G20 presidency, on 5th June 2023 in Mumbai. Around 200 participants from Central Banks and National & Finance Sector CERTs of G20 member & guest countries, MD, CEOs, CISOs and CTOs of Indian and Foreign Banks participated in the event.

(ii) CERT-In contributed in planning as well as participated in the APCERT Annual drill 2023 held on 16th August 2023. The objective of the drill was to test the response capability of leading Computer Security Incident Response Teams (CSIRTs) within the Asia Pacific economies. The theme of this year's APCERT Drill was "Digital Supply Chain Redemption". CERT-In also acted as exercise coordinator (EXCON) for international CERTs in the Drill.

(iii) CERT-In participated in ASEAN Cert Incident Drill (ACID) cyber security drill and virtual TTX scheduled on 18th & 19th October 2023. Theme of the cyber security drill was "Responding to Multi-Prolonged Attacks Arising from Hacktivism".

(iv) CERT-In successfully conducted cybersecurity exercise & training program "Cyber-Maitree 2023" for Government organizations of Bangladesh from BFSI, Power & Energy, Telecom, Transport, Health, Government, ICT, LEA, Space and Public Essential Utilities during 02-04 October 2023 in Dhaka, Bangladesh.

(v) CERT-In successfully participated in 3rd edition of Africa CERT Cyber Drill 2023: Fill the Gaps on 09th November 2023. The exercise was on challenge-based scenarios like Phishing, Incident Response, Malware Analysis, Reverse Engineering and Forensic Analysis.

(vi) CERT-In participated in Quantum Dawn VII cybersecurity exercise in November 2023. The exercise engaged over 1,000 participants from more than 150 public and private sector institutions in over 20 countries around the globe, including financial firms, central banks, regulators, and law enforcement entities.

(vii) CERT-In conducted G20 Cyber Security Exercise and Drill on 31 January 2023 for 400 Participants, including international participants from more than 12 countries while domestic participants from diverse sectors such as Finance, Education, Telecom, Ports & Shipping, Energy, IT/ITeS and others attended in-person for the Strategic Table Top Exercise and for the Operational Drill.

(viii) CERT-In participated in National Cybersecurity Authority (NCA) - ITU Exercise in May 2023. More than 25 countries participated in this exercise.

6.3.10.4 International Cooperation and Collaboration

a) Memorandum of Understanding (MoU)/ Memorandum of Cooperation (MoC)

Strengthening cooperation with all stakeholders to effectively deal with cyber security issues has been one of the main focus areas of the Government. This aspect is being dealt with by way of security cooperation arrangements in the form of MoU/MoC/Program of Cooperation (PoC) between CERT-In and its overseas counterpart agencies that are willing to work together and share information in a timely manner for preventing cyber-attacks as well as collaborating for providing swift response to cyber security incidents.

Currently, the CERT-In has 11 active Bilateral agreements in the form of MoU/MoC/PoC in the area of cyber security with its counterpart agencies across the world. CERT-In is regularly coordinating with leading service providers and product vendors within and outside the country to obtain advance information on latest cyber threats and attack trends and devise appropriate proactive and preventive measures. To deal with the complex, sophisticated cyber-attacks, CERT-In partners with cyber security organizations from industry for collaboration in the area of cyber security with CISCO India Pvt. Ltd, CloudSEK, Google India Pvt. Ltd, Quick Heal, Information Sharing and Analysis Centre (ISAC), Microsoft, Micro World Technologies (eScan), NIELIT, K7 Computing, Kaspersky, Skills DA and Redinent Innovations Pvt. Ltd.

b) CERT-In in Multilateral forums

- CERT-In is an Operational Member of Asia Pacific Computer Emergency Response Teams (APCERT). APCERT is a regional forum to ensure Internet security in Asia Pacific region.

- CERT-In is a full member of Forum of Incident Response and Security Teams (FIRST). FIRST is a global forum for cyber security teams around the globe.

- CERT-In is Accredited Member of Task Force for Computer Security Incident Response Teams/ Trusted Introducer (TF-CSIRT/TI) from 13th September 2022. TI-CSIRT was established by the European CERT community in 2000 to address common needs and build a service infrastructure providing vital support for all security and incident response teams.

- CERT-In is an associate partner in Charter of Trust (CoT) global forum. The Associated Partner Forum (APF) of CoT brings together regulators, research institutes, universities, and think tanks with the CoT's industry partners to build a trusted network committed to creating a strong digital security environment across the global economy.

- CERT-In leverages these forums for timely resolution of cross border related Cyber security incidents affecting Indian cyber space.

c) Working Groups

CERT-In is the convener of "IoT Security working group" across APCERT. The first report of the "IoT Security" working groups was completed and circulated to the APCERT operational members and partners in 2021. CERT-In is currently working to release the second draft report of the Working Group.

CERT-In is also member of various other

working groups under APCERT such as Information sharing working group, Drill working group, Malware Mitigation working group, Tsubame working group and Training Working Group.

6.3.10.5 CVE Numbering Authority (CNA)

CERT-In has been undertaking responsible vulnerability disclosure and coordination for vulnerabilities reported to CERT-In since its inception. To move a step further in the direction to strengthen trust in "Make-in-India" as well as to nurture responsible vulnerability research in the country, CERT-In has partnered with the CVE Program, MITRE Corporation, USA. In this regard, Indian CERT-In has been authorized by the CVE Program, as a CNA for vulnerabilities impacting all products designed, developed and manufactured in India since October 2021.

CVE is an international, community - based effort and relies on the community to discover vulnerabilities. The vulnerabilities are discovered then assigned and published to the CVE List by organizations from around the world that have partnered with the CVE Program. CVE Program Partners publish CVE Records to communicate consistent descriptions of vulnerabilities. Information technology and cybersecurity professionals use CVE Records to ensure they are discussing the same issue, and to coordinate their efforts to prioritize and address the vulnerabilities.

CNAs are organizations responsible for the regular assignment of CVE IDs to vulnerabilities, and for creating and publishing information about the vulnerability in the associated CVE Records within their own specific scopes of coverage. The CVE List is built by CVE Numbering Authorities (CNAs). Every CVE Record added to the list is assigned by a CNA. The CVE Records published in the catalog

enable program stakeholders to rapidly discover and correlate vulnerability information used to protect systems against attacks. Till March 2024, 43 CVE IDs have been assigned and published by CERT-In.

6.3.10.6 Sectoral CERTs and State CSIRTs

Under Sub-section (IV), clause (e) of the National Cyber Security Policy, 2013 proposed to create mechanisms for Security threat early warning, vulnerability management and response to security threats, CERT-In functions as the umbrella organization in enabling creation and operationalization of Sectoral and State CSIRTs as well as facilitating communication and coordination actions in dealing with cyber crisis situations.

CERT-In operates as a nodal agency for coordination of all efforts for cyber security emergency response and crisis management. CERT-In has developed Template for setting up of State/Sectoral CSIRTs in the country. CERT-In is issuing the necessary guidelines for setting up of sectoral CSIRTs and state CSIRTs.

CERT-In is sending out fortnightly report on vulnerable services and botnet infections through its Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre) to sectoral CSIRTs, Ministry of Power and other stakeholders in Power sector.

6.3.10.7 CSIRT-Fin

CSIRT-Fin under CERT-In has been assigned the responsibility for coordinating and supporting the response to a computer security event or incident within the financial sector constituency. CSIRT-Fin is the incident response force which focuses on mitigation processes, providing on-site awareness, expertise, and recovery oversight.

The snapshot of activities performed by CSIRT-Fin this year, is as follows:

- Handling of security incidents in collaboration with CERT-In which included security incidents related to vulnerable services, botnets, open services and phishing incidents. Entities have also been on boarded to CERT-In's Cyber Swachhta Kendra (CSK) for providing automated feeds regarding malware infections, botnets and vulnerable services

- Issuing of vulnerability notes and virus alerts along with CERT-In.

- Tailored threat intelligence alerts for proactive measures were sent to financial sector constituency and entities have been on boarded on CERT-In's automated threat intelligence platform.

6.3.10.8 Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre)

- Cyber Swachhta Kendra (CSK) - The Botnet Cleaning and Malware Analysis Centre has been setup with an eye to create a secure cyber space by detecting botnet infections in India and to notify, enable cleaning and securing systems of end users so as to prevent further infections. CSK is covering about 94% of Indian internet users as well as 928 organizations across sectors as of March 2024.

- Cyber Swachhta Kendra is a citizen centric service operated in PPP model and provided by CERT-In, which extends the vision of Swachh Bharat to the Cyber Space.

- Cyber Swachhta Kendra aims to secure India's digital IT Infrastructure by creating a dedicated mechanism for providing timely information about Botnet/Malware threats to the victim organization/user and suggesting remedial

actions to be taken by the concerned entity. The center aims to maintain cyber hygiene in ICT infrastructure of the country.

- CSK is playing a very proactive and pivotal role in a continuously evolving cybersecurity environment through identifying new botnet/ malware, understanding their threat level and subsequent Information dissemination to organizations with suggestive remedial actions.

- In order to reach out to a larger audiences in the country, the website of Cyber Swachhta Kendra was re-launched in Hindi language and a new domain "www.सीएसके.सरकार.भारत" was created. Hindi website of CSK received positive response and became very popular among citizens. CSK also started notifying end users about botnet/malware infection in their digital devices via Internet Service Providers (ISP) in Hindi as well as English language. This activity was also appreciated by users.

- During January 2023 - March 2024, over 610 botnet/malware families were tracked and reported to collaborating ISPs/organizations. The type of Malware / Botnet infections include Trojans, IoT bots, Ransomware, Crypto currency miners, POS Malware, Worm, Botnets, Adware, Exploit kit etc. Moreover, systems with vulnerable services that could be exploited to carry out cyber-attacks were also reported to various critical sector organizations. The vulnerabilities could also have severe impact such as information disclosure, launch DDoS attacks, unauthorized access etc. CSK suggests about solutions/ patching of the vulnerabilities.

- During October 2023, CSK celebrated "Special Campaign 3.0" to create cyber security awareness among internet users across the

country. CSK coordinated with ISPs, Anti-Virus companies to reach out and inform end users of internet about malware attacks, implications and safe guard their interest in cyber space. Around 2.90 Lakh Free Bot Removal Tool downloads were observed during October 2023.

- CSK also published cyber security awareness information during "Cyber Jaagrookta Diwas (CJD)" on its website as and when it is celebrated (First Wednesday of every month) so that the useful information about cyber security awareness may reach out to the citizens.

- During 01-15 February 2024, CSK celebrated "Cyber Swacchta Pakhwada" to create cyber security awareness among internet users across the country. CSK coordinated with ISPs, Anti-Virus companies to reach out and inform end users of internet about malware attacks, implications and safe guard their interest in cyber space. Around 3.19 lakh Free Bot Removal Tool downloads were observed during this period (01-15 February 2024).

- CSK is committed to enable users getting their digital devices secure against any cyber infection. CSK also strives to collaborate with Indian entities/ cyber security companies to come up with good security solutions/ AVs. CSK currently has collaboration with three Free Bot Removal Tools (FBRTs) namely Escan, K7 and QuickHeal to citizens through its portal/website. CSK is now providing FBRT for Windows as well as for Android platform. The overall count of no. of downloads of all the FBRT (total 3 in numbers) till March 2024 stands at 56.56 lakh.

- The FBRTs are regularly updated with latest malware signature of recent botnet/ malware so that citizens can be safe against evolving cyber malware.

6.3.10.9 Infrastructure Group CERT-In

Data centre protection has been enhanced by deploying anti-bot and e-mail security blades in the Unified Threat Management appliance (UTM) deployed at the CERT-In data centre. State-of-the-art next generation e-mailing solution has been designed and implemented for effective communication.

Intrusion prevention systems and web application firewalls have been augmented for enhancing application layer security for critical applications. A virtual private network (VPN) has been designed for selective applications, so as to enable work-from-home operations in case of emergency situations. Redundant bandwidths have been integrated with load balancing through multiple internet service providers with Distributed Denial of Service protection so as to achieve 100% uptime and security.

Wide area network has been enhanced through encrypted point-to-point channels interlinking CERT-In offices and disaster recovery site in multiple locations across states.

6.3.10.10 Cyber Forensics Lab

The Cyber Forensics Laboratory of CERT-In has been notified as Examiner of Electronic Evidence in exercise of the powers conferred by section 79A of the Information Technology (IT) Act, 2000 in Computer Forensics and Mobile Device Forensics as its scope. Cyber Forensics Lab of CERT-In is equipped with the state-of-the-art equipment and tools to carry out data retrieval, processing and analysis of the raw data extracted from the digital data storage, mobile devices, cloud service providers, IoT devices, Drones, DVRs and NVRs

using sound digital forensic techniques. The primary task of the Lab is to assist the Incident Response (IR) team of CERT-In on occurrence of a cyber-incident and extend digital forensic support to carry out further investigation. In addition, the Cyber Forensics Lab assists different Law Enforcement Agencies and Intel Departments viz. NIA, CBI, IB, Delhi Police Special Cell, ATS/ STF of state polices in digital forensic data retrieval and analysis which is being extensively used in investigation of the cases of terrorism, anti-national activities etc. that involves unlocking and bypassing of security features of high end digital exhibits in a forensically sound manner such that the report can be presented in the Court of Law.

Officers posted in Cyber Forensic Lab, CERT-In impart training through training workshops organized by CERT-In on computer forensics and mobile device forensics through lectures, demonstrations and hands on practical sessions, which covers seizing, preservation, processing and analysis of the raw data extracted from the digital items. CERT-In also supports other institutes in imparting trainings on various aspects of cyber forensics by delivering lectures along with demonstrations.

6.3.10.11 CERT-In Threat Intelligence eXchange - Proactive Threat Intelligence Sharing Platform

CERT-In is operating an automated cyber threat exchange platform for proactively collecting, analysing and sharing tailored alerts with organisations across sectors for proactive threat mitigation actions by them.

Based on analysis, CERT-In releases Indicators of Compromises (IoC's)- operational, tactical and strategic, Alerts, Advisories & Vulnerability notes to update the Government and critical sector organizations majorly about the threats and suitable necessary actions to counter those

threats. The threat intelligence shared catering to incident response teams, Security operations Centre [SOC] teams, Vulnerability management Teams, Risk Analysis teams of various Banks and BFSI, Government Ministries/ Departments, State/ Sectoral CSIRTs, State Data Centers, Space, Atomic Energy, Oil and Gas, Health Sector and Power Sector organizations.

CERT-In has been sharing actionable threat intelligence with its stakeholders and counterparts since September 2015 in its CERT-In Malware Threat eXchange activities. More than 2000 alerts have been sent to CISO's / POCs of critical organizations including threat intelligence communities, Government organizations, BFSI sectors, Defense & its associated entities and private sector organizations.

CERT-In via its established automated Cyber Threat Intelligence Sharing Platform [CTIS] in 2018 to facilitate bidirectional sharing of operational, strategic, enriched tactical threat intelligence to various counterparts and stakeholders, thus to help enhance the effectiveness of security and IT teams in reducing exposure by attempt to uncover unknown threats and informing better, faster decisions. The platform collects, correlates, enriches, contextualizes, analyses, integrates, tags with Traffic Light Protocol (TLP) and pushes to the partners in near real time. The shared data can be consumed by the recipients into their automated workflows so as to streamline the threat detection, management, analysis, and defensive process and track it through to completion by leveraging its powerful API integrations with supporting SIEMs, firewalls, and other endpoint protection solutions.

CERT-In envisages that implementing threat intelligence elevates Government/Critical organization's security posture, enabling the respective security team to understand and effectively predict the cyber threats that imperil

their organization's key assets. Empowering organizations to anticipate who may attack next, and how, allows security teams to focus on prioritizing resources so they can respond effectively to future cyber-attacks.

6.3.10.12 Security awareness, skill development and training

As part of its mandate, CERT-In is regularly carrying out various activities for development of cyber security capacities, skill building, awareness and citizen sensitization with respect to cyber-attacks and cyber frauds. In order to create security awareness within the Government, Public and Private Sector organizations, CERT-In regularly conducts trainings / workshops to train officials of Government, Public and Private sector organizations across all sectors and citizens on focused topics of Cyber Security.

The training/ workshop programs focus on technical topics with technology presentations & demonstration/ Hands-on sessions for technical cyber community. The target audience of CERT-In training and capacity building programs are System/ Network Administrators, IT/ Cyber Security Professionals, C-Level and Board Level officials from Government, Public and Private sector organizations across all sectors and citizens.

CERT-In organized trainings/ workshops on various topics relating to cyber security. During the period of January 2023 to March 2024, CERT-In has conducted 29 trainings on various specialized topics of cyber security. About 11,690 Officers including system/Network Administrators,

Database Administrators, Application developers, IT Managers, Chief Information Security Officers (CISOs)/ Chief information officers (CIOs), and IT Security professional have been trained.

CERT-In organized Digital India Dialogue on "Safe & Trusted Internet - Cyber Security for Digital Nagriks & Digital Enterprises" on 5th July 2023. Shri Rajeev Chandrasekhar, Hon'ble Minister of State (MoS) for Electronics & Information Technology and Skill Development & Entrepreneurship chaired the session. The objective of dialogue was to discuss and share ideas among relevant stakeholders, key government departments, and industry entities responsible for creating awareness, sensitize the digital nagariks & digital enterprises and developing roadmap for addressing the issues and challenges faced by digital nagriks & digital enterprises. Over 170 senior officials from Central Government Ministries, Departments, State Government, Education Sector, State Police Departments, Internet Service Providers & Telecom Regulators, Aviation Sector entities, Fintech, Regulators in financial sector, Industry Associations, Product & Security companies, Social Media companies, Banks, Insurance, Railways, Law Firms, PSUs and Private Sector organizations attended the event.

CERT-In is carrying out various activities and campaign for creating cyber security awareness and sensitizing internet users for safeguarding from various cyber threats, frauds and crimes. CERT-In is observing Cyber Security Awareness Month during October of every year, Safer Internet Day on 1st Week Tuesday of February Month every year, Swachhta Pakhwada from 1 to 15 February of every year and Cyber Jagrookta Diwas (CJD) on 1st Wednesday of every month by organising various events and activities for citizens as well as the technical cyber community in India. CERT-In officials provide Cyber security and Cybercrime frauds awareness sessions to different Ministries, Government Departments, Educational institutions and Industry across the country.

CERT-In observed the National Cyber Security Awareness Month during October 2023 (NCSAM2023) by organising various events and activities for citizens as well as the technical cyber community in India with a theme of "Secure our world". During NCSAM 2023, CERT-In conducted various technical training programs for technical cyber community through technical sessions and hands-on demonstrations by CERT-In experts, collaboration partners and Industry. Total outreach during NCSAM 2023 is **86,13,62,533**.

CERT-In has released a Cyber security Awareness Booklet for Digital Nagriks and Digital Enterprises during the National Cyber security Awareness Month 2023 to create more awareness on the cyber-attacks and cyber frauds with information on best practices and reporting mechanisms. The booklet is available online at https://www.cert-in.org.in/PDF/CSA_Booklet.pdf
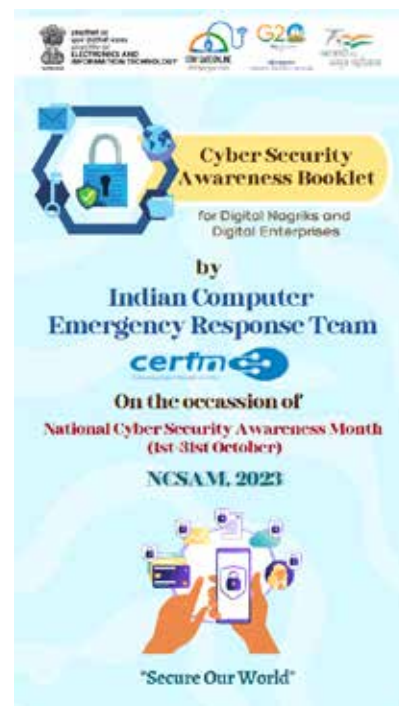
CERT-In released Internet Safety Awareness Booklet for Digital Nagriks and Digital Enterprises during the Safer Internet Day on 06th February 2024 to educate the users on the best practices that needs to be followed for using the internet in a safe and secure manner. The booklet is available online at https://www.cert-in.org.in/PDF/ISA_Booklet.pdf
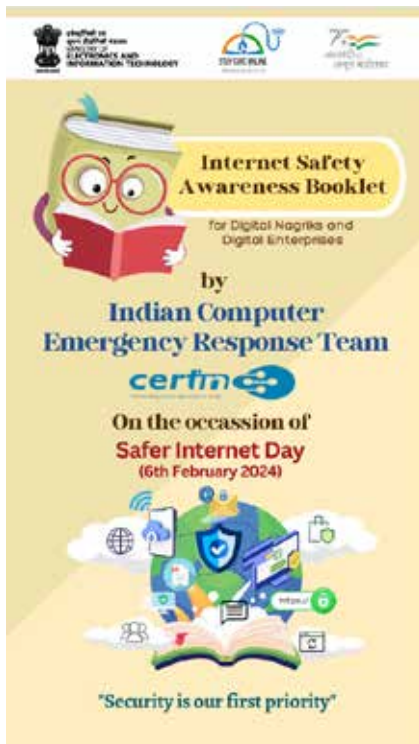
CERT-In carried out various cyber security awareness campaigns in the form of hosting cyber security quiz in collaboration with C-DAC Hyderabad in Stay Safe Online portal, awareness sessions on cyber hygiene to Government Ministries, Departments, PSUs, Private sector organizations, Academia and Research organizations in collaboration with its partners.

CERT-In is regularly sharing safety and security tips and awareness posters, info-graphics and videos through its official websites and social media handles such as Facebook, Twitter, Koo,

and Pixstory for sensitising internet users on cyber frauds and cybercrime and prevention measures.

CERT-In and ISACA successfully conducted a joint Industrial Control System/Operational Technology workshop for 100+ participants from essential services sectors on 28th October 2023.

CERT-In in collaboration with Google successfully conducted a workshop on Cyber Crisis Management Plan (CCMP) on 12th March 2024 at Delhi for various Government Departments including Power & Energy sector.

CERT-In and GCA (Global Cyber security Association) jointly conducted a workshop on "Cybersecurity Governance and Risk Assessment & Management" on 21st March 2024 for senior officials from various Government departments and PSUs.

6.3.11 National Cyber Coordination Centre (NCCC)

CERT-In has operationalised the NCCC project with the objective to generate situational awareness of existing and potential cyber security threats and enable timely information sharing for proactive, preventive, and protective actions by individual entities. NCCC aims to create a structured system to facilitate coordination effort among stakeholders by sharing with them inputs in terms of information about threats/attacks and possible extent which in turn enables immediate remedial actions by the stakeholders.

The project is facilitating various organizations and entities as well as major events in the country to mitigate cyber-attacks and cyber incidents on a near real time basis.

6.3.12 CERT-In Initiatives towards Security including Digital Payments

CSIRT-Fin under CERT-In has been assigned the responsibility for coordinating and supporting the response to a computer security event or incident within the financial sector constituency. CSIRT-Fin is the incident response force which focuses on mitigation processes, providing on-site awareness, expertise, and recovery oversight.

- 814 Alerts, 73 Advisories and 495 vulnerability notes have been issued by CERT-In to enable organisations and users to secure their systems and data during January 2023 to March 2024.

- All authorized entities/banks issuing PPIs in the country have been advised by CERT-In through RBI to carry out special audit by empanelled auditors of CERT-In on a priority basis.

- CERT-In conducted technical cyber security drill "Cysec 2023" on incident response on 19th May 2023 for participants from finance sector.

- CERT-In in collaboration with RBI successfully conducted "G20 Cyber Security Exercise for Banking sector" under India's G20 presidency, on 5th June 2023 in Mumbai. Around 200 participants from Central Banks, National & Finance Sector CERTs of G20, member of guest countries, MD, CEOs, CISOs and CTOs of Indian and Foreign Banks participated in the event.

- CERT-In and SEBI successfully conducted an operational cyber security exercise for CISOs/CTOs and technical leads of Market Infrastructure Institutions (MIIs), Qualified Registrars to an Issue and Share Transfer Agents (QRTAs) and brokerage firms on 22nd June 2023 in Mumbai.

- CERT-In in collaboration with SEBI successfully conducted two Strategic Table Top cyber security exercise for Board & Top Management of SEBI regulated entities on 31st August 2023 & 14th December 2023 in Mumbai. The theme of the exercise was "Building Cyber Resilience: Safeguarding against Cyber Threats and Disruptions". 31 SEBI regulated entities participated in these drills.

- CERT-In along with RBI (College of Agriculture Banking) conducted a joint exercise for Banking Organizations on 21st August 2023, participants from 55 banks joined in the exercise.

- CERT-In in collaboration with RBI conducted a joint exercise for urban cooperative banks on 23rd January 2023.

- CERT-In along with Union Bank of India successfully conducted joint Table Top Exercise (TTX) on 03rd March 2023.

- CERT-In has successfully conducted Technical Cyber Security Drill 'RiskAware-2023' for organizations from Finance sector on 26th October 2023. The theme of the drill was "Building Cyber Resilience–Preparing for the Unknowns".

- The snapshot of activities performed by CSIRT-Fin this year, is as follows:

  ➤ Handling of security incidents in collaboration with CERT-In which included security incidents related to vulnerable services, botnets, open services and phishing incidents. Entities have also been on boarded to CERT-In's Cyber Swachhta Kendra (CSK) for providing automated feeds regarding malware infections, botnets and vulnerable services

  ➤ Issuing of vulnerability notes and virus alerts along with CERT-In.

  ➤ Tailored threat intelligence alerts for proactive measures were sent to financial sector constituency and entities have been on boarded on CERT-In's automated threat intelligence platform.

6.4 Cyber Laws and Data Governance

MeitY is custodian of two Acts, namely, the Information Technology Act, 2000 ("IT Act") and the Digital Personal Data Protection Act, 2023 ("DPDP Act").

Information Technology Act.

The IT Act was enacted on 17th October 2000 with a view to: (a) provide legal recognition of electronic records, (b) facilitate e-governance, e-transaction and e-commerce, and (c) Deter computer-based crimes. The IT Act was amended in 2008 by incorporating provisions relating to protection of sensitive personal data, exemption from liability to intermediaries, protection of critical information infrastructure, penal provisions for new forms of cybercrime such as obscenity, sexually explicit materials, identity theft, cheating by personation, cyber terrorism, etc. The IT Act has been recently amended through the Jan Vishwas (Amendment of Provisions) Act, 2023 [*vide* Serial No. 32 and entries relating thereto in the Schedule] to amend certain provisions for decriminalization and rationalisation of offences to further enhance trust-based governance for ease of living and doing business. The Jan Vishwas (Amendment of Provisions) Act, 2023 may be accessed at the following link:

https://egazette.gov.in/WriteReadData/2023/248047.pdf

Further, it may be noted that MeitY is regularly undertaking review of the existing rules under the IT Act with an attempt to overhaul them to address many present-day and emerging challenges in the cyberspace. In order to achieve the Government policy which is aimed at ensuring an Open, Safe & Trusted Internet and accountability of intermediaries including the social media intermediaries to users in India and to address other emerging issues relating to digital media entities, MeitY in exercise of its powers under the IT Act, 2000, has made and notified the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021 ("IT Rules, 2021") on 25th February, 2021, which were subsequently amended on 28th October, 2022 to introduce Grievance Appellate Committees (GACs), to enable users to appeal against the decisions taken by Grievance Officer of intermediaries on user complaints. If an aggrieved citizen finds the need to appeal, they can do so through the online portal of GAC "www.gac.gov.in". All appeals made through the GAC portal are diligently addressed. The GAC is committed to resolving the appeals within 30 days from the date of appeal, ensuring a timely and effective resolution process. The said rules further provides to regulate the manner in which responsible online games may be made available in India and put a framework and guardrails to prescribe and regulate permissible online games. The latest amended IT Rules, 2021 may be accessed at the following link:

https://upload.indiacode.nic.in/showfile?actid=AC_17807324077&type=rule&filename=information_technology_(intermediary_guidelines_and_digital_media_ethics_code)_rules,_2021_(updated_06.04.2023)-.pdf

The Digital Personal Data Protection Act.

DPDP Act, 2023 has been enacted on 11th August, 2023. It had adopted the approach of simple, accessible, rational & actionable law. This Act provides for the processing of digital personal data in a manner that recognizes both the rights of the individuals to protect their personal data and the need to process such personal data for lawful purposes and for matters connected therewith or incidental thereto. The URL of the notified Act is as under:

https://www.meity.gov.in/writereaddata/files/Digital%20Personal%20Data%20Protection%20Act%202023.pdf

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Chapter 7

Skill India: Capacity Building

7.1 Skill India

Activities of Human Resource Development (HRD) Division, MeitY are targeted to support availability of trained human resources for the manufacturing and service sectors of electronics and IT industry. Initiatives include identifying gaps emerging from the formal sector and planning programmes in non-formal and formal sectors for meeting these gaps. This includes skill development in the domain of electronics and IT and related areas. The skill development activities of the Ministry are primarily being taken up by its two autonomous societies viz. National Institute of Electronics and Information Technology (NIELIT), and Centre for Development of Advanced Computing (C-DAC). In addition, the various organisations/ attached offices under the Department viz. ERNET India, DIC, CSC E-Governance Services India Limited,

STQC, NIC etc. are also engaged in training of various stakeholders in small numbers. The following schemes/ activities pertaining to HRD for Electronics and ICT sector are under implementation:

7.1.1 Post Graduate and Doctorate Level

Visvesvaraya PhD Scheme for Electronics System Design and Manufacturing and IT/IT Enabled Services (IT/ ITeS)

Details are available at Para 9.10.2.6

7.1.2 Graduate Level

Scheme of Financial Assistance for setting up of Electronics and ICT Academies

MeitY has setup seven (07) Electronics and ICT Academies at premier and leading academic

institutions viz. (i) IIT Guwahati (ii) IIT Kanpur (iii) IIT Roorkee (iv) IIITDM Jabalpur (v) MNIT Jaipur (vi) NIT Warangal and (vii) NIT Patna to address the requirement of training the faculty in the latest as well as upcoming/ emerging areas of Electronics and ICT for Engineering and other streams. These academies have been conducting the 'Faculty Development Programs' (FDPs)/ courses in Conventional Classroom mode, NKN mode and online mode. The duration of the scheme is up to 30.06.2023 with the target to train 92,800 faculties. Under the scheme, a total of 3,47,867 beneficiaries have been trained under 2,010 faculty development programs (Faculty: 1,13,106; Students/ Others: 2,34,761) by these E&ICT Academies.

7.1.3 Vocational Skill Development Level

i. **Two Schemes on Skill Development in ESDM sector are under implementation**

   MeitY has approved following the following two schemes for Skill Development in ESDM Sector viz. "Scheme for Financial Assistance to select states/ UTs for skill Development in Electronics System Design and Manufacturing (ESDM) sector" (Scheme-1) and "Skill Development in ESDM for Digital India" (Scheme-2) to facilitate creation of an eco-system for development of ESDM Sector in the entire country.

   Scheme-1 has a total target of 90,000 candidates. This Scheme is being implemented in the States/ UTs viz. Andhra Predesh, Telangana, UT of Jammu & Kashmir, UT of Ladakh, Karnataka, Punjab, Uttarakhand and Uttar Pradesh (Earlier Kerala was also approved but they later exited the Scheme in 2017). This Scheme is implemented through the State Implementing Agencies (SIA) which are nominated by the respective States. Theses

SIAs are responsible for implementation and create necessary mechanism for implementation, monitoring and placement within overall Scheme Guidelines approved by MeitY.

Scheme-2 has a total target of 3,28,000 candidates. This Scheme is being implemented through NIELIT-PMU which is operating and managing the Scheme under the aegis of MeitY in these 32 States/ UTs, which inter-alia includes transfer of funds to the various implementing agencies.

Cumulative target of both the Scheme is 4,18,000 and training is being implemented in NSQF compliant courses (upto 1st April 2022 at Level L1-L2 to L5 courses and now at Level L3 to L5-L6 courses) at Pan India level. Both the above Scheme are being implemented concurrently with NIELIT acting as the Programme Management Unit (PMU). Under both of the Schemes so far, a total of 4,43,917 candidates have enrolled, out of which, 4,37,851 candidates have been trained, 3,15,936 candidates have been certified and 78,840 candidates have been placed.

ii. **Efforts to generate greater participation of Industry through Sector Skill Councils - Electronics, Telecom, IT / ITeS**

   MeitY is actively associating and supporting the various skill development activities of the following Sector Skill Councils (SSCs) concerning the domains addressed by this Ministry:

   a. Electronics Sector Skill Council of India (ESSCI)

   b. Telecom Sector Skill Council (TSSC)

   c. IT- ITeS Sector Skill Council (NASSCOM)

The above SSCs have taken up various courses for skilling of candidates in their respective domains. Ministry has also supported development of new job roles/ NOSs with ESSCI, TSSC and NASSCOM IT / ITeS SSCs in the area of Electronics and IT.

7.1.4 Capacity Building in Niche Areas

i. Information Security Education and Awareness (ISEA) Project Phase-II:

The ISEA Project Phase-II was approved with the objectives of capacity building in the area of information security, training of Government personnel and creation of mass awareness on information security targeting various user segments. The project aimed at training of 1.14 Lakh candidates in various formal and non-formal courses, faculty training, etc., and training of more than 13,000 Government officials in the area of information security, besides creating mass awareness for approximately 3 Crore internet users through direct/indirect mode. The academic activities of the project are implemented through 52 institutions comprising premier academic institutions such as IISC Bangalore, select IITs, NITs, IIITs, Government Engineering Colleges, C-DAC & NIELIT Centres and Technical Universities. The ISEA Project Phase-II officially concluded on 31.12.2023.

Under the project, so far, 92,170 candidates have been trained/ undergoing training in various formal/ non-formal courses in Information Security through 52 institutions (further, 5 Technical Universities participating under the project have reported around 2.90 Lakh candidates as trained/ under-going training in formal courses in their respective affiliated colleges). Besides this,

28,463 Government Officials have been trained in various short-term courses in the area of Information Security through direct/ e-learning/ VILT mode, which *inter-alia* includes 13,302 officials of Central Ministries/Departments trained under the one day Generic course (12,646) and five days intensive Foundation course (656) on Cyber Security through Virtual Instructor Led Training (VILT) mode as on December 2023. As a part of Awareness, 1,567 awareness workshops on Information Security have been organized across the country for school & colleges students, teachers, faculty, Government personnel, LEAs, general users, parents, women, CSCs, etc. covering 3,53,558 participants. Beside this, 1,24,909 school teachers have been trained as master trainers in 43 training programmes.

In addition, around 5.75 Crore (estimated) beneficiaries have been covered so far through indirect mode covering 15 Cyber Safety and Security Awareness Weeks organized in select cities; in collaboration with State Cyber Cell/ Police departments; 116 mass awareness programs broadcasted through Doordarshan / All India Radio; 27 editions of bi-monthly newsletters published in print/ digital mode; multilingual awareness material in the form of handbooks (16), multimedia short videos (75), multi-lingual posters (128), cartoon stories for children (65), etc. published and disseminated through print, electronics & social media and also made available for download through www.infosecawareness.in. Further, a self-paced three-modules e-learning course on 'Cyber Hygiene Practices' has been made available through ISEA awareness portal www.infosecawareness.in in which 96,224 participants have been registered and 33,215 participants have been certified. Online

quiz competitions on cyber hygiene/cyber security aspects have been organized regularly for various users, in which a total of 7.37 Lakh candidates have participated and 3.90 Lakh candidates have completed the same.

Further, as per the direction of MHA, the Ministry is observing 'Cyber Jagrookta Diwas' on the first Wednesday of every month since May 2022 onwards for capacity building of Government employees and creating awareness for prevention of cyber-crimes under the aegis of ISEA Project Phase-II. So far, 16 awareness programs on various aspects of cyber security have been organized for the officials/ staff of MeitY & its organizations covering 6,855 candidates as of March, 2024.

ii. ISEA Project Phase-III:

MeitY has approved ISEA Project Phase III on 16.10.2023 for the duration of 5 years. The ISEA Project Phase-III has been designed with a targeted approach for development of resources for safe, trusted and secure cyber space. The project envisaged to generate 2.65 Lakh human resources in the area of information Security over a period of 5 year comprising of skilled & certified Cyber Security Professionals i.e. CISOs, Deputy CISOs, Associate team of CISOs/ Aspirants - 45,000 beneficiaries and training of 2.2 Lakh student (UG/ PG level), research scholars, faculty, etc. in various formal/ non-formal courses in the advance and emerging areas of Information Security and innovation activities. In addition, more than 12 Crore beneficiaries comprising school children & teachers, college students & faculty, women, specially- abled, senior citizens, government employees, MSMEs, other non-IT users, CSCs, NGOs, CSOs, etc. are envisaged to be covered under the Cyber Aware Digital Naagrik

component through direct/ indirect mode. The project would be implemented through 50 premier academic institutions (IITs/ NITs), autonomous organizations of MeitY (C-DAC/ NIELIT) and Technical Universities in a hub-n-spoke mode.

iii. FutureSkills PRIME (Programme for Re-skilling/Up-skilling of IT Manpower for Employability):

MeitY in collaboration with National Association of Software and Service Companies (NASSCOM) has initiated a programme titled FutureSkills PRIME (**P**rogramme for **R**e-skilling/ Up-skilling of **IT M**anpower for **E**mployability), aimed at re-skilling/ up-skilling of IT professionals in 10 new/ emerging technologies namely AI, Robotic Process Automation, Augmented/ Virtual Reality, IoTs, Big Data Analytics, Additive Manufacturing/ 3D Printing, Cloud Computing, Social & Mobile, Cyber Security and Block chain. The programme aims at up-skilling/ re-skilling 4.12 Lakh beneficiaries (4 Lakh Professionals, 10,000 Government Officials and 2,000 Trainers) in these technologies.

FutureSkills PRIME programme follows an '*aggregator of aggregators*' approach for digital skills training on a national scale. Online content from Indian and global providers is aggregated on the FutureSkills PRIME portal and made available to candidates, to facilitate anytime-anywhere learning, in line with their aptitude and aspirations. The IT-ITeS SSC NASSCOM is the key implementing agency for the programme. For the identified technologies, 40 C-DAC/ NIELIT centres are also participating as (Lead and Co-Lead Centres) in the programme to offer bridge courses, training of trainers and government official training, etc.

Under the FutureSkills PRIME as of 31.03.2024, a total of 17.47 Lakh+ candidates have signed-up on the FutureSkills PRIME portal (https://futureskillsprime.in/), and around 7.03 Lakh candidates have been enrolled in various courses, out of which a total of 3.07 Lakh candidates have completed the courses. Also, the Resource Centres (Lead/ Co-Lead Centres), have trained 11,068 Government Officials (GoT) and 2,360 Trainers (ToT).

iv. Capacity building for human resource development in Unmanned Aircraft Systems (Drone and related Technology):

MeitY has approved the project entitled "Capacity Building for Human Resource Development in Unmanned Aircraft System (Drone and Related Technology)" on 11.07.2022. The primary objective of the programme is to leverage collaborative activities in human resource development through capacity building in education and training in the area of UAS. The programme is conceived to achieve the broad objectives which include (i) To enhance capacity & capabilities of select institutions in identified WTs on Unmanned Aircraft Systems, (ii) To institutionalize a collaborative ecosystem through identified Resource Centres (RCs) and Participating Institutions (PIs) for synergy of capabilities & expertise (iii) To foster development of competent human resources at various levels including Post Graduate & Graduate programs, PG Diploma / Certificate programs, Faculty Updation and Master Trainers in niche areas of UAS (iv) To promote entrepreneurial mindset and nurture technical talent among the student community (v) To nurture technical talent and ideation among the student community through IPR generation, Competitions, Workshops / Conferences, etc.

The project, implementation is being carried out by 30 premium institutions, in a hub-n-spoke mode, comprising 5 Resource Centres; 15 Academic Participating Institutes (PI-Academic); and 10 C-DAC/NIELIT Participating Institutes (PI-C-DAC/ NIELIT) Centres. The project aims to create an overall trained manpower of 42,560 Nos which includes 100 candidates undertaking M.Tech Degree in UAS/Drones, 4000 candidates undertaking Minor Degree/ Retrofitting courses in UAS/ Drones, 1000 Master Trainer/ FUP, 32,400 students trained through non-formal short term and certificate course.

So far, a total of 104 Bootcamps has been organized and participated by 3,886 candidates, 10 Faculty Updation Programme (FUPs) conducted wherein 260 Faculty members have been trained, 05 workshops have been conducted which were participated by 411 participants, 14 IPR-papers with 42 participants, 02 IPR-patents with 05 participants and 76 Proof of Concepts (POC) with 387 participants have been submitted. IIT Kanpur has started a new M.Tech in Unmanned Aerial System Engineering from August' 23 onwards. Post Graduate Diploma in Unmanned Aircraft System Programming (PG-DUASP)' has been also launched by C-DAC Pune at two institutes i.e. C-DAC Pune & NIELIT Aurangabad. Post Graduate Diploma in Unmanned Aircraft System Programming (PG-DUASP)' has been also launched by C-DAC Pune & The course has been started at two institutes i.e. C-DAC Pune & NIELIT Aurangabad with the effect of September 23. Also, 03 Minor degree programs have been initiated at IIT Kanpur, IIIT Hyderabad, and IIITDM Kurnool respectively, and enrolled 66 students. A total of 45 Retrofitting Electives have been started

by various participating institutes and enrolled 789 students.

7.1.5 Chips to Startup (C2S) Programme

The C2S Programme aims to train 85,000 number of Specialized Manpower at about 100 participating Institutions (including Academia, R&D Organization, Startups, MSMEs) over a period of 5 years in the area of VLSI and Embedded System Design and leapfrog in ESDM space by way of inculcating the culture of System-on-Chip (SoC)/ System Level Design at Bachelors, Masters and Research level and act as a catalyst for growth of Start-ups involved in fabless design.

The programme would not only generate 85,000 number of Specialized Manpower at B. Tech, M. Tech & PhD level in Chip design area; but also results in the development of 20 Systems/ 175 Chips/ 30 reusable IP Cores and incubating 25 startups in this area. Details of the Programme are available at **http://c2s.gov.in/**

- Under the programme, 113 Organizations across the country (Including Academia/ R&D Organization/ Startup/ MSME) are being supported by way of providing centralized access of EDA tools, Fabrication and financial support for implementing R&D projects for IP/ Chip/ SoC development.

- **ChipIN Centre:** ChipIN Centre has been setup at C-DAC Bangalore for making available to 100 participating institutions the following services:- (a) MPW fabrication services, (b) EDA tool from Cadence, Synopsys, Siemens-EDA in remote manner and (c) Design handholding.

- **SMART Lab Facility:** VLSI SMART Lab Facility has been setup at NIELIT Calicut (with two labs having 100 hardware system) to train about 1 Lakh candidates in 5 Years (20,000 candidates/ year) in Hardware design including VLSI Design, Embedded hardware design, Board design, etc. through NSQF aligned Courses and by providing remote access of FPGA boards ported with SHAKTI/ VEGA Processors.

(v) M. Tech and M. Des Programme in Electronics Product Design:

To train manpower in the area of Electronics Product Design for designing innovative products, rapid prototyping & development and hands-on experience with cutting edge technology and processes, MeitY has initiated following programme with an objective to promote indigenous design and development of Electronics System in the country.

a. M. Des programme/ Executive development programme in Electronics Product Design:

M. Des programme / Executive development programme in Electronics Product Design has been initiated at IIT Guwahati in March 2021 to graduate 120 M. Des students and 4 PhD Student in Electronics Product Design over the period of 5 years. Besides this, Executive Development Programme will be conducted for 200 Industry experts.

b. Special Manpower Development Programme (SMDP)- M. Tech. in Electronic Product Design and Skill Development:

M. Tech. in Electronic Product Design and Skill Development has been initiated at IISc Bangalore in March 2021 to train 305 Students/Faculty (125 students via M. Tech Programme, 144 Students via Short-term Certificate//Workshop and 36 Faculties vis

Faculty Development Programme) over the period of 5 years.

7.1.6 Indian Nanoelectronics Users Program (INUP)

Based on the grand success of project "INUP-"Phase-I" and "Phase-II" - a joint project at IISc, Bangalore and IIT Bombay, an umbrella project entitled Indian Nanoelectronics Users Program - idea to Innovation (INUP-i2i) is being implemented by IISc Bangalore, IIT Delhi, IIT Madras, IIT Kharagpur, IIT Guwahati and IIT Bombay.

The project INUP-i2i is supporting researchers in the area of nanoelectronics across the country by organizing the hands-on workshops as well as to train researchers/users by undertaking the R&D projects on different aspects of nanoelectronics and mentoring the start-ups in nano area. The approach adopted under this project has been to make available the state-of-the-art research facilities created at nanoelectronics centres to the researchers all over India.

So far more than 29 familiarization, 25 Hands-on-training workshops, 17 Industrial trainings and 5 Hackathon has been conducted. More than 4500 skilled manpower has been trained and around 170 R&D projects are being supported under the project.

a. Mentorship of the Startups and collaborating institutes

- 25 startups in the nanotechnology domain and 47 institutions including IIITs/ NITs/ CUs/SUs/PUs are being supported through Hub-and-Spoke model under the program

- All the nanocentres are closely connected to a number of institutions across the country who are being encouraged to promote their students getting trained at the state-of-the-

art experimental facilities.

b. NATIONAL SKILL QUALIFICATION FRAMEWORK (NSQF) CERTIFICATION

Under the project INUP-i2i, two courses have been developed and approved under NSQF:

- The Standalone NOSs on Nanotechnology (Foundation & Advanced program) have been successfully approved in the NSQC Meeting by NCVET in Feb 2023. The Qualification Files and Model Curriculums for both programs are available on the NQR Portal. Below are the links:

Foundation Program on Nanoscience & Technology: https://nqr.gov.in/qualifications/3809

Advanced Program on Nanoscience & Technology: https://nqr.gov.in/qualifications/3808

7.1.7 Development of North-Eastern Region by enhancing the Training/ Education capacity in the Information, Electronics & Communications Technology (IECT) Area

MeitY is implementing a Project approved by the Cabinet with budget outlay of ₹296.95 Crore (GIA of ₹269.62 Crore). The project objective includes up-gradation of the three existing NIELIT centers located at Imphal, Aizawl, Gangtok; Setting up of seven new Extension centers at Senapati and Churachandpur in Manipur; Dibrugarh, Jorhat and Kokrajhar in Assam; Lunglei in Mizoram; Pasighat in Arunachal Pradesh; and Upgradation of two existing extension centers located at Chuchuyimlang in Nagaland and Tezpur in Assam to increase the training capacity from 3,080 per year to 14,400 per year from the 5th year onward. As of now the annual training capacity of these centers (including six centers operational from temporary locations at Guwahati and Silchar in Assam; Itanagar and Tezu in Arunachal Pradesh;

Shillong and Tura in Meghalaya) is around 20,000 candidates. Presently all the NIELIT Centres/ extension centers are operational from permanent/ temporary premises. Six NIELIT Centers i.e. Imphal, Aizwal, Churachandpur, Kokrajhar, Tezpur and Chuchuyimlang had been inaugurated on 16th and 17th September, 2021; another 4 centres viz. Pasighat, Senapati, Jorhat and Dibrugarh had also been inaugurated on 6th May, 2022; Lunglei Centre was completed in all respect by 31st March, 2023 and functional; Gangtok Centre had also been inaugurated on 8th April, 2023 and are operational from their permanent campuses; 01 NIELIT Centre i.e. Gangtok, some minor work/ procurement is yet to be completed. So far an amount of ₹264.70 Crore has been released to NIELIT for implementation of the project. Under the project around 2.50 Lakh candidates have been trained in various Electronics & ICT courses so far.

7.1.8 Capacity Building in IECT including training in Digital Skill sets and Current Industry Demanding Technologies for various sections of society in the NE States

MeitY has approved the project with a budget outlay of ₹92.33 Crore over a period of two years.

The objectives of the project are to fulfil the gap in technological skilling and awareness, NIELIT Centres in the NE Region have conceptualized this project with the following objectives:

i. To provide awareness and training in IECT to citizens spread across different sections of the society by 08(eight) NIELIT Centres located in the NE Region using mobile ICT labs to reach out to all places including remote corners of the NE States to provide essentials training.

ii. To promote awareness & training related to Digital Inclusion/ Digital services to common citizens including Farmers, Women, Elderly persons, School and College students, school dropouts.

iii. To impart job-oriented value addition courses to the Graduates, polytechnic diploma holders/ students in the utility areas such as Digital marketing, Solar Technology, Computer Applications, Computerized Accounting, Cyber Security, AR-VR, Blockchain, IoT, Machine Learning, AI, Drone Piloting Technology, Multimedia etc., to fulfil the local needs.

iv. To train the graduate in current Industry demanding technologies such as Programming or coding, Web or Mobile, Database, System Administration and Security, Software Testing/ QA/ Management, Technical Support and BPO Expert etc. to improve the employability.

v. Up-skilling and re-skilling of NIELIT staff and school teachers in emerging and future technologies.

vi. To create and promote an ecosystem for local start-ups and entrepreneurship development in the NIELIT Campuses of NE Region.

So far, a total of 1,42,334 candidates have been trained.

7.1.9 Establishment of Intelligent Educational Infrastructure (Smart) in Eklavya Model Residential Schools (EMRSs)

The project is approved by MeitY to be implemented by ERNET India. The Project, jointly funded by MeitY and Ministry of Tribal Affairs (MoTA), is for setting up of Intelligent Educational Infrastructure in 328 EMRSs spread across the country. The objective of the project is to set up Intelligent Educational Infrastructure at EMRSs along with facility of Internet connectivity.

It will help in the growth and development of the tribal students and to bridge the digital divide by using latest technology. ERNET India is the implementing agency of the project. Under the project, the first year target of setting up of Intelligent Educational Infrastructure along with Internet Leased Line (ILL) connectivity at all 48 Nos of EMRSs has been achieved. Also, the work of setting up of smart classes with connectivity in other 280 EMR schools is in progress

7.1.10 Grass-Root Level

i. **Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)**

"PMGDISHA" to usher in digital literacy in rural India by covering 6 Crore rural households (one person per household) by 31.03.2024. To ensure equitable geographical reach, each of the 2,50,000 Gram Panchayats across the country are envisaged to register an average of 200-300 candidates. The Scheme is being implemented as a Central Sector Scheme by MeitY through an implementing agency namely CSC e-Governance Services India Limited, with active collaboration of all the State Governments and UT Administrations.

So far, a total of around 7.27 Crore candidates have been enrolled and 6.27 Crore have been trained, out of which 4.68 Crore candidates have been certified. The PMGDISHA Scheme has been officially concluded on 31.03.2024

ii. **Create skill development facilities in deprived areas through the strengthening of the National Institute of Electronics and Information Technology (NIELIT)**

MeitY is implementing a Project with the objective of upgrading three existing NIELIT centres located at Imphal, Aizawl, Gangtok;

Setting up seven new Extension centres at Senapati and Churachandpur in Manipur; Dibrugarh, Jorhat, and Kokrajhar in Assam; Lunglei in Mizoram; Pasighat in Arunachal Pradesh; and Upgradation of two existing extension centres located at Chuchuyimlang in Nagaland and Tezpur in Assam to increase the training capacity from 3,080 per year to 14,400 per year from the 5th year onward. As of now the annual training capacity of these centres (including six centres operational from temporary locations at Guwahati and Silchar in Assam; Itanagar and Tezu in Arunachal Pradesh; Shillong and Tura in Meghalaya) is around 20,000 candidates. Presently all the 12 NIELIT Centres/extension centres under the project are operational and providing skill training programs in the E&ICT domain. It is also to mention that at present there are 22 NIELIT Centres/ Extension Centres are providing Skill Training Programmes across all 8 NER states.

Also, MeitY is supporting for setting up NIELIT Centre at MUZZARFUR and Buxar in Bihar, Mandi and Shimla in Himachal Pradesh, Dimapur in Nagaland, UT Daman, Bikaner in Rajasthan, Kargil in UT of Ladakh in FY 2023-24.

iii. **Capacity Building in IECT including training in Digital Skill sets and Current Industry Demanding Technologies for various sections of society in the NE States**

The objectives of the project are to fulfil the gap in technological skilling and awareness, NIELIT centres in the North Eastern Region have conceptualized this project with the following objectives:

(a) To provide awareness and training in IECT to citizens spread across different sections

of society by 08(eight) NIELIT Centres located in the NE Region using mobile ICT labs to reach out to all places including remote corners of the North Eastern States to provide essential training.

(b) To promote awareness & training related to Digital Inclusion/Digital services to common citizens including Farmers, Women, Elderly persons, School and College students, and school dropouts.

(c) To impart job-oriented value addition courses to the Graduates, polytechnic diploma holders/students in the utility areas such as Digital marketing, Solar Technology, Computer Applications, Computerized Accounting, Cyber Security, AR-VR, Blockchain, IoT, Machine Learning, AI, Drone Piloting Technology, Multimedia, etc., to fulfil the local needs.

(d) To train the graduate in current Industry demanding technologies such as Programming or coding, Web or Mobile, Database, System Administration and Security, Software Testing/QA/ Management, Technical Support and BPO Expert etc. to improve employability.

(e) Up-skilling and re-skilling of NIELIT staff and school teachers in emerging and future technologies. vi. To create and promote an ecosystem for local start-ups and entrepreneurship development in the NIELIT Campuses of NE Region.

So far, a total of 1,24,086 candidates have been trained.

iv. **Capacity Building Program Using ICT Tools & Technology to Enhance Livelihood of Weavers/Artisans of Bodoland Territorial Council (BTC), Assam**

MeitY has approved the project entitled "Capacity Building Program using ICT Tools & Technology to Enhance Livelihood of Weavers/ Artisans of Bodoland Territorial Council (BTC), Assam" with an objective of training for Handloom community development at Two Districts of BTC, Assam i.e., Kokrajhar & Baksa using modern technologies like a computer embroidery machine, e-Tailoring Technology, Design creation using CAD software, etc. and to train 5000 beneficiaries. Under the project, two high-end ICT Labs equipped with modem Hardware and handloom machinery have been developed at Baksa and Kokrajhar districts, BTC Assam, and, as of 30.09.2023 a total of 1000 beneficiaries had been successfully trained on Graphics Design and training 400 beneficiaries on Handloom machinery is ongoing; and, a total of 3,000 motifs and 5000+ designs have been created; and, 2 workshops have been organized at Baksa and Kokrajhar district of BTC, Assam with weavers & artisans, domain experts in the handloom sector, policymakers, and all other stakeholders

v. **Technology-mediated Delivery of Courses in Medical Science Education for NER Medical Colleges**

MeitY has approved the project entitled 'Technology mediated Delivery of Courses in Medical Science Education for NER Medical Colleges'. The project is being implemented by C-DAC Noida, in collaboration with All India Institute of Medical Sciences (AIIMS), New Delhi. The project envisages assisting and supplementing the medical colleges,

of the North East Regions, in providing the much-needed expert medical education and technology-mediated classes through online courses. These online courses will not only benefit the medical students in getting the expertise of the AIIMS faculty but will also specifically benefit the students belonging to lower socioeconomic backgrounds, who may not be able to buy all required books, so these free online learning modules will be extremely helpful to them, along with all other students.

Under the project, a total of 1,750 students have accessed/accessed various medical colleges primarily from the 8 identified NER medical colleges and 10 medical colleges in other states like Bihar, Andhra Pradesh, Tamilnadu, Orissa, Uttar Pradesh, etc. The Virtual Teaching (V.T) infrastructure support has also been provided and deployed at the 8 identified NER Medical Colleges. The Virtual Teaching assistance is being provided through Webinars, and a series of workshops and will include V.T classes, of expert faculty from AIIMS, New Delhi in the future, for the benefit of the students of the NER medical colleges. Under the project, two webinars and one workshop have been conducted which was attended by around 190 students.

7.1.11 IT for Masses Programme

IT for Masses Programme is aimed at narrowing the digital divide by initiating/ promoting activities in ICT for focus groups (Women, SC, ST, Senior Citizens, Differently Abled & economically weaker Section) and underprivileged areas (North Eastern Region, Backward Districts and Blocks & Districts having more than 40% SC/ST population) for inclusive growth of IT Sectors through Infrastructure Creation, Deployment of IT tools, Training, Capacity Building & Entrepreneurship

Creation activities in IT domain.

The Ministry is earmarking funds for the Development Action Plan for SC (DAPSC), Scheduled Tribe Component (STC), and General component. The Programme caters exclusively to the benefit/development of focus groups i.e., Women, SC, ST, Senior Citizens, Differently Abled & Economic Weaker Sections.

So far, around 24,545 (SC: 13,408, ST: 7098 & Women: 4039) Nos of candidates have benefited. Under the IT for Masses scheme various projects have been initiated to benefit SC/ST, women, and EWS categories of candidates in the country.

i. **Development of Women/Girls Using ICT**

   Gender Empowerment through ICT has been one of the major initiatives of the Government. MeitY has also been implementing various ICT training/capacity-building projects for the empowerment of women in different States/UTs.

ii. **Projects covering Gender (Women) beneficiaries**

   (a) Skill Development Training for the Masses under ICT – Maharashtra

   (b) Creation of R&D culture in Electronic Materials among SC/ST and Women students from remote areas in Maharashtra .

   (c) Skill Development of youths in Aspirational Districts in the area of IECT leading to enhancement in Employability – PAN India

   (d) Employability Enhancement & Livelihood Training Program [EELTP] of SC/ST & EWS (Women) Youth through Capacity Building and Skill Development in IECT-PAN India.

iii. Fee-reimbursement Programme

As per the directions and guidelines received from NITI Aayog (erstwhile Planning Commission) by MeitY (erstwhile DeitY) vide their communication No.D.O.No.M-13054/2/2005-BC dated 05.09.2007, no fee should be charged from the SC and ST candidates for educational and skill development programmes by the Government and autonomous institutions and the expenditure for the Scheme should be accounted for from the SCSP and TSP fund of the respective Ministries/Departments.

Since 2007-08, NIELIT is implementing the "Fee Reimbursement to SC/ST" programme. The aforesaid programme is a DBT on-boarded scheme in which free training is being provided to the SC/ST candidates in various formal, non-formal, and IT literacy courses at NIELIT's own centres under budgetary support of MeitY.

For the direct benefit of beneficiaries, MeitY has issued a Gazette Notification on 13.08.2019 for the use of an Aadhaar as mandatory for any SC/ST candidate desirous of availing the benefit under the aforesaid programme. Further, the Guidelines for Fee Reimbursement to SC/ST was issued on 20.04.2020 for better implementation of the programme and an MIS portal has been developed and on-boarded for constant monitoring of the programme. Also, the aforesaid programme has been on-boarded on the UMANG portal.

During the FY 2022-23, a total of 3,633 SC and 15,623 ST Candidates benefitted under the Fee-reimbursement programme.

7.1.12   E-Learning Platform

i.   OLabs NextG (OLabs Next Generation):

MeitY has approved the project titled "OLabs NextG: Next Generation Online Labs (OLabs) for schools" which is being implemented by C-DAC, Mumbai jointly with Amrita Vishwa Vidyapeetham, Tamil Nadu. OLabs portal (http://www.olabs.edu.in) is a resource point for access to online Labs that cover all experiments as per the CBSE curriculum for Physics, Chemistry, Biology, and also activities under Maths and English. These are available in regional languages namely Hindi, Marathi, Malayalam, etc. OLabs NextG which is aligned with the New Education Policy 2020 has been approved and jointly funded by MeitY and the Ministry of Education (MoE).

The objective of the project is to design and develop 500 Online Labs and upgrade of existing 173 labs using the latest tools/ technologies for the students of classes VI-XII for various subjects, training of 10,000 teachers/students from 200 schools. Under project 31.10.2023, a total of 310 labs in subjects Physics, Chemistry, Biology, Science, Mathematics, Social Science, Sanskrit, Computer Science, and English for classes 6th to 12th have been developed and available on OLabs website (olabs.edu.in). Labs of OLabs are also available on DIKSHA virtual labs portal https://diksha.gov.in/virtuallabs.html, OLabs Android app is also available and hosted on GOV.IN Appstore. OLabs is available in English, Hindi, Marathi, and Malayalam languages.

ii.   MedSIM 2.0 (Online Skills Lab and Virtual Patient Cases):

MeitY has approved a project titled 'MedSIM 2.0- Online Skills Lab' and Virtual Patient Cases for the development of a Medical Simulation platform for medical students being implemented jointly by C-DAC, Thiruvananthapuram, Amrita University and AIIMS Bhubaneswar. MedSIM is

a simulation-based medical education platform that allows medical students to enhance their clinical reasoning and judgment skills. Key objectives of the MedSIM (2.0) (http://medsim.in) is to design and develop a Preclinical and Paraclinical Online Skills Lab, develop New Virtual Patient Case Simulations to cover the entire MBBS curriculum, Aligned with MBBS Regulations 2020, National Medical Commission, enhance existing MedSIM (1.0) platform with Authoring tool, Learning Analytics, Assessment & Feedback and training of 5,000 medical students and 1,000 medical faculty from 500 medical colleges. Under the project so far, a total of 113 clinical and 57 pre/para clinical cases have been studied. A total of 118 simulation cases have been added to the website from 29 topics.

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Chapter 8

Statutory Organisations

8.1 Controller of Certifying Authorities (CCA)

8.1.1 Introduction

The CCA has been appointed by the Central Government under section 17 of the Information Technology Act (IT Act 2000) for purposes as defined in the Act. The Office of the CCA came into existence on November 1, 2000. Since then, the Office of CCA is executing its statutory functions under the administrative control of MeitY. It aims at promoting the growth of E-Commerce and E-Governance through the wide use of digital signatures.

The IT Act, 2000 facilitates the acceptance of Electronic Records and Electronic Signatures through a legal framework for establishing trust in digital transactions.

The CCA established the Root Certifying Authority of India (RCAI) under section 18(b) of the IT Act

to digitally sign/certify the public keys of Certifying Authorities (CA) in the country. The RCAI is operated as per the standards laid down under the Act. The CCA certifies the public keys of CAs using its own private key, which enables users in cyberspace to verify that a given certificate is issued by a licensed CA. The IT Act provides for the CCA to license and regulate the working of CAs. The CAs issue digital signature certificates for the electronic authentication of users in the cyber world.

8.1.2 Root Certifying Authority of India (RCAI)

8.1.2.1 Root Certifying Authority

The model adopted by India is a hierarchical PKI with the trust chain starting from the RCAI. It is operated by the CCA, Government of India. Below RCAI, there are CAs licensed by CCA to issue Digital Signature Certificates under the IT Act.
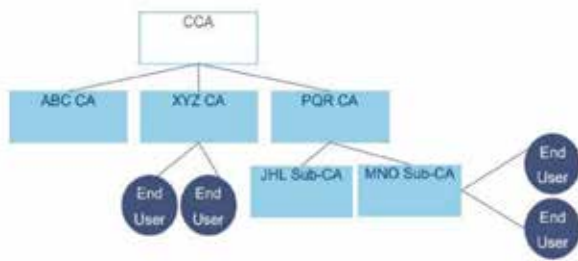
Hierarchical structure of RCAI

The IT Act provides for the CCA to license and regulate the working of CA. The following are some of the functions of CCA

- Function as RCAI

- Certifying the public keys of the CAs.

- Laying down the standards & Guidelines to be followed by the CAs,

- Licensing CAs and exercising supervision over their activities.

- Addressing the issues related to the licensing process

- Approving the Certification Practice Statement (CPS)

- Auditing the physical and technical infrastructure of the applicants through a panel of auditors maintained by the CCA.

- Resolving conflict of interest between CAs and subscribers
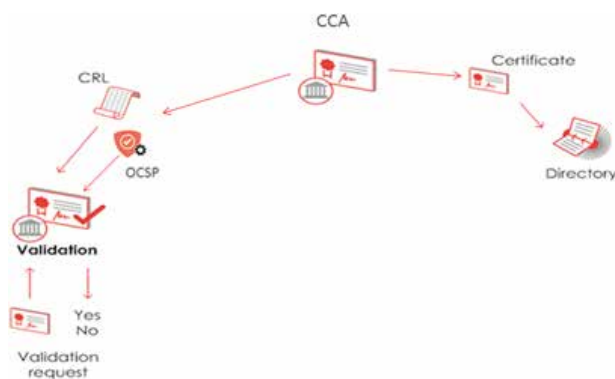
Overview of Technical Operations as Root CA

The Root Certificates of CCA is the trust anchor of all the CA certificates and DSCs issued by Licensed CAs. A two new self-signed Root certificates with a key-size of 4096 RA have been created. The new root will be used for certifying the CA who issue end-entity digital signature certificates SSL Certificates. Twenty-two (22) CAs have been certified under CCA India 2022. The enrollment of root certificates in Adobe and Microsoft products is completed.

8.1.2.2 Certifying Authorities (CAs)

CAs can be private sector companies, Government departments, public sector companies, or non-governmental organizations (NGOs). These are also called Licensed CAs. At present, there are twenty-two CAs licensed by Root CA and all of them are operating under same policy, standards, and verification methods, subjected to be audited by the criteria set by Root CA. The policy IDs of certificates are also same for all CAs. CAs are required to provide CRL, OCSP and Timestamping Services. CAs are also not allowed to issue certificates other than that mentioned in the CPS which is approved by CCA. The certificates issued by Licensed CAs are legally valid in India. A CA can create sub-CAs to meet the business branding requirement. These sub-CAs, which will be part of the same legal entity as the CA, will issue certificates to the end entities or subscribers. The CAs are allowed to create ONE level of sub-CA only. CA are required to operate under the provisions of Act, Rules, Regulations and orders issued by CCA. The orders issued by CCA are published in the form of Guidelines.

The license is issued for a period of 5 years. CAs are required to renew the license after the expiry of the license. The license is subject to suspension, revocation and renewal. The terms and conditions for the renewal are same as fresh licenses. The

licence is issued based on eligibility criteria like net worth, paid-up capital and compliance to technical and physical infrastructure in accordance with the provision under Act.
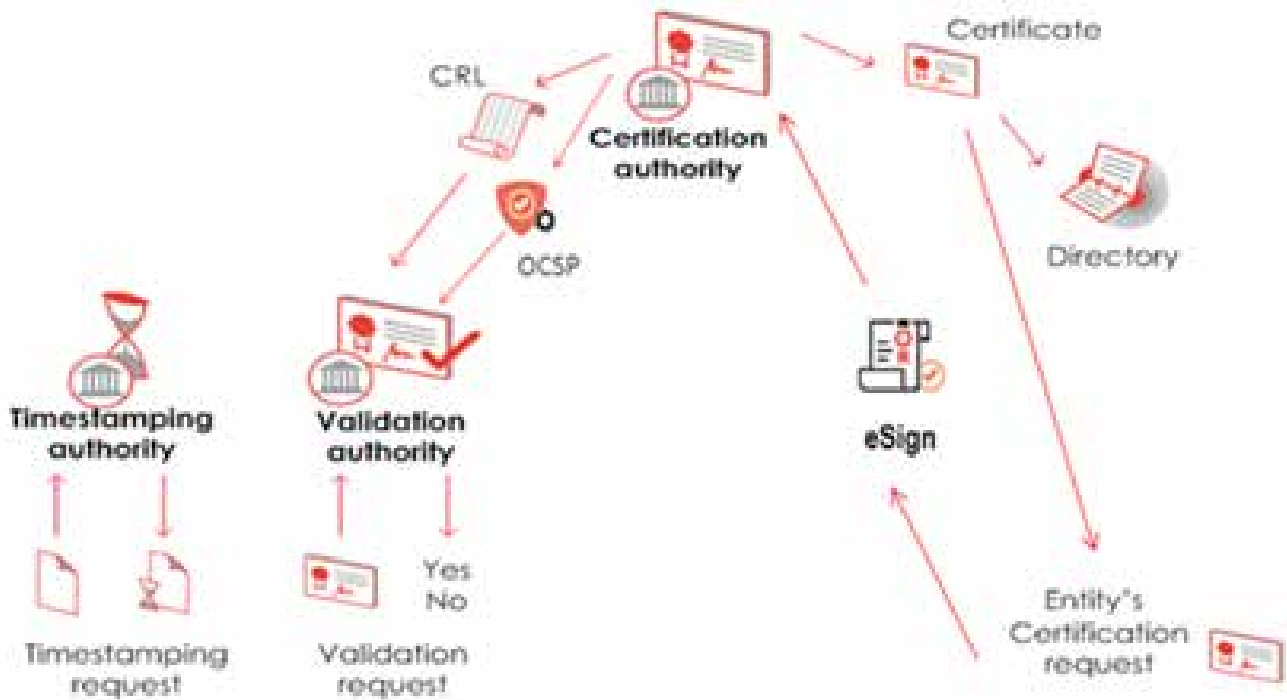
Overview of Technical Operations as Certifying Authorities

8.1.2.3 Electronic Signature Certificates

To obtain an Electronic Signature Certificate from CA, the applicant needs to undergo a verification process as mentioned in the Identity Verification Guidelines (IVG) issued by CCA and upon successful verification.

In order to issue Digital Signature Certificates (DSC), KYC of DSC applicants are carried out by CA. In the current scenario, the submission of DSC application and verification by CA are fully electronic. For KYC, the option available include online Aadhaar verification, Aadhaar offline eKYC, banking eKYC, organizational eKYC, PAN based eKYC or a direct verification. End-user electronic signature certificates are strictly issued in a Hardware Crypto Token for a period of 1-3 years.

CA creates an eKYC account and issue an electronic Signature certificate to the applicant. As the verification process are online, the certificate can be obtained within 2-3 hours. For all categories of applicants, email-id, mobile number, photo, scanned copy of proof of identity and scanned copy of proof of address are required to be submitted to CA.

The total number of DSCs issued in the country grew to more than **57.05** Crore (out of which

52.51 Crore DSCs are for eSign) by October 2023 & continue to grow rapidly and is expected to increase significantly with the launch of various e-Governance/e-Commerce programmes.

DSC Issuance Chart

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
■ DSC Token	67.9	25.92	23.68	40.5	38.64	44.75	46.83	47.2	46.22	51.7	25.96
■ DSC eSign	0	0	5.38	97.94	351.7	198	314.8	439.7	984.2	1455	1351
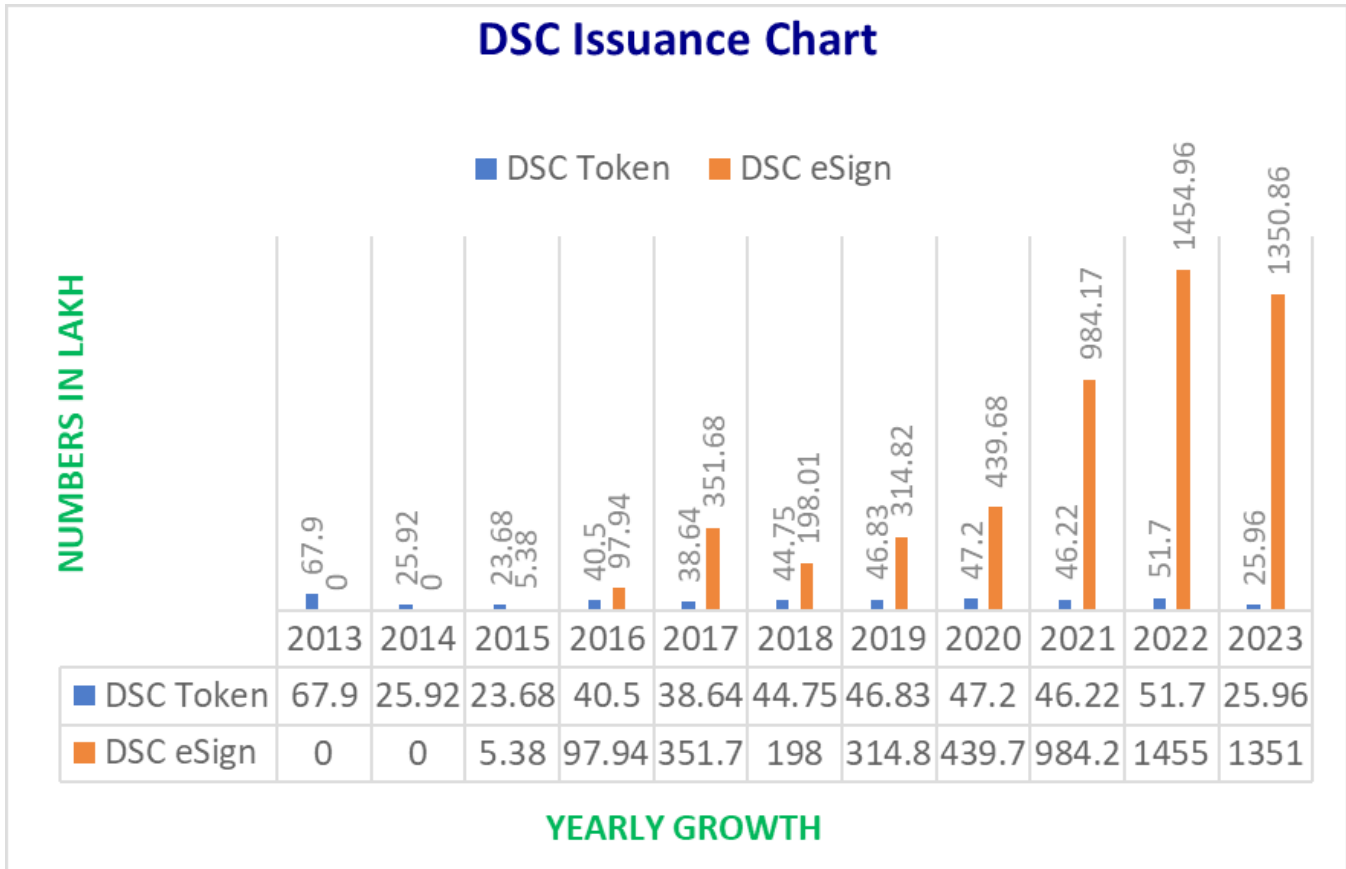
YEARLY GROWTH

Yearly Growth of Electronic Signature

8.1.2.4 Time stamping

The National Physical Laboratory, India (NPLI), is responsible for the maintenance and development of the Indian Standard Time (IST). NPLI maintains the time scale of IST with the help of a commercial cesium atomic clock. The time scale maintained by NPL is designated as UTC. CAs are required to derive time from national time source for their use in the issuance of electronic signature certificate and eSign Service. Also, the time included in the time-stamp token shall be synchronized with Standard Time Source within the accuracy of ±1 second. CAs are providing time-stamping services in compliance with RFC 3161.The time stamp token includes a representation (e.g., hash-value) of the datum being time-stamped as provided by the time stamp requestor/subscriber. The Guideline was also issued in this regard by CCA.

8.1.2.5 Online Certificate Status Protocol (OCSP) & Certificate Revocation List (CRL)

Digital certificates are used to create trust in online transactions. The usage of certificate-related functions is deemed as valid only if the certificate is valid at the time of usage. The validity of the certificate is determined through the CRL or OCSP. CA issues certificates with a validity period up to 3 years. Within the validity period, the certificate may be revoked by CA under certain

circumstances. CA periodically issue the revocation list and publish it on the website of CA. Certifying Authorities publishes the CRL in accordance with the provisions of IT Act and Guidelines specified by the Office of CCA. Relying parties can verify revocation status of DSC in an offline mode, by periodically downloading CRLs or by accessing CRLs from the CAs website.

To provide more timely status information, all CAs provide an OCSP service to enable relying-party application software to determine the status of an identified Certificate in an online mode. The CAs are required to operate their OCSP service as per the requirements specified under the Guidelines issued by CCA.

8.1.2.6 eSign

eSign is an online Electronic Signature Service, based on successful authentication of individual using e-KYC services, the key pairs generation, the certification of the public key based on authenticated response received from e-KYC services, and digital signature of the electronic document are facilitated by the eSign online Electronic Signature Service provider instantaneously within a single online service. The key-pairs are used only once and the private key is deleted after one time use. The Digital Signature Certificates are of 30-minute validity, and this makes verification simple by eliminating the requirements of revocation checking. Document that is signed using eSign will contain a valid digital signature that can be easily verified using standard methods.

MeitY in consultation with UIDAI, approved the use of online Aadhaar authentication & eKYC for issuance of DSC as specified under Rule 4 of the Aadhaar Authentication for Good Governance (Social Welfare, Innovation, Knowledge) Rules, 2020. With this, the adoption of eSign service is rapidly increasing.

8.1.3 Electronic Signatures Policy Framework

A pictorial representation and a brief description of policies applicable to CA, electronic Signature Certificate and Electronic Signature are given below:
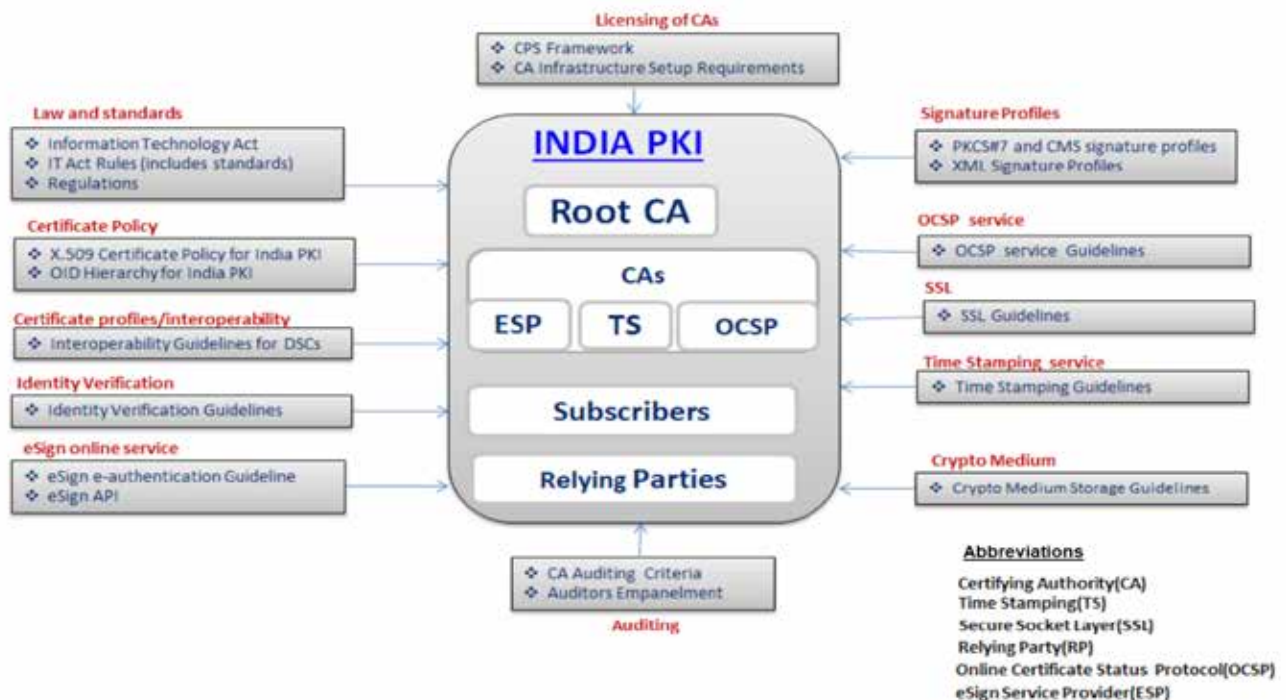
Policy Framework

- In India PKI hierarchy, have two separate trust chains one for one end-entity certificates and one for SSL. There are twenty-two Licensed CAs that are operated in different parts of the country.

- CAs are operated under single India PKI Policy. There is no separate policy for any of the licensed CA by Root CA.

- The verification requirements prior to issuance end-entity certificates are governed by Identity Verification Guidelines specified by Root CA. Licensed CAs are required to adhere to these Guidelines for issuance of any certificate.

- The certificate policy for India PKI covers the policy Id given to each class of certificates which are common across all CA and adhere to India PKI CP.

- To facilitate interoperability, Root CA has specified "DSC Interoperability Guidelines for issuance certificates under the Root Chain. A detailed specification for end entity and SSL certificates are covered under DSC interoperability Guidelines specified by Root

CA and the same is followed by each sub-CA.

- Under the provisions of IT Act, Controller to license the CAs and also to ensure that none of the provisions of the Act are violated. Audits are carried out to ensure the adherence to IT Act, 2000, the rules and regulations thereunder, and guidelines issued by the Controller from time-to-time. Auditing of the physical and technical infrastructure of CA is carried out through a panel of auditors by the CCA. The audit reports are submitted to Root CA directly by auditors. The criteria for the audit include WebTrust and CAB requirements.

- In order to establish a single national policy, Root CA has already laid down common CPS template for sub-CAs. Each CA will have their own CPS and have provided links to policy, procedure, and guidelines of Root CA. The CPS are available in the disclosure records of each CA published on the website of CCA.

8.1.4 License granted/renewed to operate as Certifying Authority

CCA grants a licence to the organization to operate as a CA, who issues DSCs to end-users. The progress in the licensing of CAs is below:
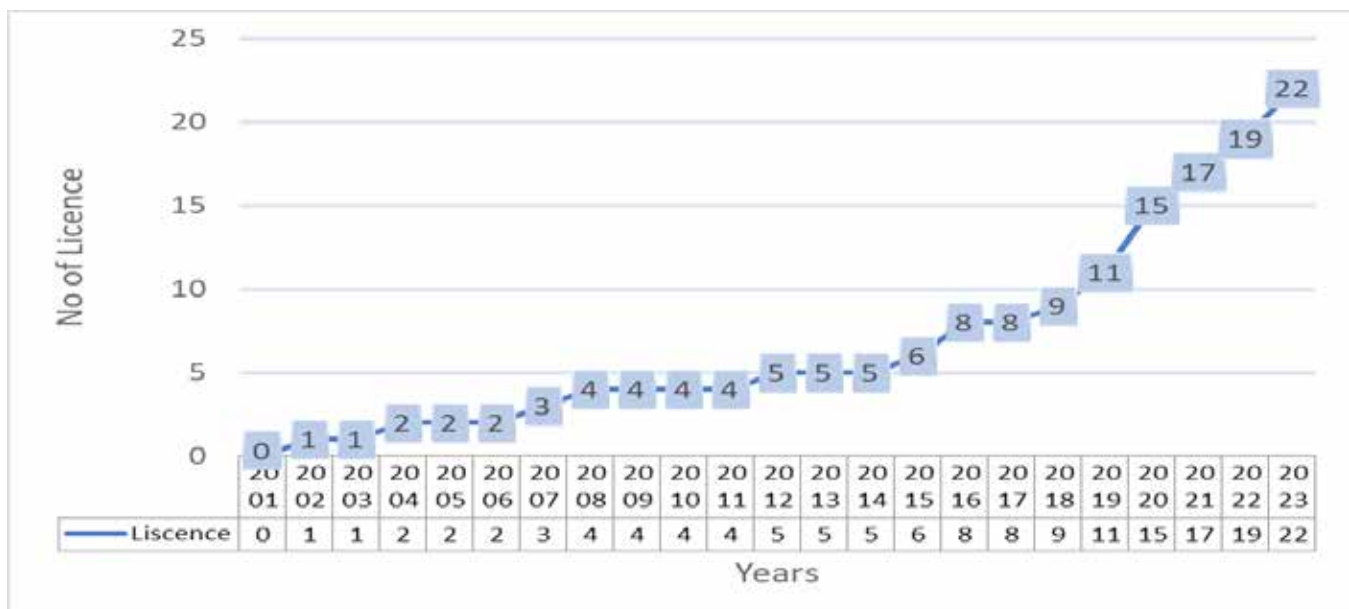
8.1.5 Services offered by CAs

The licensed CAs offer services to public depending on their Organizational policy. A brief overview of the different services offered by the certifying authorities is in the table below:

OVERVIEW OF SERVICES AVAILABLE WITH LICENSED CAS

	Licensed CAs	Class 1-3 DSCs	eSign	SSL*	Time Stamping
1.	Safescrypt	√	√		√
2.	(n) Code Solutions	√	√		√
3	e-Mudhra	√	√	√	√
4.	Capricorn	√	√		√
5.	VSign (Verasys)	√	√		√
6.	RISL (RajComp)	√	√	√	√
7.	IDSign	√	√		√
8.	Pantasign	√	√		√
9.	Xtra Trust	√	√		√
10.	ProDigiSign	√	√		√
11	SignX	√	√		√
12.	Care 4 Sign	√	√		√
13.	C-DAC		√		√
14.	Protean (NSDL e-GOV)		√		√
15.	CSC		√		
16.	CDSL Ventures		√ CDSL		√ CDSL
17.	RPSL		√		√
18.	IDRBT	√ Banks		√ Banks	√ Banks
19.	Indian Air Force	√ IAF		√ IAF	√ IAF
20.	Indian Army	√ Army		√ Army	√ Army
21.	Indian Navy	√ Navy	√ Navy	√ Navy	√ Navy
22.	IGCAR	√ IGCAR			√ IGCAR

* The Root CA Certificate of India is listed only in Microsoft products (Including IE)

CLOSED CAS

Closed CAs	Class 1-3 DSCs	SSL and Code Signing Certificates
MTNL	NA	NA
iCERT	NA	NA
TCS	NA	NA
NIC	NA	NA

8.1.6 Next Generation Public Key Infrastructure (PKI) for Smart Application

As part of its promotional role for boosting electronic transactions for e-Commerce and e-Sign application, the Office of CCA conducts awareness programmes. Training programs on Digital Signatures and PKI are continuously being organized across the country for various target audience groups. These awareness programmes are conducted across the length and breadth of the country. C-DAC, Bangalore has been identified as an awareness partner. Through a grant-in-

aid project, it has conducted various awareness programs on behalf of CCA India.

A series of Digital Signature and PKI events were organized from 8-9th September 2023 in Bangalore which included:

i.   International Conference on PKI and its Applications-PKIA 2023 (8th September 2023)

ii. International Workshop on Mutual Recognition of PKI & Digital Signatures-Indian Proposed Framework (9th September 2023)

iii. A Tech Expo was organized on 9th September 2023.

8.1.7   Digital Locker Authority (DLA)

Under the DIP, Government of India has planned to provide shareable private space on a public cloud and to digitize all documents and records of the citizens and make them available on a real-time basis. These mechanisms of 'e-Document repositories' and 'Digital Lockers' will greatly improve citizen convenience and usher in paperless transactions across the entire ecosystem of public services. The framework for the Digital Locker Ecosystem has been set up by the CCA who has been given additional charge to function as 'Controller of Digital Locker Authority (CDLA)'.

A new digital locker service providers (DLSP) data exchange model has been proposed as the existing framework of Digital locker was having a dependency on Aadhaar and usage of same was restricted by the verdict given by Supreme Court of India. This new model allows each DLSP to be in conformity to the updated Aadhaar act and still be able to provide their users access to issuer data within the Digital Locker ecosystem. Each DLSP will be free to further add more documents from these issuers to their system, while also providing

users access to documents available via MeitY DigiLocker system.

8.1.8   Initiatives-Objective undertaken by CCA

i.   **Present Initiative:**

a) ***Next Generation PKI for Smart Applications and Training (NGPKI) Programmes***

Objective: To create awareness associated with the usage of Digital Signature and its significance to assure the trust of the users. Further, to increase the usage of DSCs and to enable the trusted economy in the emerging technology.

b) ***Development of Secure Post Quantum PKI***

Objective: To develop a secure quantum-safe PKI to handle the secure exchange of electronic information for various network activities and applications such as the Financial Sector, Internet Banking, Secure email communications, software installation/updates, e-payments, e-Commerce, etc.

c) ***Open Competition for Indian Web Browser Development Challenge (IWBDC) with in-built CCA Root Certificate***

Objective: To develop a self-resilient web browser with an in-built CCA Root Certificate to enable quantum-safe Secure Sockets Layer for internet users.

ii. **Plans for Execution:**

a) ***Development of PKI-based Digital Certificates for IoT Device Security***

Objective: To develop the trusted PKI digital certificate eco-system for IoT devices

in Device Authentication, Smart Cities, UAV i.e., Drones, Automotive industry, etc., to establish a secure and trusted environment for IoT communication, data integrity, and device authentication between devices and entities. This development can be utilized in critical infrastructures and various other sensitive departments to securely authenticate their IoT device communications.

b) **Common API Platform and method to fetch the number of digital signatures signed through DSC Token**

Objective: This project is to develop the crypto token validation for the digital signature ecosystem and seamless usage, & ease of use. The Common API Platform is to be developed based on the assumption that all the DSC tokens used under the CCA will use a single API platform for doing the necessary cryptographic operations such as Digital Signature, Encryption/ Decryption, etc. The Platform is generic using which all the tokens in the market can be communicated easily without depending on specific token vendor drivers.

c) **Blockchain-based Digital Signature Certificate Validation and storage System with a Smart Dashboard**

Objective: To develop a Blockchain-based DSCs Validation and Storage System to

- Validate the DSC before its issuance by the CA to its client through Web Service;

- Record the DSC in a Blockchain-based ledger with distributed nodes and the corresponding smart contract;

- Verify a DSC stored in the Blockchain ledger on request. The application users of a DSC will be required to ensure, before registering any DSC in their database systems, that the DSC is genuine through this system. This will remove the fraudulent activities that may occur due to the submission of fake DSCs (not issued by a licensed CA).

d) **Implementation of ISO 27001 for WebTrust Compliance to Root Certifying Authority of India (RCAI)**

Objective: To establish and maintain a robust security framework that ensures the confidentiality, integrity, and availability of CCA operations and the digital certificates it issues. To ensure compliance with relevant industry standards and regulations, such as the CA/Browser Forum's Baseline Requirements and the WebTrust for CA program, and to maintain and enhance the trustworthiness of the CA by demonstrating adherence to industry best practices and security standards. Further, developing comprehensive security documents for RCAI based on ISO/IEC27000 to fulfill the requirement of illustrated controls of WebTrust, all the existing documents shall be considered and customized based on the ISO/IEC27000 and WebTrust Standard requirement for CCA.

e) **Secure Mobile based Public Key Infrastructure (PKI) solution**

Objective: A Mobile PKI solution is a system that leverages mobile devices for secure authentication, encryption, and digital signatures. PKI is a framework that uses public key cryptography to provide

secure communication, and a mobile-based PKI solution extends these capabilities to mobile platforms. Mobile PKI solutions may be widely used in various industries, including government, finance, healthcare, and corporate environments, where security and confidentiality are paramount. They provide a robust framework for securing mobile communication and transactions while ensuring that only authorized users and devices have access to sensitive data. Mobile PKI Solution has the potential to replace the currently being used "tokens", which store the signing & encryption keys.

8.2 Unique Identification Authority of India (UIDAI)

8.2.1 Introduction

8.2.1.1 The UIDAI was established to develop the policy, procedure and systems for issuing Aadhaar numbers to individuals and perform its authentication. Accordingly, it has been UIDAI's endeavour to develop policy, procedure and systems that would enable individuals to get Aadhaar numbers issued and to perform authentication to establish their identity.

8.2.1.2 UIDAI was set up through a Government notification dated 28th January 2009 as an attached office of the Planning Commission, to lay down plans and policies to implement the Unique Identification (UID) Scheme and to own, operate, update and maintain the UID database. The first Aadhaar number was issued on 29th September 2010.

8.2.1.3 Following the enactment and coming into force of the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016 ("Aadhaar Act"), UIDAI was established through a notification dated 12th July

2016 of MeitY as a statutory authority under the Aadhaar Act.

8.2.2. Relevance of Aadhaar Number

8.2.2.1 The inability to establish one's identity has been a major challenge for the poor and marginalised sections of society in accessing benefits, subsidies and services made available by the government. Given the large population of India, it was difficult to identify each and every individual. Further, with a multiplicity of agencies issuing different identity documents and government departments and agencies requiring different identity documents, every time an individual sought to avail of a subsidy, benefit or service, she or he had to undergo a fresh cycle of identity creation and/or verification, which typically entailed possession of some other documents. Such duplication of efforts and "identity silos" not only increased the overall cost of delivery of subsidies, benefits and services but was also not in the interest of furthering ease of living.

8.2.2.2 Therefore, a need was felt to create a digital identity and, to this end, the Aadhaar Act was enacted. The Act provides for good governance, efficient, transparent and targeted delivery of subsidies, benefits and services, the expenditure, for which is incurred from the Consolidated Fund of India, to individuals residing in India through assigning of unique identity numbers to such individuals and for connected and incidental matters. The objective was to harness the benefits of a unique identity for all residents, which would offer a means to detect any duplication of identity and which may be authenticated/verified in an easy, cost-effective manner.

8.2.3 Aadhaar Act

8.2.3.1 The validity of the Aadhaar Act was upheld by the Hon'ble Supreme Court in its judgement

dated 26th September 2018 in Justice (Retd.) K. S. Puttaswamy and Anr; vs Union of India & Ors; with certain observations and directions. The directions of the Apex Court were given effect to through an amending Act that amended the Aadhaar Act, the Telegraph Act, 1885 and the Prevention of Money-Laundering Act, 2002. The provisions of the amending Act came into force on 25th July 2019. Salient features of the amended provisions of law are as follows:

(a) To provide for voluntary use of Aadhaar number, only with the informed consent of the Aadhaar number holder, by authentication or offline verification;

(b) To enable use of Aadhaar authentication by State Governments as well;

(c) To provide that services shall not be denied upon refusing to or being unable to undergo authentication;

(d) To provide for safeguards and restrictions on the performing of authentication;

(e) To lay down the procedure for offline verification;

(f) To confer power upon the Authority to give such directions as it may consider necessary to any entity in the Aadhaar ecosystem;

(g) To establish the Unique Identification Authority of India Fund;

(h) To provide for civil penalties, adjudication and appeal;

(i) To omit section 57 of Aadhaar Act, which permitted use of Aadhaar for any purpose, since the same had been struck down by the Apex Court; and

(j) To allow the use of Aadhaar number for authentication on voluntary basis as acceptable

Know Your Customer (KYC) document under the Telegraph Act, 1885 and the Prevention of Money-Laundering Act, 2002.

8.2.4. Features of Aadhaar Number

Key features of Aadhaar Number are as follows:

(i) It is a 12-digit random number, generated after a process of de-duplication using biometrics to ensure uniqueness of identity;

(ii) It does not contain any intelligence and does not bear any relationship to the attributes or identity of an Aadhaar number holder;

(iii) It is created and managed using scalable technology architecture;

(iv) It operates using open source technologies; and

(v) An individual is issued only one Aadhaar number.

8.2.5 Enrolment

8.2.5.1 The enrolment process for the Aadhaar number begins with an individual seeking to enrol submitting her/his information to the enrolling agency with supporting documents for verification at any Aadhaar enrolment centre across the country. During the enrolment process, she/he is required to fill the prescribed enrolment form and submit her/his demographic and biometric information. An acknowledgement slip is given to the enrolee, containing details of enrolment and an Enrolment identifications (EID) number for tracking the status of enrolment.

8.2.5.2 UIDAI has set up a nationwide infrastructure for Aadhaar enrolment in India through a network of Registrars and accredited enrolment agencies. The Registrars are largely Government departments, agencies and public

sector banks. Enrolment agencies are selected through rigorous selection criteria. An individual is enrolled by a UIDAI certified operator through UIDAI software under a highly robust, controlled, non-repudiable and secure process. Individuals are enrolled for Aadhaar through certified operators, who are selected on the basis of a rigorous examination and test process. The operator authenticates every enrolment through her/his own fingerprints and Aadhaar number. In this manner, a complete account is maintained as to which operator enrolled whom, where and when, so that in case of any default, accountability of the enrolment operator and agency may be readily fixed. Thereafter, biometric data of enrolling persons are matched against the entire database of existing Aadhaar number holders, and only after checking that there is no match is an Aadhaar number generated. All enrolment data, including biometrics, are encrypted using a 2,048-bit encryption key at the time of the enrolment and are not accessible to any agency except UIDAI, which alone can access the data through a secure decryption key available only with UIDAI.

8.2.5.3 Enrolment for issuance of an Aadhaar number and update of identity information linked to Aadhaar number is enabled through the following (information below is as on 31st March 2024):

(a) India Post – 7,345 permanent enrolment centres (PECs);

(b) Banks – 8,278 PECs;

(c) State Government office locations – 28,838 PECs;

(d) UIDAI – 88 Aadhaar Seva Kendras (ASKs) in 72 cities across 28 States and UTs;

(e) Common Service Centre (CSC) eGovernance Services India Limited – 753 CSC ASKs (at State, district and block level); and

(f) India Post Payments Bank – 7,345 operators for mobile Aadhaar update and child enrolment services, offered using mobile Aadhaar enrolment kits.

8.2.5.4 UIDAI has taken the following major initiatives for strengthening the Aadhaar enrolment ecosystem:

(a) **Document update:** Considering that Aadhaar has emerged as the most widely accepted proof of identity and is being used to avail of numerous services by the Aadhaar number holder, for which they are required to submit their Aadhaar number linked with latest and updated identity information details, and with a view to provide them a facility to revalidate their demographic information (name, gender, date/year of birth and address), UIDAI has developed a new feature called ''document update'', which can be accessed online through UIDAI's myAadhaar portal or by visiting any Aadhaar enrolment centre and submitting copies of supporting documents evidencing Proof of Identity (PoI) and Proof of Address (PoA).

(b) **Adult enrolment:** To ensure the robustness of the enrolment process, enrolment of adults for issuance of fresh Aadhaar numbers is now done with verification by State Nodal Officers appointed by the State Government concerned, on a portal made available by UIDAI. In order to ensure proper monitoring of the enrolment and usage of Aadhaar the State Unique Identification Implementation Committees under the chairpersonship of Chief Secretaries have been reconstituted and District Level Aadhaar Monitoring Committees have been constituted.

(c) **Child enrolment:** Pursuant to the

recommendations of a committee constituted under the chairpersonship of the Registrar General of India, Aadhaar numbers of both parents are now being collected and biometric authentication of one parent or legal guardian is being done at the time of enrolment of a newborn. Further, birth registration linked Aadhaar enrolment is being promoted across the country through issuance of Aadhaar enrolment kits to operators in hospitals, with a view to ensure enrolment of newborns at the hospital itself. Moreover, the enrolment of the biometrics of children upon attaining the age of five years and the update of biometrics upon attaining the age of 15 years is offered free of charge if such enrolment/update is done within two years of attaining such age.

8.2.6 Authentication

8.2.6.1 Aadhaar authentication is the process wherein Aadhaar number, along with other attributes (demographics/biometrics/OTP) is submitted to UIDAI's Central Identities Data Repository (CIDR) for verification. The CIDR verifies whether the data submitted matches the data available in CIDR and responds with a "yes/no" or an e-KYC.

8.2.6.2 The purpose of authentication is to enable an Aadhaar number holder to establish her/his identity to the authentication requesting entity, for the purpose of getting any subsidy, benefit or service provided by or through such entity.

8.2.6.3 In both Yes/No and e-KYC authentication, the authentication requesting entity sends the Aadhaar number along with the demographic information, biometric information or mobile-based one-time password (OTP), or any combination thereof, submitted by the Aadhaar number holder, in encrypted form.

8.2.6.4 In the case of Yes/No authentication, UIDAI validates the submitted information against information stored in its database and sends a "yes" or "no" response.

8.2.6.5 In the case of e-KYC authentication, UIDAI validates the input parameters against the data stored therein and return a digitally signed e-KYC authentication response with encrypted e-KYC data.

8.2.6.6 Authentication requesting entities: All requesting entities are required to be registered with UIDAI before they may undertake authentication. Such a requesting entity is onboarded as an Authentication User Agency (AUA), enabling it to perform Yes/No authentication. In case it is to perform e-KYC authentication as well, it is also registered as an e-KYC User Agency (KUA). An AUA or KUA may, with the permission of UIDAI, appoint one or more entities as their sub-AUA or sub-KUA. All requesting entities are required to store Aadhaar numbers and any connected Aadhaar data in a separate, secure database/vault/system, called Aadhaar Data Vault.

8.2.6.7 *Authentication Service Agencies (ASAs)*: ASAs provide secure Multiprotocol Label Switching (MPLS) connectivity between requesting entities and UIDAI's CIDR.

8.2.6.8 *mAadhaar mobile application:* UIDAI has developed the mAadhaar mobile app to enable Aadhaar number holders to download their e-Aadhaar from the Aadhaar database. It also provides a number of other facilities, such as ordering a Polyvinyl Chloride (PVC) Aadhaar card, scanning of the secure Quick Response (QR) code on an Aadhaar card/ e-Aadhaar/ Aadhaar letter, download of paperless offline e-KYC in Extensible Mark-up Language (XML) format, etc.

8.2.6.9 *Face authentication:* Smartphone based face authentication, which uses AI technology,

has been introduced with effect from on 15th October 2021. This offers a touchless biometric authentication alternative to fingerprint or iris based biometric authentication. As of 31st March 2024, 71 entities have commenced using face authentication.

8.2.6.10 As on 31st March 2024, there are 199 AUAs, including 191 KUAs, and 22 ASAs. 2,094.65 Crore authentication transactions have been performed since inception, including 1886.75 Crore e-KYC transactions.

8.2.7 Security Measures

8.2.7.1 UIDAI uses advanced encryption technologies for protecting data in transmission and storage. UIDAI's Information Security Management System is ISO 27001:2013-certified. Further, the CIDR has been declared as a protected system under section 70 of the IT Act, 2000 and the National Critical Information Infrastructure Protection Centre provides key security inputs on an ongoing basis to maintain its cyber security posture.

8.2.7.2 A leading global firm has been engaged to facilitate the creation of a framework for the Governance, Risk, Compliance and Performance of the Aadhaar ecosystem and oversight of the same for adherence to the framework, with a view to ensure a robust, comprehensive and secure environment.

8.2.8 Customer Relationship Management

8.2.8.1 UIDAI has set up an Aadhaar Sampark Kendra as the central point of contact for resolution of queries and grievances of Aadhaar number holders, accessible through the toll-free number 1947 and the email address help@uidai.gov.in. The contact centre has a mechanism to log queries and grievances and provide Aadhaar number holders with a unique reference number for tracking till closure of the matter. It also offers support in major regional languages.

8.2.8.2 The customer relationship management system of UIDAI supports multiple channels, *viz.,* phone calls, email, chatbot (Aadhaar Mitra), web portal, seven major social media channels, letters and walk-in as the means through which grievances may be registered, tracked and resolved.

8.2.9 Details of budget and expenditure for the financial year 2023-24

8.2.9.1 During the financial year 2023-24, UIDAI has been allocated grant-in-aid of ₹800 Crore. Expenditure of ₹1,396.04 Crore has been incurred against this till 31st March 2024. This includes the expenditure met from UIDAI Fund in addition to grant-in-aid released by MeitY.

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Attached Offices and Societies

9.1 Centre for Development of Advanced Computing (C-DAC)

C-DAC is a premier R&D organization under the Ministry of Electronics and Information Technology (MeitY). The organization focuses on applied research, design/development and deployment of innovative IT and electronics solutions for various key sectors.

The core research and development areas of C-DAC includes High-Performance Computing, Quantum Computing, Digital India RISC-V (DIR-V) and Strategic Electronics, Multilingual Computing and Heritage Computing, Cyber Security & Cyber Forensics, Software Technologies including FOSS, Healthcare Technologies and Education & Training. C-DAC Advanced Computing Training School (ACTS) is a well-known brand in the area

of High-end training in Electronics and IT in the country.

In the year 2023-24, C-DAC achieved notable progress in the areas of electronics and information technology through extensive research and development. The organization successfully created and implemented a range of solutions, while also establishing collaborations with renowned organizations at both national and international levels. Additionally, C-DAC played a major role in providing training opportunities and organizing various events, conferences, workshops, etc.

Key technological achievements of C-DAC during the year in each of its focused areas are outlined below.

9.1.1 National Supercomputon Mission (NSM)
The Details are available at para. 5.1.1

9.1.1.1 HPC Systems Deployed under NSM

(Details are available at para 5.1.1.1)

9.1.1.2 Indigenous HPC Technologies under NSM (Details are available at para 5.1.1.2)

9.1.1.3 Application Porting, Optimization and Scaling

300+ applications/ libraries/ tools in molecular dynamics, computational fluid dynamics, weather prediction, material science, computational chemistry, bioinformatics, physics, ML, DL, and other domains were deployed on NSM sites. System acceptance tests were completed for NSM Systems at multiple sites.

ANUGA hydrodynamic model for flood prediction, was optimized on Intel Cascade Lake cluster to produce timely flash flood forecasts in Mahanadi delta. The simulated output was verified using ground observations and microwave sentinel satellite data. Optimizations were carried out for Mahanadi delta with mesh resolution of 900 square meters, 300 square meters and 100 square meters.

Resnet152 inference benchmarks were explored on Rudra Server for cloud setup. Objective was to compare performance of RUDRA server cloud instances to AWS cloud instances. For OV-FP32 precision, OpenStack on Rudra and AWS performed alike.

9.1.1.4 Early Warning System for flood prediction in river basins of India

A geospatial portal SimInu (Simulation of Inundation) was developed to disseminate flood early warning information to disaster managers, enabling them to take timely & informed decisions. It boasts of a significant lead time of around 2 hours to forecast flood for next 48 hours. Flood forecast (inundation and water level) information

is available on-click over interactive map.

Tapi river basin was also simulated for flood spread and depth estimation, at the request of the user agency. The daily outputs included a 2-day flood forecast in the form of Village level percentage inundation maps and Water level information, which was shared with Central Water Commission. The simulated output was validated using ground observations and microwave Sentinel satellite data. The accuracy of the outputs varied to the tune of 80-85%, depending upon the changes in base topography.

9.1.1.5 GIS based significant initiatives leveraging HPC

a. **Multi-sectorial simulation and science-based decision support framework**

Integrated meteorology, air quality and hydrology system aim at coupled modeling with urban parameterization, urban canopy, UHI, boundary layer, data assimilation of atmospheric, chemical and morphology data with business as usual and what-if scenarios test bed and interoperable cross-sectorial data, metadata and query framework. It has a multi-scale, multi-disciplinary modeling ecosystem for setting up WRF model for daily weather forecast, heavy rainfall events, Sensitivity analysis and setup model for heat wave forecast over Pune, Bhubaneswar, and Bengaluru.

b. **A HPC Software Suite for Seismic Imaging to aid Oil & Gas Exploration**

SeisRTM, is the Reverse Time Migration (RTM) software for seismic imaging of complex structures under the earth. It is developed to perform RTM using Conventional Wavefield Saving and boundary Wavefield Saving. It

includes enhanced utilities such as creating 2D geometry, 2D interpolation, conversion of binary model files to SEG-Y format, smoothing, padding, muting, stacking, frequency analysis, wavelet generation, etc.

c. Forest Fire Detection for North-East

The forest fire spread simulation has been carried out using the WRF SFIRE open-source model. The experiments were conducted to optimize the model performance to forecast the next 24 hours of wildfire spread in around 2 hours 15 minutes of time. Fuel data is being compiled and same will be tested for forest fire spread simulation.

The forest fire spread simulation was carried out in collaboration with Forest Department, Sikkim, for a live fire occurred on 12 March 2024. Forest department found it useful in fire response activities and saving the forests from burning.

d. Human Resource Development

Under NSM, more than 20,000 next generation of HPC aware manpower have been trained including students, researchers, and faculties through the organization of Faculty Development Programs, Workshops, Bootcamp, and Hackathon.

9.1.1.6 Artificial Intelligence

PoC for implementation of AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT)

C-DAC has realized Proof of Concept (PoC) for AIRAWAT of 200 AI PFLOPS. It acts as a common computational cloud platform for Big Data Analytics and Assimilation with a large, power-optimized AI cloud infrastructure connecting all Centers for Research Excellence in AI (COREs), Indian Centers for Transformational AI (ICTAIs) and other Academic, Research Labs, Scientific Community, Industry and Start-Ups institutions with NKN. Along with PARAM SIDDHI–AI system, installed earlier, HPC-AI infrastructure of AIRAWAT PoC makes the cumulative compute capacity of 410 AI PFLOPS.

9.1.2 National Level Initiatives

9.1.2.1 Digital India RISC-V Program (DIR-V)

In furtherance of the vision of AatmaNirbhar Bharat and positioning India as the global hub for Electronics System Design and Manufacturing, Govt. of India MeitY launched the Digital India RISC-V (DIR-V) Program with the aim of developing a portfolio of RISC-V based Microprocessors and its compute ecosystem.

C-DAC has successfully completed the design and development of the VEGA series of microprocessors including India's first indigenous 64-bit multi-core RISC-V based Superscalar Out-of-order Processor. The VEGA series comprise of 32/64-bit Single/Dual/Quad Core Superscalar Out-of-Order high performance processor cores based on RISC-V Instruction Set Architecture along with a robust ecosystem. Five processors are currently available in the VEGA series. The first VEGA microprocessor-based SoC chip 'THEJAS32', a 32-bit Single core SoC has been successfully fabricated and available.

A series of fully indigenous "Made in India" development boards named "ARIES" have been built upon the RISC-V ISA-compliant VEGA Processors comprising easy-to-use hardware and software for the development of embedded systems for a wide range of applications including Sensor fusion, System supervisors, Remote sensors, Small IoT devices, Toy and electronic education equipment, etc. The VEGA SDK provides a full ecosystem with

numerous examples and support documentation.

'THEJAS64' a 64-bit Single core SoC chip has been fabricated at the Indian foundry SCL, Chandigarh and die level testing completed. The design implementation of 'DHRUV64' 64-bit Dual core SoC ASIC is in progress. 'DHANUSH64' 64-bit Quad core SoC variant is under development.

9.1.2.2 Emergency Response Support System (ERSS)

Emergency Response Support System (ERSS) is the vision of Govt. of India to launch a nationwide, unified emergency response system with a single emergency number '112', for all kinds of emergencies and distress calls from across the country. The ERSS system is integrated with Police, Fire, Medical and Disaster management systems for providing emergency dispatch services to the person in distress.

ERSS system also facilitates seamless integration with other emergency support services such as CHL-1098 and WHL-181, for which C-DAC is currently the Total Service Provider (TSP). Automation of Child Helpline-1098 (CHL), Automation of Women Helpline-181(WHL) and their integration with ERSS-112 are two projects under the schemes - Mission Vatsalya and Mission Shakthi of Ministry of Women & Child Development (MoWCD), Govt. of India. A web-based solution for automating the CHL/WHL services is developed indigenously by C-DAC and is deployed in all the States/UTs where the new CHL/WHL system is installed.

In ERSS Phase II, the focus is on continual improvement introducing highly scalable and robust, mobile and web-based system, intelligently tuned to the field requirements of state police departments.

9.1.2.3 National Mission on Power Electronics Technology (NaMPET-III)

NaMPET is a National level R&D Programme facilitating Research, Development, Deployment, and Commercialization of Power Electronics Technology. Under the NaMPET programme, the following are the activities undertaken by C-DAC during the period.

- Wide Band Gap (WBG) based state-of-the-art Power Conditioner @25kW for Microgrid is commissioned and field operation inaugurated by Secretary, MeitY at Elephant Rehabilitation Centre, Kottoor, Kerala.

- C-DAC Vehicle Control Unit (VCU) technology powering more than 1500 Trains both in the Passenger and Freight category.

- Smart Energy Meter (SEM) technology has been accepted by 12 Industries and M/s GEPDEC, Noida cleared IS certifications and started pilot production and deployment initiated in KSEBL distribution. Deployment in Military camps with CERTIN Certification for C-DAC SEM and AMI is initiated. The first SEM platform with a DIR-V VEGA processor is developed and verified for functionality.

- Commercial turnkey deployments of 1 MegaWatt Power Plant and 48VDC powering for 5 storied building with C-DAC technologies are getting commissioned for ANERT and KDISC

9.1.2.4 Chips to Startup (C2S)

Chips to Startup (C2S) Programme was initiated by MeitY from January, 2022 onwards with an aim to train about 85,000 specialized manpower over a period of 5 years in VLSI and embedded system design. The programme is envisaged to leapfrog in ESDM space by way of inculcating the culture of System-on-Chip (SoC)/Reusable hardware IPs/

System-level design at bachelors, masters and research-level and act as a catalyst for growth of Startups involved in fabless design.

C2S Programme of MeitY is the fourth phase (Phase-IV) under the Special Manpower Development Programme (SMDP) primarily aimed at developing specialized manpower in VLSI Design (successively at BE/BTech, ME/MTech, and PhD levels) as well as developing IPs/ASICs/ SoCs/systems/sub-systems in academic/research institutes utilizing ASICs/ICs developed in-house for identified societal applications.

The programme envisages to have about 100-120 nos. of participating institutions across the country that would be supported for developing proof-of-concept (PoC)/ working prototypes/ electronic systems at various TRLs by way of providing fiscal support and resources such as EDA tools (through remote access of EDA tools grid network), chip fabrication support, prototype design using FPGA boards, etc.

C-DAC, Bangalore is the Programme Coordination Institution for the overall implementation of the C2S programme. 100 Institutes and 13 Start-ups/ MSMEs have been selected based on Call-For-Proposals.

9.1.2.5 Design Linked Incentive (DLI)

The Design Linked Incentive (DLI) Scheme aims to provide financial incentives as well as design infrastructure support across various stages of development and deployment of semiconductor design for Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design with an aim to achieving significant indigenization in semiconductor and electronic products and IPs deployed in the country. The target segment for the scheme covers Startups, MSMEs, and Domestic Companies.

C-DAC, Noida is the Nodal Agency for the implementation of the DLI Scheme. The third roadshow was organized by C-DAC & MeitY in 2023 in the presence of Shri. Rajeev Chandrasekhar, Hon'ble Minister of State for Electronics & Information Technology and Skill Development & Entrepreneurship, Govt. of India aiming to stimulate the next-gen Semiconductor Designers, Promote the culture of Co-development and joint ownership of IPs with active industry participation and Indigenously Develop Semiconductor Chips for Automobile, Mobility, Communication & Computing.

As on March 2024, a total of 38 applications were received for financial support under DLI and 29 applications were received for access to the EDA Tools from the National EDA Toolgrid setup at ChipIN centre. So far, 21 applications for financial support have been evaluated and 11 applicants have been approved for financial support. 24 applicants have been approved for access to the EDA tools from ChipIN.

9.1.3. Quantum Computing

9.1.3.1 Metro Area Quantum Access Network (MAQAN)

MAQAN projects aims to setup a quantum network at Chennai with an aim to field demonstrate secure key generation, key management and secure data communication. The MAQAN consortium recently demonstrated a Quantum Network testbed in a 1 x 2 topology. Cryptographic keys were generated through Coherent-One-Way (CoW) Quantum Key Distribution (QKD) protocol between indigenously developed QKD transmitter (Alice) and a QKD receiver (Bob). The generated quantum secure key was then used for video transmission over a classical communication link. The 1 x 2 topology consists of transmitters at IIT Madras, SETS Chennai, and receiver as a central hub at the ERNET office at IITM Research Park. MAQAN network is managed through a Software Defined Networking (SDN) enabled user application.

9.1.3.2 QSim - Quantum Computer Simulator Toolkit

QSim allows researchers to explore and develop Quantum algorithms and applications. It provides realistic simulator considering effects of noise. Project is being executed collaboratively by C-DAC, IISc Bangalore and IIT Roorkee. QSim is accessible via web portal and has 6000+ active users. It is also available as a standalone system as PARAM SHAVAK QSim. The indigenous simulator is also ported for running quantum simulations on GPU platform.

9.1.3.3 Quantum Network Simulator

The Quantum Network Simulator has been developed under the project "High Performance Programmable Simulation Framework for Quantum Network / Internet Communication". This tool can efficiently simulate the communication of quantum information over quantum networks. It can be used for modelling quantum networks and study the performance of different quantum network protocols, topologies and configurations.

9.1.3.4 Centre of Excellence in Quantum Technology

Centre for Excellence in Quantum Technology (CoE-QT) project aims to lay a solid foundation for the field of Quantum technology in India, with a focus on the development of quantum processor, quantum communication, and quantum sensing solutions, study of quantum interactions, quantum algorithms, and post-quantum cryptography. It is a collaboration along with the Indian Institute of Science (IISc) and Raman Research Institute (RRI), Bangalore.

C-DAC has developed an Arbitrary Waveform Generator (AWG) in both baseband and microwave regime. The microwave signal generator features eight 14-bit 6.554 GSPS DACs, consisting of both four single-ended and four differential outputs, facilitating precise waveform generation within the 4-4.5 GHz range.

9.1.4 Strategic Electronics

C-DAC has developed various systems of strategic importance to the nation's Defense, Space and Atomic Energy programs with features like interoperability, resilience, scalability, modularity and robustness. The following are the key activities undertaken by C-DAC in Strategic Electronics during the period.

- C-DAC is associated with ISRO in developing and supplying indigenously developed technologies for qualification tests of various stages of the ISRO mission programs. The products Ultrasonic Solid-propellant Burn Rate Measurement System (USBRMS), Sonic Ultrasonic Non-Destructive Test System (SoUNDS) and the Integrated Telemetry Simulation unit developed by C-DAC in collaboration with ISRO have been used in mission 'Chandrayan-3' & Aditya-L1 or qualification tests for various stages of the system. These include precise measurement of burn rate of booster stage propellants, thickness measurement of booster stage rocket insulation layer, propellant inhibition layer etc., bonding integrity testing of acoustic sound foam used in orbiter and lander modules. And also used for flaw detection of various components used in cryogenic unit and payload adapter unit.

- DRDO awarded mission mode project VARUNAMAALAA (Offshore Buoy System and Onshore Data Reception Centre) to C-DAC. This project aims a string of installations at various parts of sea surrounding Indian subcontinent for 24x7 networked wide area surveillance and external threat monitoring.

- Precision Instrumentation Amplifier (PRIAMP), designed and developed by C-DAC, was handed over to ISRO at a function held at Satish Dhawan Space Centre, ISRO, Sriharikota in the backdrop of the Aditya-L1 mission. The product PRIAMP is a high accuracy instrumentation amplifier for the measurement of critical parameters like thrust, pressure, displacement, and firing current among others. PRIAMP is a mission-critical equipment for Static Firing Testing of rockets, which was designed and developed based on the requirements provided by ISRO.

- User evaluation trial of Echo sounder for EKM class of submarine has been successfully completed in the Bay of Bengal in the submarine INS Sindhushastra. Indian Navy has been conducting the sea trial of the equipment for the last one year continuously under various sea conditions and now Indian Navy accepted the system. Submarine Echo Sounder is a navigational system to measure depth below keel upto 10000 mtrs and can operate up to a depth of 300 mtrs.

- C-DAC has developed, installed, and successfully completed the user evaluation trial of Electromagnetic Transducer for the Electromagnetic LOG system installed in Naval ships.

9.1.4.1 Intelligent Transportation Systems

C-DAC is successfully completed InTranSE Phase-II project in collaboration with IIT Bombay, IIT Madras, and IISc Bangalore. The Proof-of-Concept implementation and demonstration were completed for the following products and are currently ready for deployment.

- On-board Driver Assistance and Warning System (ODAWS)
- Millimetre wave radar
- IMU sensor (gyroscope, accelerometer, and GPS)
- ODAWS Software
- Bus Priority System (BPS) with BPS algorithm
- A mobile app-based Departure Time Traveller
- Fleet Management System (FlexiFleet)
- A mobile app-based Personalized Transit Route Guidance System (PRTGS)
- A web-based app for Operational Strategy to Headway Reliability of Public Transport Buses (OSHR)
- CMOS-based Industrial Smart Camera
- Industrial 10GigE CMOS Camera
- Online Sucro Crystal and Imaging System
- Thermal smart camera with road traffic application
- Traffic Controller Interface (TCI) Hardware
- Imaging and Vision Development Tool (IVDT) tool
- Development of Common Service Layer based on Global standard for ITS (CoSMiC)
- Desktop-based low-cost driving simulator integrated with a general-purpose traffic simulator

Technology Transfer of the following products has been carried out with the industries

- Thermal smart camera - 9 companies
- Industrial 10 Gig camera - 1 company
- FlexiFleet, PTRGS & OSHR - 4 companies.

C-DAC has undertaken the activity of preparation of Detailed Project Report for Intelligent Traffic Management System (ITMS) project of Delhi Police/ MHA and successfully completed.

9.1.4.2 The National Program on Agriculture and Environment Electronics (AgriEnIcs)

AgriEnIcs

As part of AgriEnIcs project, following products were developed and deployed for field trials:

- Go-Paryavekshak (Go-P) is a Cattle health monitoring device deployed at ICAR-NDRI, Kalyani.

- Mastitis disease detection device is also deployed at ICAR-NDRI, Kalyani.

- GrainEx is a multi-grain analysis device deployed at ICAR-IARI, New Delhi and BAU, Ranchi.

- CT-Vieu is a chili quality analysis device already developed.

- Robotic Apple Harvester is deployed at SKUAST, Kashmir.

- Poultry Environment monitoring device is installed at ICAR-DPR and two commercial poultry farms (one Broiler and one Layer farm).

- AQ-AIMS v1.0 is an Air Quality monitoring device, whose technology has been transferred to M/s J M Envirolab Pvt. Ltd.

AquaSURAKSHA

AquaSURAKSHA is a bio-sensing device for the detection of pesticide residues in aquatic environments, whose technology was transferred to M/s Arogyam Medisoft Solution Pvt. Ltd.

9.1.5 Solutions for Smart Cities

9.1.5.1 Delhi Safe City Project

Safe city is the vision of the Ministry of Home Affairs (MHA), Govt. of India, to launch CCTV Surveillance at public places to aid Delhi Police to combat women safety related challenges in Delhi and at the same time reducing the overall criminal activities in the city.

Civil and Infra, electrical work and installation of Non-IT and IT component is being completed in Data Centre (DC) and Command and Control Centre at Police Headquarters (C4i). 16 District Command and Control Centres (C3is) and 180 Command and Control Centres (C2is) at Police Stations are ready with all civil infra, electrical work, and IT infra installed. Configuration and integration of various software including integration of identified Databases of national importance and Delhi police into the Safe City Project is in progress. Commissioning of the pilot phase is expected during December 2023 and overall project commissioning is expected to complete by July 2024.

9.1.5.2 Smart Water Meter, Smart Energy Meter

Smart Energy Meters and Smart Water Meters are the two key elements of smart cities and utilities. A single-phase smart energy meter compliant to BIS IS16444 standard has been designed and developed at C-DAC. This device has 4G-LTE based cellular connectivity and supports various features like net-metering, pre-paid metering, remote connect/disconnect, tamper detection, onboard LCD, optical port, etc. This indigenous device is also equipped with the in-house developed IS15959 (DLMS/COSEM) protocol stack. Along with the smart energy meter, a complementing AMI (Advanced Metering Infrastructure) comprising of the HES (Head-End System), MDMS (Metering Data Management System) and UBS (Unified Billing System) developed at C-DAC makes it a complete solution.

A highly accurate, reliable, and robust, ultrasonic smart water meter with ultra-low power LoRA wireless connectivity has been developed at C-DAC. This device measures the water consumption at the customer premises which collectively helps to monitor, control, and manage the water distribution network in a more efficient manner, and ultimately leads to assuring the availability of water to each and every citizen.

9.1.6 Language Computing and Heritage Computing

9.1.6.1 Speech Technologies for North-Eastern Languages (STNEL)

C-DAC in collaboration with IIT Madras, IIT Guwahati, NIT Manipur, and IIIT Siri City is working on speech technologies for Northeastern languages, which is a sub project under consortium-based umbrella project "Speech Technologies in Indian languages" under NLTM. As part of the activity, C-DAC is working on the task of data collection in Nepali language, curation of datasets in Bengali language, and development of KWS systems in these languages.

9.1.6.2 Development and Deployment of Scalable Speaker Recognition Technology in Different Applications

C-DAC in collaboration with IIT Madras, IIT Dharwad, IIIT Dharwad, NIT Patna, NIT Manipur, KLE Tech University, and KL University is working on "Development and Deployment of Scalable Speaker Recognition Technology in Different Applications", as a sub-project under consortium-based umbrella project "Speech Technologies in Indian languages" under NLTM. As a part of this activity, C-DAC is working for the task of Forensic Speaker Recognition.

9.1.6.3 Speech Enabled Multilingual Chatbot

C-DAC has developed a Speech Enabled Multilingual chatbot that takes input in both speech and text forms and provides responses in both speech and text forms. It understands the user's intent and provides responses based on the predefined answer, or it creates answers based on business rules, data, etc. It uses Natural Language Processing techniques to process language, enabling them to understand human speech. The system is capable of handling predefined common queries such as inquiries about business/product/ service, tracking details/status, FAQs, etc. This system has been developed as a part of the 'Speech Technologies in Indian languages' sub-project under the Project titled 'National Language Translation Mission (NLTM): BHASHINI'.

9.1.6.4 Integration of Kanthasth 2.0 with e-office

Kanthasth 2.0 is a machine translation system that helps in the translation from English to Hindi and vice versa and currently more than 13 thousand are using it by various Ministries, departments, PSU, banks, etc. E-Office for NIC (Digital Workplace) is the medium to achieve Simplified, Effective, and Transparent working in Government offices. This facility of machine translation is being provided by the Department of Official Language with the help of C-DAC.

On the occasion of Hindi Diwas Samaroh-2023 and 3rd Akhil Bhartiya Rajbhasha Sammelan held at Pune, Maharashtra on September 14-15 2023, Honourable Union Minister of State, Shri Ajay Kumar Mishra, Dy. Chairman, Rajya Sabha, Shri Harivansh Narayan Singh launched Kanthasth 2.0 service with E-Office. Kanthasth 2.0 Mobile app was also launched by the Union Minister of State for Home Affairs, Shri Ajay Kumar Mishra and Union Minister of State for External Affairs, Shri V. Muraleedharan in the 12th World Hindi Conference at Fiji by the Ministry of External Affairs, Government of India in association with the Government of Fiji.

9.1.6.5 HIMANGY (HIndustani Machini ANuvaad TecholoGY)

C-DAC is working on English-to-Indian Language Machine Translation and among Indian language pair namely Machine Translation System from English to Indian Languages [Hindi, Marathi, Odia, Gujarati, Kannada and Malayalam] and vice versa, HIMANGY (HIndustani Machini ANuvaad TechnoloGY): a bi-directional Indian Language to

Indian Language Machine Translation for Hindi to Punjabi, Telugu, Urdu, Gujarati, Kannada, Odia, Kashmiri, Sindhi, and Dogri. Baseline systems for bilingual translation are trained, a parallel corpus is compiled and generated, and shallow parsers are developed.

9.1.6.6 VIDYAAPATI: A Bidirectional Machine Translation system for Bengali, Konkani, Maithili, Marathi, and Hindi

C-DAC is working on a Machine Translation project, Vidyaapati: A Bidirectional Machine Translation System involving Bengali, Konkani, Maithili, Marathi, and Hindi using the Neural Machine Translation (NMT) framework. It aims to create linguistic resources in the domain of Admin, Law, and Education, etc., establishing benchmark data, defining evaluation standards, creating corpora, and implementing the Machine Translation (MT) system for all stakeholders involved. For Hindi-Bengali, Hindi-Marathi, and vice versa pair of around 10000 and 7000 corpora has been collected and translated along with domain identification of approx. 3000 English-Hindi sentences.

9.1.6.7 National Knowledge Portal "The Repository - Indian Textiles and Crafts (RTC)"

As a part of the 9th National Handloom Day celebrations on 7th August 2023 held at Bharat Mandapam, Pragati Maidan, Delhi, the Hon'ble Prime Minister of India, Shri. Narendra Modi has launched the National Knowledge Portal "The Repository - Indian Textiles and Crafts, developed by C-DAC with a project funded by the National Institute of Fashion Technology (NIFT), New Delhi. The aim of this knowledge portal is to provide an interactive digital platform for showcasing the creativity, diversity, & and rich traditions of Indian textiles, clothing, and crafts.

9.1.7 Health Informatics

9.1.7.1 Telemedicine Solutions

9.1.7.1.1 eSanjeevani

eSanjeevani, National Telemedicine Service has evolved into world's largest document telemedicine implementation in primary sector, it has been developed, deployed and operationalized by C-DAC. This mammoth cloud-based telemedicine platform is based on microservices architecture.

National organizations like ESIC, CGHS have also onboarded eSanjeevani to provide remote health service to their beneficiaries. eSanjeevani2.0 mobile android app has also been made available on Google Play Store and Apple's Appstore for Practitioners, Providers, and Patients.

eSanjeevani has served more than 164 million patients. This service operates at 1,36,871 Health and Wellness Centres (HWCs) as spokes, which are served by 14,083 Hubs and 238 online OPDs service the IT savvy urban populace. Over 1,94,230 practitioners including doctors, medical specialists, and super-specialists, as well as healthcare workers use the platform. Considering the scalability and the ruggedness of 'eSanjeevani', MeitY, Govt. of India has offered it to the world as a Digital Global Good as a part of India Global Stack.

9.1.7.1.2 Mercury™ Nimbus Neo Suite

Mercury™ Nimbus Neo Suite is a cloud-enabled Telemedicine, TeleICU, EMR/EHR-centric teleconsultation solution that can scale from clinic to multi-hospital deployment scenarios. Mercury™ Nimbus solution to offer reliable Telemedicine-related services by leveraging 5G connectivity. The solution is analyzed using in-house developed 5G simulation environments and CEWiT, IIT Madras 5G testbed. Mercury™ Nimbus Solution continued its TeleICU and Telemedicine services to Odisha state and NTPC Ltd.

Under the Odisha Telemedicine network, 05 state specialty hospitals are connected with 30 district hospitals and 13 e-ICU centers to provide consultation to the remote patient where approximately 29,000 Teleconsultations have been carried out to date.

In the NTPC Telemedicine network, 17 remote NTPC sites were connected with 02 specialty centers benefiting NTPC employees and their families. Approximately 8,000 Teleconsultations have been carried out.

9.1.7.2 Healthcare Solutions

9.1.7.2.1 e-Upkaran

e-Upkaran is a web-based Equipment Management and Maintenance System for the Management and Maintenance of Biomedical Equipment in the healthcare system of the country. With the inclusion of AMSCL (Assam Medical Services Corporation Limited) Assam, and KSMSCL (Karnataka State Medical Services Corporation Limited) Karnataka, e-Upkaran deployment tally has increased to 13 Instances in India covering 12 States and 01 Union Territory.

9.1.7.2.2 e-Aushadhi

C-DAC's e-Aushadhi is a web-based Supply Chain Management System for the distribution and supply of drugs and vaccines in the healthcare system of the country. During this year, with the inclusion of Andaman & Nicobar, Chandigarh and Ladakh, e-Aushadhi deployments in India have grown to 31 instances, with 17 States having a single instance each, 01 State having two instances, 06 Union Territories, 05 National Programs under the MoHFW, and 01 Program under the DGAFMS, Ministry of Defence.

9.1.7.2.3 e-RaktKosh

e-RaktKosh is a centralized Blood Bank Management System. It is a comprehensive IT solution for streamlining the standard operating procedures, guidelines, and workflow of blood banks complying with EHR-2016 standards and ABDM milestones. It has citizen centric portal and mobile app to provide the information regarding nearest blood bank and availability of bloods. e-RaktKosh has onboarded 3,500+ blood banks across 36 States and UTs in the country. e-RaktKosh has integrated with State Portals / HMIS, PayTm, Arogya Setu, etc, it is also integrated with Govt. of India e-Pramaan & e-Prayaas to provide the singe sign-on.

9.1.7.2.4 e-Sushrut

e-Sushrut is a full-fledged Hospital Management Information System that provides an indispensable mechanism for digitizing and streamlining the workflow of various hospital services.

At Present e-Sushrut HMIS is being used by more than 3000+ Health Facilities in India. e-Sushrut HMIS-Railways has accomplished an extraordinary milestone by generating a staggering 13.3 million digital e-Prescriptions within just two years of its launch.

9.1.7.3 Assistive Research in Health

9.1.7.3.1 Mental Health and Normalcy Augmentation System (MANAS)

"Mental Health and Normalcy Augmentation System" (MANAS) is a comprehensive and scalable digital wellness platform, with a national scope, initiated and funded by the Office of the Principal Scientific Adviser (PSA) and endorsed by The Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC), Government of India.

At present, the MANAS app is available for both Android and Apple phones and is supported with English and Hindi language. The App is rolled

out at Maharashtra University of Health Sciences (MUHS), Maharashtra, and Central Institute of Psychiatry (CIP) Jharkhand, and proliferated to nodal agencies like (Nation Health Mission NHM) Chhattisgarh, Lokopriya Gopinath Bordoloi Regional Institute of Mental Health (LGBRIMH) Assam. Additionally, MANAS promotes mental well-being through the 'ManasMitra' webinar series conducted in collaboration with various stakeholders, nodal agencies, and Rural Technology Action Group (RuTAG) members.

In continuation with the efforts in mental wellness and wider outreach, C-DAC completed MANAS WeConnect program under the aegis of O/o PSA, which is the first of its kind in India to conduct MANAS Codeathon in order to sensitize young Indians towards mental wellbeing, nurture their innate potential, and give them a unique opportunity to contribute for mental wellbeing.

9.1.7.3.2 DISAAA - An Integrated Solution for Automatic Assessment of Autism

C-DAC has indigenously designed and developed in collaboration with NIEPID, an Automatic Assessment Tool for the specially enabled to detect traits of Autism using Visual Attention (both Attention Analysis and Eye Gaze), Facial Expression and Vocal Emotion Recognition. The tool is based on Deep Learning based Artificial Intelligence (AI) technique for classification and Machine Learning based algorithms for accurate quantification of intensity (degree) of attention, expression, and emotion. The system helps in determining the cognitive level of a child and assists in improving the cognitive aspect through the affective components of emotion of people with Autism Spectrum Disorder (ASD). Under the initiative, three ICT-based labs at NIEPID Kolkata, Noida, and Secunderabad have been setup and deployed for children with autism for analysis.

9.1.7.3.3 e-Courses & IT-enabled Training in Health & Medical Science education for NER Medical colleges and HCW's [Health Care Workers]

C-DAC has established and deployed the MEeT (Medical Education with e-Technology) online platform, and mobile app to deliver online courses and impart professional training in Medical Science Education. This is being done in collaboration with AIIMS, Delhi, wherein C-DAC is the Technology Enabler and AIIMS Delhi is the Knowledge partner.

A total of 10500+ medical students /HCWs have enrolled and are accessing the courses from primarily 268 medical colleges including 8 NER medical colleges. The courses will continue to be provided to the Medical fraternity from more medical colleges and with the addition of newer courses in IT and Medical Science.

9.1.8 Cyber Security and Cyber Forensics

9.1.8.1 Unified Blockchain Framework

National Blockchain Framework (NBF) is a Technology Stack that is designed for end-to-end Blockchain application development. It hosts several components such as a dashboard for automated network setup, a generic smart contract layer, authentication and authorization functions, certifying authority, and a set of Open APIs for accessing through Web and Mobile applications.

As part of project, 4 patents and 28 Research Papers are published. Infrastructure for the NBF is set up at two Data Centres. The NBF is being used in the design and development of blockchain-enabled consent framework to support the UIDAI attendance system, Blockchain-enabled eStamp solution (BCStamps) for security printing and minting corporation of India (SPMCIL), and Blockchain based Certificate Issuing Solution for the National Police Academy.

9.1.8.2 GHOST: Generation of In-House Secure Trusted Elliptic Curve

Ghost is a Cryptographically Secure and Trusted Elliptic Curve Generation tool indigenously developed at C-DAC. Ghost generates elliptic curves over arbitrary prime field sizes for scalable security in a transparent and well-explained manner.

At present, National Security Council Secretariat (NSCS) office through the Indian Army is evaluating GHOST Evaluation Report of the NIST P-256 elliptic curve for review and decisions. GHOST tool is now deployed at the Signal Unit of the Indian Army at Anand Parvat Military Station, New Delhi on 24th June 2023 and GHOST curves are being used in their critical security applications.

9.1.8.3 Cyber Threat Management System (CTMS)

This framework has been developed for large-scale attack data capturing, collection and analysis which is being leveraged by the National Threat Situational Awareness Program (TSAP) centre and is used for generation of cyber threat intelligence. A total of 1500+ honeypot threat capturing sensors are deployed at 449 different organizations of various sectors across the country. The raw attack data are collected from these deployed sensors and sent to a central data collection centre for further processing, analysis, correlation and analysis for cyber threat intelligence (CTI) generation in standard actionable formats. The CTMS is currently functional at the National Threat Situational Awareness Program (TSAP) centre at CERT-In, NCCC Data Centre-STPI Bengaluru.

9.1.8.4 C-DAC Intelligent Malware Sandbox

To secure Indian cyberspace from evolving malware threats, C-DAC has developed an indigenous Intelligent Malware sandbox, which has comprehensive methods, including static, dynamic, and computer vision approaches to detect and classify malware using artificial intelligence (AI).

9.1.8.5 Cyber Forensics Solutions

C-DAC had developed various Cyber Forensics solutions including Cyber Check (forensic data recovery and analysis tool), Advik CDR Analyzer (A Call Data Record/ IPDR Analysis Tool), MobileCheck (Mobile phone forensic solution), Win-LiFT (Windows Live Forensics. Tool Suite), Web Investigator (Internet Forensics Tool for Windows Computers), Photo Examiner (Windows based cyber forensic application), NeSA (Network Session Analyser), TrueImager (high speed, lightweight, portable disk imaging hardware solution), TrueTraveller (Complete forensic field kit), eGlancer (Forensics Kiosk), and Bin-V (Binary Vishleshak/Analyser).

The tools are supplied to agencies like Mibiz Consultancy Services, Office of the Commissioner of State Tax, State Goods and Services Tax Department, Tax Towers Thiruvananthapuram-Kerala, Income Tax Department-Vijayawada, TECHWEB – Meghalaya, Noorul Islam Centre for Higher Education, Kanyakumari District, Tamil Nadu State and College of Engineering and Technology, SRM Institute of Science and Technology. C-DAC had initiated Lab establishment in J&K and Lakshadweep UTs.

9.1.8.6 CDACSIEM

CDACSIEM solution addresses these challenges effectively. It aggregates, standardizes, stores, and applies advanced analytics to scrutinize data, facilitating early threat detection and empowering organizations to conduct comprehensive investigations in response to alerts. It was implemented at ITPO in Delhi during the G20 event to address security threats. Besides these, it has been deployed in Research Centre Imarat

(RCI), Hyderabad, Panjab University, Chandigarh, National Police Academy (NPA), Hyderabad, Mormugao Port Trust, Goa, Punjab National Bank, Delhi and across C-DAC Centres.

9.1.9 Software Technologies including FOSS

9.1.9.1 Platforms and Frameworks

MeriPehchaan: A National Single Sign On

It is an initiative taken by Meity to simplify life of citizens while using various government services. National Single Sign On will provide an option to citizens to use the same credentials while using all those government services which are available on the platform of National Single Sign On.

Three existing single sign-on, e-Pramaan, Janparichay and Digilocker which were catering multiple services as SSO have developed a protocol among the three SSO such that users can access any of the services available on any of the three SSOs.

NSSO caters to more than 8000 services, and users and it has completed more than 23 crore transactions. DigiLocker, Umang, Assam Sewasetu, Rajasthan SSO, Bihar Serviceplus, etc., are some of the major services available on MeriPehchaan.

9.1.9.2 Employees Provident Fund Organization (EPFO)

C-DAC has initiated work on the Centralization project of EPFO, which will bring all the services offered by EPFO, under a single umbrella. It's a major step towards EPFO's long cherished goal of One Member-One Account. Following the Hon'ble Supreme Court's decision on the Pension on Higher Wages, an end-to-end system to process the joint application form has been developed by C-DAC.

9.1.9.3 Mobile Seva

Mobile Seva platform is an innovative initiative developed by C-DAC that aimed at mainstreaming mobile governance in the country. It provides an integrated whole of government platform for all Government departments and agencies in the country for the delivery of public services to citizens and businesses over mobile devices using SMS, USSD, IVRS, CBS, LBS, apps, and AppStore. It is a centrally hosted cloud-based mobile enablement platform, which allows the departments to expeditiously start offering their services through mobile devices anywhere in India, without having to invest heavily in creating their separate mobile platforms.

C-DAC has been providing services of SMS, IVRS, attendance applications, and Apps development for more than one decade. 4,600+ accounts created by departments and agencies 5,400+ Crore transactions have been completed so far by the platform. The platform provides support for the DLT platform developed by telecom providers. (www.mgov.gov.in)

9.1.9.4 e-Hastakshara: An Online Digital Signing Facility (C-DAC's e-Sign Service)

e-Sign is an online electronic signature service, which can be integrated with service delivery applications via an API to facilitate an e-Sign user to digitally sign a document. Using authentication of the Aadhaar holder through Aadhaar e-KYC service, online electronic signature service is facilitated. e-Sign service facilitates instant signing of documents online by citizens in a legally acceptable form. Using this, an Aadhaar holder can electronically sign a form/document anytime, anywhere, using device such as Personal Computer or Laptop or Mobile.

Achievements:

- C-DAC has commissioned and made operational a new DC for eHastakshar operations with a capacity of 10 lakh eSign/day.

- More than 15 Crore e-Sign Digital Signatures have been issued by C-DAC since inception till March 2024.

- 12 outreach programs have been conducted by C-DAC for e-Sign proliferation in the year 2023 with various Central/State Government organizations.

- Currently 215 agencies are leveraging e-Sign 2.1 Production service.

- The services are being leveraged by various departments/ applications such as Employees' Provident Fund Organisation, National Informatics Centre (NIC), Centre for eGovernance, Karnataka, North Eastern Council, Central Ground Water Board, Ministry of Jal Shakti, Unique Identification Authority of India, Election Commission of India, Telecom Regulatory Authority of India and National Test House etc.

9.1.10 Free and Open-Source Software

9.1.10.1 Secure BOSS OS

C-DAC customized Secure BOSS OS based on the latest version 10.0 for Indian Army (version 2), Indian Navy (Version 4) and Strategic Forces Command (SFC) to be deployed pan India on their respective internet-facing machines of around 15000+ Machines. C-DAC has developed the Secured BOSS and deployed in Integrated Defense Services (IDS), Indian Coast Guard (ICG) and other Strategic Sectors.

9.1.10.2 Standardization Activities

e-Governance Standards and Guidelines

C-DAC along with Standardization Testing and Quality Certification (STQC) Directorate is engaged in the development and review of ICT Standards/ Guidelines/Frameworks. During the year, five topics are approved for formation of Standard/ Guidelines. Viz. Cloud Inter-operability and Portability, Enterprise Architecture (EA) Security, Metadata and Data Standards for Agriculture, Metadata and Data Standards for Education and Metadata and Data Standards for Logistics.

9.1.11 Capacity Building Initiatives

9.1.11.1 Information Security Education and Awareness (ISEA)

During the year, under the ISEA – Phase II project, a total of 5,111 candidates have been trained/are undergoing training in various formal/non-formal courses in the area of Information Security through 52 institutions. 2,206 Government Officials have been trained in various short-term courses through direct/e-learning/VILT mode. 48 Awareness workshops (Online /Offline) by covering 35,116 participants, and 7 Quizzes were organized covering 67,654. ISEA collaborated with Union Bank of India & released customer Cyber Safety Awareness creatives in bilingual and reached more than one crore customers across in India. ISEA has participated in and showcased its activities in Bharat Pride Exhibition held at Arka International School Hyderabad during 27-29 September 2023, a total of 650 school children participated.

As part of the G20 Presidency 'Stay Safe Online' campaign was initiated and implemented to sensitize internet users about online cyber risk & safety measures and to promote safe online behaviour & best practices on cyber hygiene.

Under this campaign, more than 15,704 multilingual creatives on various aspects of cyber hygiene practices and cyber security were designed and disseminated through several social media platforms.

9.1.11.2 Future Skills PRIME

Future Skills PRIME is a Programme for Re-Skilling/Up-Skilling of IT Manpower for Employability. The project is approved by MeitY under the Champion Sector Service Scheme (CSSS). C-DAC being Programme Management Unit, aims to re-skill/up-skill 4.12 Lakh IT Professionals in ten (10) emerging technologies: 3D Printing/Additive Manufacturing, Blockchain, Cyber Security, Internet of Things, Artificial Intelligence, Robotics Process Automation, Social and mobile, Big Data Analytics, Cloud Computing and Augmented Reality/ Virtual Reality, through Resource Centres across the Nation by Hub-n-Spoke Model. Currently, 15.15 Lakh candidates have signed up on the FutureSkills PRIME portal. Around 6.40 lakh candidates have enrolled for Foundation/Deep-Skilling/ Bridge and non-aligned courses out of which, around 2.62 lakh candidates have completed the courses. 10,466 Government officials from Central/State Government Offices/ Departments/ PSUs trained across the Nation and 2087 Trainers trained under the Training of Trainer Programme.

9.1.11.3 SwaYaan: Capacity Building for Human Resource Development in Unmanned Aircraft System

Project 'SwaYaan' is implemented by 30 institutions which includes IISc Bangalore, IITs, IIITs, NITs, CDAC, and NIELIT. The hub-and-spoke model implemented in an RC/PI structure is led by C-DAC Hyderabad and IIITDM Kurnool as the Programme Management Unit (PMU). Under the project, the overall target is to train 46,785 candidates through various Formal, Non-Formal programs and Research Program such as M.Tech in UAS/Drones, Minor degree/Retrofitting courses in UAS/Drones, PG Diploma Program, Short term Skilling Courses, Innovation Challenge, Bootcamps, POC, National Workshops, International Conference, Open Online Courses, IPR (Paper and Patents) creation, etc. Currently the SwaYaan has conducted more than 210 UAS/Drone activities which includes 10 Faculty Development Programs (FDP), 120 Bootcamps, 5 workshops, PG Diploma in UAS/Drone, Proof-of-Concept implementation, and launch of MTech at IIT Kanpur with an overall participation of 5,516 candidates.

9.1.12 Education and Training

C-DAC's Education and Training have been developing skilled resources as part of the Skill India initiative through its Post Graduate Diploma and Post Graduate Degree awarding programmes for its internal human resources needs of Research and Development activities and IT industry. These skill enhancement ICT training courses are imparted by C-DAC training centres as well as Authorized Training Centres spread across India. C-DAC's education and training division is involved in the following activities:

- Post Graduate Diploma courses in ICT
- Education and Training Technologies
- Comprehensive Recruitment & Computer Based Exam (CRCBE)
- International Training & Solutions
- IT & Skill Development Programmes for Capacity Building
- Corporate Training for Corporate, PSU and Government Organization

9.1.12.1 Post Graduate Diploma Courses in ICT

C-DAC has launched the following new PG Diploma courses during the period:

- Post Graduate Diploma in UAS Programming

(PG-DUASP) under the Drone and Allied Technologies project of MeitY.

- Post Graduate Diploma in HPC Application Programming (PG-DHPCAP) course under the National Supercomputing Mission capacity building project

- Post Graduate Diploma in Cyber Security and Forensic (PG-DCSF)

- Post Graduate Diploma Fintech and Blockchain Development (PG-DFBD)

9.1.12.2 Solutions for Online Examination

9.1.12.2.1 Comprehensive Recruitment and Computer Based Exam System (CRCBE)

C-DAC has developed a comprehensive suite of exam applications for Recruitment of various Govt. Organizations in a safe and secure manner. The whole software stack is deployed at the C-DAC's own Data Centre with a provision of DR site at C-DAC. All the data is safely and securely stored within C-DAC.

C-DAC has built the capability to conduct exam across 150-250 exam centres at around 50-100 cities of India. C-DAC has registered around 70+ lacs candidates using C-DAC's registration portal, and conducted exam for around 50+ lacs candidates successfully, strictly adhering to the Exam Schedule. Candidates have registered from more than 700 districts of India.

C-DAC is conducting exam for Indian Air Force, Indian Coast Guard, Indian Navy and Rajasthan Housing Board.

9.1.12.3 Examination for Indian Air Force

- C-DAC has conducted AFCAT exam of Indian Air Force successfully from 25-27th August 2023 for selection of candidates in Flying Branch, Ground Duty Officers (Technical & Non- Technical). The exam was conducted at 179 Centres across 103 cities through which 1,15,781 candidates examined. AFCAT registration for the next batch will be conducted in December 23. The exam will be tentatively scheduled in February 2024.

- The AgniveerVayu exam for the recruitment of Agniveer in the Indian Air Force was conducted successfully from 20-23rd May, 2023 across 135 centers spanning across 65 cities through which 1,64,141 candidates were examined. The AgniveerVayu examination for the recruitment of AgniveerVayu of the next batch is scheduled from 13-17th October 2023 across 172 centers spanning in 76 cities through which 2,89,119 candidates will be examined. Agniveervayu registration for the next batch is scheduled for January/February 2024. The examination will be scheduled in March 2024.

9.1.12.4 Exam for Indian Coast Guard

- C-DAC has successfully conducted registration of ICG-Sailors from 08-27 September, 2023 inviting male candidates to apply for the post of Navik (General Duty), Navik (Domestic Branch), and Yantrik in the Indian Coast Guard. 1,95,632 candidates have applied online. C-DAC has conducted Coast Guard Enrolled Personnel Test (CGEPT) for Navi and Yantrik categories of Indian Coast Guard across 75 cities. ICG-Sailors (Coast Guard Common Admission Test) registration is scheduled in February 2024.

- C-DAC has successfully conducted registration of ICG- Officers from 01 Sep - 24th September 2023 for vacancies comprising of General Duty (GD), Technical (Mechanical), Technical (Electrical/ Electronics) and Law Entry. 17,051 candidates have applied online. ICG-Officers (Coast Guard Common Admission Test) registration is scheduled in February 2024. The exam will be scheduled in April 2024.

9.1.12.5 Pradhan Mantri Gramin Digital Saksharta Abhiyaan (PMGDISHA)

Pradhan Mantri Gramin Digital Saksharta Abhiyaan (PMGDISHA) is a central government initiative for digital literacy. C-DAC centers having their presence across India are participating as assessment & certifying agencies. C-DAC centers conduct the online remotely proctored examination in the PMGDISHA scheme and issue certificates to the successful candidates. C-DAC centers have successfully examined around 1.2 crore citizens up to August 2023 since the beginning of the project. A total of 5,07,706 candidates were assessed from 1st April 2023 to 30th September 2023 and it is expected to examine 10 Lakh additional candidates by March 2024.

9.1.12.6 OLabs NextG: Next Generation Online Labs (OLabs) for schools

Considering the excellent and consistent response to OLabs, and the encouraging feedback from teachers, OLabs NextG was proposed to take this activity further. The focus would be to expand the base to benefit more students and enrich the overall lab experience for the students for effective learning of related concepts.

- 80 New labs developed by C-DAC in various subjects from Class 6 to Class 12. Overall status: 138 new labs have been developed.

- 212 online labs (including 173 Olabs labs and 39 new labs added) integrated into Diksha Platform.

- 12 Math, 6 Social sciences, and 5 Language labs (English, Sanskrit, and Hindi) development in progress.

- Training of 150+ teachers conducted for Online labs via online mode.

- The development of 2 AR labs is done and the development of 1-VR lab for Social science subjects is in progress.

- OLabs mobile app (version-3) is hosted on the Mobile Seva app store.

- Translation done of 5 mathematics labs in the Hindi language

- Google Analytics 4 is added in the newly developed labs (50+) to measure traffic and engagement of labs.

- Logger module is integrated with the newly developed labs (50+) to store the user logs while performing the labs/activities in OLabs.

- Olabs Android app is available on the mSeva App store with 4,522 downloads.

9.1.13 North East Initiatives

9.1.13.1 Establishment of the Centre for SC-ST and Women Enablement on High-Performance Computing

Centre for SC-ST and Women Enablement on High-Performance Computing has been established and dedicated to the empowerment of individuals from SC, ST, and women communities in the field of high-performance computing (HPC). The initiative also made efficient use of the "PARAM UTKARSH" facility, enabling the execution of real-world experiments and practical learning.

In the capacity-building domain, the project is playing a pivotal role in training and upskilling. The target is to train a total of 450 candidates from SC, ST, and women backgrounds. The training programs offer a wide spectrum of subjects, ranging from high-performance computing to applications in embedded systems, artificial intelligence with data analytics, and cybersecurity.

9.1.14 International Initiatives

The following are the significant international initiatives taken by C-DAC during the year:

- Hon'ble External Affairs Minister of India, Dr. S. Jaishankar inaugurated India-Namibia Centre of Excellence in IT (IN-CEIT) setup by C-DAC

at Namibia University of Science & Technology (NUST) in Windhoek on 5th June 2023. He was joined by the Hon'ble Deputy Prime Minister of Namibia, Ms. Netumbo Nandi Ndaitwah, and the Minister of Higher Education of Namibia, Dr. Itah Kandjii – Murangi in the inauguration ceremony.

- On the 18th April 2023, the Indo-Argentina Centre of Excellence in Information Technology (IA CEIT) was formally inaugurated at the National University of Hurlingham (UNAHUR) in Argentina. The launch event was attended by high-level authorities, including the Hon'ble Minister of Education of Argentina, Mr. Jaime Perczyk, H.E. Indian Ambassador, Mr. Dinesh Bhatia, and two senior officials from MEA India, Mr. Rohan Singh and Mr. Robin Jain.

- Mr. V. Muraleedharan, Hon'ble Minister of State for External Affairs, Government of India visited Syria on 12th - 13th July 2023 and along with H.E. Engg Ayad Al-Khateeb, Hon'ble Minister of Communication and Technology, Govt. of Syria paid a visit to NexGen ISCEIT setup by C-DAC.

- H.E. Mr. Omar Perotti, Governor of the Province of Santa Fe, Argentina along with a representative from the Embassy of Argentina in India and other Senior Members of Government of Argentina visited C-DAC Delhi on July 26, 2023. C-DAC Delhi has set up the India- Argentina Centre of Excellence in Information Technology (IA-CEIT) at the University of Hurlingham in Buenos Aires with financial assistance from the Government of India.

C-DAC got empaneled under the Indian Technical and Economic Cooperation Programme (ITEC) and e-ITEC Scheme of Ministry of External Affairs (MEA), Government of India, and ha s   trained more than 120 participants in the certificate courses in the areas of Artificial Intelligence, Blockchain Development Technologies and Software Analysis.

9.2 Society for Applied Microwave Electronics Engineering and Research (SAMEER)

9.2.1 Introduction

Society for Applied Microwave Electronics Engineering and Research (SAMEER) is an autonomous R&D institution under the Ministry of Electronics and Information Technology, Government of India. The objective is to support various radio frequency (RF) and Microwave application-specific requirements of the various ministries of the Government of India. SAMEER has five centres situated in Mumbai, Chennai, Kolkata, Visakhapatnam, and Guwahati. The headquarters of SAMEER is situated at the IIT campus, Powai, Mumbai. Application specific product development and associated research in the broad area of microwaves are undertaken by SAMEER, which also engage in various state-of-the-art and challenging projects from HF to Lightwave, aiming to remain at the forefront of various microwave and millimeter wave domains. This includes, but is not limited to, linear accelerator technology, atmospheric radars, microwave heating and drying, photonics, microwave communication, 5G communication systems, quantum technology and other such applications. Passive and active components and subsystems such as amplifiers, antennas, power dividers, digital receivers, transceivers, etc., are designed and developed by SAMEER. SAMEER scientists regularly publish their research papers in various reputed journals and conferences.

Test and measurement services in Electromagnetic Interference and Compatibility (EMI/EMC), antenna performance measurement services, shielding effectiveness evaluation of chambers, calibration services for different electronic equipment, and testing of equipment to safety standards are also offered by SAMEER to support private industries and government agencies of the country in qualifying their products according to various national and international standards.

9.2.2 SAMEER CENTRES
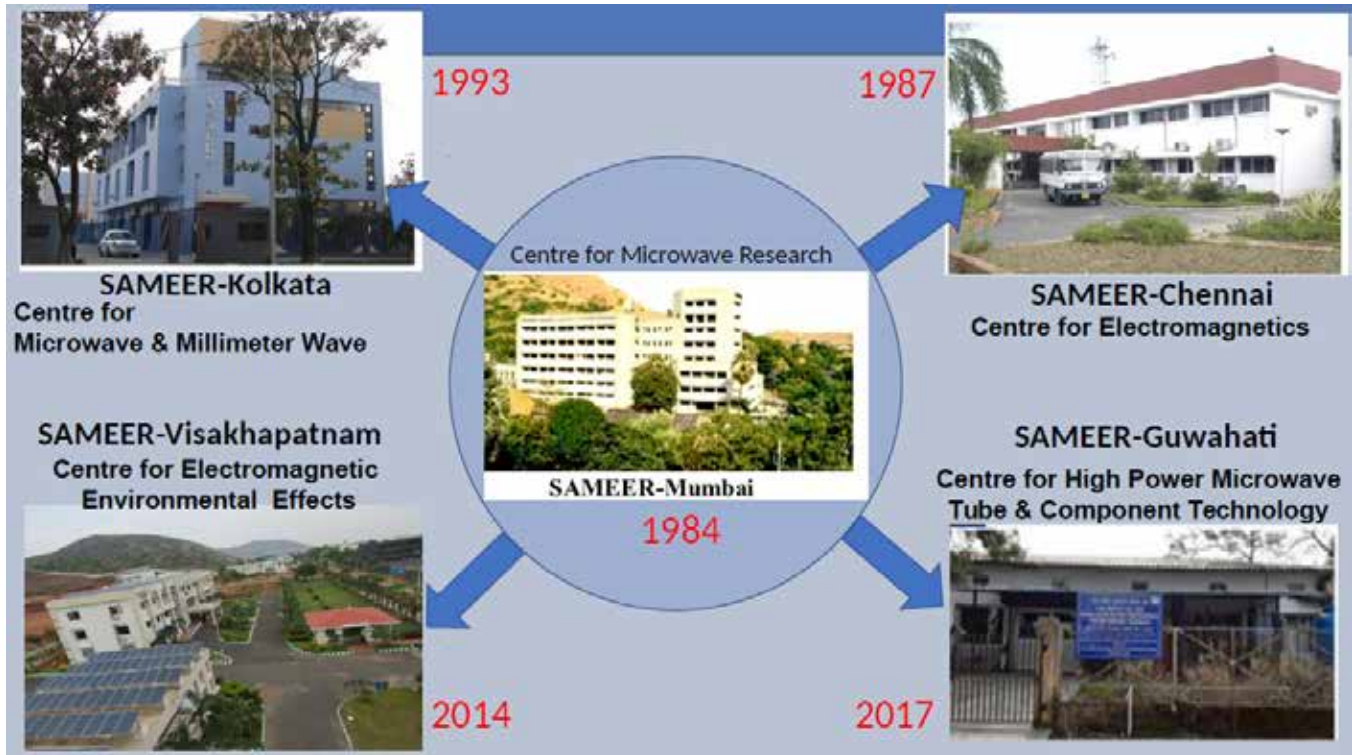
Fig: SAMEER Centres

- **SAMEER CENTRE FOR MICROWAVE RESEARCH, MUMBAI**

  SAMEER, Mumbai Centre possesses expertise in the areas of High-Power RF Microwave Systems for industrial applications, RADAR-based Instrumentation, Medical Electronics, Atmospheric Remote Sensing Radar and Systems, and Photonics and has done pioneering work in these areas. Cutting-edge research in fields such as Quantum Technology is also being actively pursued by SAMEER Mumbai. EMC test and measurement and Electrical Safety and Environmental Test facilities have been established at Navi Mumbai and have been accredited by NABL. Linear Accelerator tube development and Radiation-shielded test and assembly facilities have also been established at the Navi Mumbai campus.

R&D projects for various government-funded research laboratories, academic institutions, public sector undertakings, and industries are undertaken by SAMEER Mumbai.

- **SAMEER CENTRE FOR ELECTROMAGNETICS, CHENNAI**

  SAMEER-Centre for Electromagnetics (SAMEER-CEM), Chennai, aims to promote R&D in the field of Electromagnetics, Electromagnetic Interference and Compatibility (EMI/EMC). Diversification of R&D and system development in the field of EMI/EMC testing and consultancy, communication systems and technology, thermal analysis on electronic Systems, advanced antennas, and beamforming systems, etc., has been carried out by SAMEER, Chennai. Major projects for

ISRO, Government organizations, Department of Telecommunication, etc., have been executed by SAMEER, Chennai. Contribution to the 5G Test Bed development jointly with IITs/IISc has been made by SAMEER, Chennai. SAMEER, Chennai has recently established state-of-the-art EMC test facilities which includes 3 meter and 5 meter Shielded Anechoic Chambers(SAC).

- **SAMEER CENTRE FOR MICROWAVE AND MILLIMETER WAVE, KOLKATA**

  The application-based design and development of antennas, components, subsystems, and systems at various frequency bands starting from UHF (Ultra High Frequency) to Terahertz (THz) frequencies are actively pursued by SAMEER Kolkata Centre. Projects from various ministries of the Government of India to demonstrate new technologies in microwave/ millimeter-wave/terahertz communication are accepted by the centre. Sponsored design and development projects from various Government of India establishments to provide solutions for their application-specific requirements are also undertaken by SAMEER Kolkata Centre. Core projects are initiated on anticipated requirements. Consultancy services in EMI/EMC are extended to the developers of electronic products, and test and measurement services are offered to private industries and Government agencies in the areas of EMI/EMC, antennas, radome, RCS, and shielding effectiveness evaluation of chambers. The centre is equipped with a Compact Antenna Test Range (CATR) for the radiation performance measurement of antennas and has established EMI/EMC test/measurement facilities for performance evaluation of electrical/electronic products as per various national/international standards.

- **SAMEER CENTRE FOR ELECTROMAGNETIC ENVIRONMENTAL EFFECTS, VISAKHAPATNAM**

  SAMEER's Electromagnetic Environmental Effects (E3) Laboratory in Visakhapatnam, Andhra Pradesh, is engaged in projects of national importance, such as critical infrastructure protection against EMP, to qualify the electronics sector of the country and ensure the satisfactory performance of hardware. The evaluation and design services provided by this centre, currently available only at limited locations overseas, will not only ensure safety against imports but also save foreign exchange. Unique facilities at this centre will enable research activities in specialized domains of High-Power Electromagnetics, with specialized test facilities established such as Electromagnetic Pulse (EMP), Pulsed Current Injection (PCI), and Ultra-Wide Band (UWB).

- **SAMEER CENTRE FOR HIGH POWER MICROWAVE TUBE AND COMPONENT TECHNOLOGY (CHMTCT), GUWAHATI**

  CHMTCT under SAMEER, located in IIT Guwahati, Assam, was started in 2015 with specialization in the area of high-power microwave tube and component technology. SAMEER-CHMTCT pursues its objective of R&D in the area of high-power microwave tube/component, including conventional as well as futuristic microwave tubes. SAMEER Guwahati has successfully developed high power circulators and RF loads that aim to satisfy the requirements of in-house Linac systems. The centre is also in an advanced stage of developing high power magnetrons at 2998 MHz. The ongoing activities of the centre also include the design and development of X-band active and passive devices.

9.2.3 R&D activities

9.2.3.1.Societal Applications

9.2.3.1.1 ATMOSPHERIC SYSTEMS

Dual Band Radiometer

Fig: The dual-band lens antenna for radiometer application

This is a MeitY sponsored project along with SAMEER-Kolkata and SAMEER-Mumbai. The dual-band receiver for atmospheric humidity profiling at K-band (22 - 31 GHz) and temperature profiling at V-band (50 - 60 GHz) has been developed by SAMEER Kolkata. The developed dual-band receiver has been experimentally evaluated and delivered to the nodal office (SAMEER Mumbai) for overall system implementation. The major challenge in the receiver development was to ensure a very low noise floor over the above frequency ranges, which eventually results in a low noise figure and high sensitivity. A shared aperture dual-band lens antenna has also been indigenously designed and developed. The V-band and K-band polarizations are orthogonal to each other. About 31 dBi of gain

at 26 GHz and about 37 dBi of gain at 55 GHz are exhibited by the antenna.

This Multi-channel Radiometer comprises dual-channel broadband front-end receiver subsystems, one for temperature (50–60 GHz) and the other for water vapor (20–30 GHz) profiling that share the same antenna and antenna pointing system. The dual-channel receiver uses a single heterodyne, double sideband down-converter, and a digitally tuned frequency synthesizer for frequency selection.

Fig: Data Acquisition system and Control unit for Dual band Radiometer

The center frequency of the synthesizer can be changed to the required band (20 or more channels) through software selection. After down-conversion, a VHF amplifier, VHF filter, VHF detector, and integrator will be used to estimate the noise envelope. The signal detector and integrator output are fed to the ADC to digitize the incoming signal and then to the Data Acquisition system for further processing.

The Micro-controller-based Data Acquisition system will generate the required control signals, tune frequency synthesizer, acquire data, and process radiometer-received signals in real-time as per the operational parameters specified by the user. All subsystems have been developed, and

firmware development is under process. K and V band Receiver, LO Generation unit, and Data acquisition and control unit development have been completed. The GUI for operation has also been completed, and the temperature and PTU sensors are being integrated with the system.

Advanced Digital Ionosonde

Fig: Transmit antenna tower and ionosonde control room hardware

The objectives of the project, sponsored by the Indian Institute of Geomagnetism(IIG), were to obtain good signal-to-noise ratio to mitigate the heavy noise due to interference, obtain short duration ionograms, estimate vertical drifts, reconstruct vertical electron density profile, and make antenna size smaller. The subsystems such as Delta transmit antenna, 1KW Transmitter, 4 channel Digital receiver, PC-based application software for archival, processing & display of the Ionogram, Angle of arrival, Skymap & Drift velocities of Ionosphere have been developed and integration testing is under progress. The Transmit antenna Tower is installed at IIG, Allahabad and software algorithms are under the test phase.

Phased Array Doppler SODAR

Fig: Mini SODAR system at SHAR, Sriharikota

SODAR (Sound Detection and Ranging) or the Acoustic Radar is a versatile instrument used for Atmospheric boundary Layer studies and environmental applications. The Sodar measures the wind speed, wind direction, and wind components at various heights and plots an echogram. This system operates remotely and 24 hours continuously without any interruption.

SAMEER has successfully developed, installed and commissioned at the following locations:

(i) ISRO Propulsion Complex (IPRC) Mahendragiri for Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram.

(ii) Satish Dhawan Space Centre (SDSC), Sriharikota Range (SHAR).

9.2.3.2 COMMUNICATION

6G Sub-THz Wireless communication with Intelligent Reflecting Surfaces (IRS)

Fig: 6G LOS communication link demonstration at Indian Mobile Congress 2023

The objective of this MeitY sponsored project is to demonstrate a fully functional 6G high-speed communication link at 140 GHz using an indigenously developed transmitter, receiver, and antennas under the AtmaNirbhar Bharat mission. Initial level design and simulations of transmitter and receiver chains, and some components have been completed. High-gain lens antennas have been indigenously designed and developed for the communication link at 140 GHz. This antenna operates over 110-170 GHz and has a gain of about 32 dBi at 140 GHz. This indigenously developed LOS communication link was demonstrated in the Indian Mobile Congress 2023 with a 54 GBPS data rate.

Fig: Slotted array antenna developed at 140 GHz for 6G Sub-THz Wireless communication with Intelligent Reflecting Surfaces (IRS).

Fig: Lens antenna at 140 GHz for 6G Sub-THz Wireless communication with Intelligent Reflecting Surfaces (IRS)

Apart from the high-gain lens antenna, a slotted array antenna is designed, simulated, and fabricated for the D-band operation. The initial S-parameter measurements of these antennas are satisfactory.
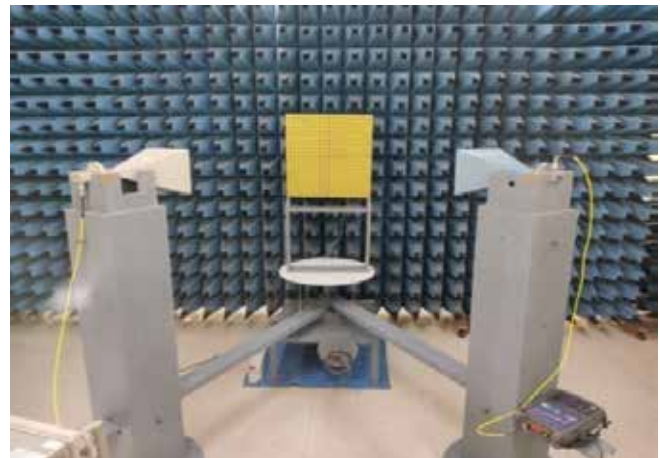
Fig: IRS development at 5.6 GHz

Intelligent reflecting surface (IRS) is another important requirement of this project. An IRS at 5.6 GHz has been designed and non-specular reflection is verified with an input code from the in-house developed controller. Its performance was also demonstrated at India Mobile Congress 2023.

One of the important circuit components in both transmitter and receiver is a band-pass filter (BPF) developed at 140 GHz.

6G THz Test bed with Orbital Angular Momentum and Multiplexing

Fig: Indigenously developed Lens antenna with elliptic profile at 280 Ghz for 6G THz test bed

This Test bed sponsored by DoT, is being implemented by SAMEER, jointly with three other IITs with the objective of:

(a) 6G THz testbed, the first of its kind in the country

(b) A wireless communication link around 300 GHz with an indigenously developed transmitter and receiver

(c) OAM multiplexing for large data transmission using Orbital Angular Momentum-based antennas (OAMA).

A pair of lens antennas with an elliptic outer profile has been indigenously designed and developed for this communication link. It operates over 220-330 GHz and exhibits a high gain of 52 dBi at 280 GHz. The initial S-parameter measurements of these antennas are satisfactory.

Studies and simulations of OAM antennas are in progress. Initial design of uniform circular array (UCA) is undertaken at 5 GHz.

9.2.3.3 Medical Systems

6 channel 100W source for Microwave Hyperthermia treatment of cancer

Fig: 6 channel 100W source for Microwave hyperthermia treatment installed at IIT Madras

A 6-channel 100W source has been developed and installed at IIT Madras for use in Microwave Hyperthermia treatment of cancer. In microwave hyperthermia treatment, microwaves are used to heat the targeted cancer tissues, either to increase the efficacy of the dose delivered in the region of interest or to elevate the temperature sufficiently to destroy the targeted cells. The system used in this treatment employs a high-power microwave source, which is broadband in nature and operates over a frequency band of 400-1000 MHz with low harmonics of -30 dBc. The amplifiers utilize a power combining scheme which includes power dividers & combiners, filters, GUI, and firmware that have been developed at SAMEER.

9.2.3.4 RF & MICROWAVE SYSTEMS

Through-Wall Imaging (TWI) Radar for Homeland security

Fig: TWI Radar unit
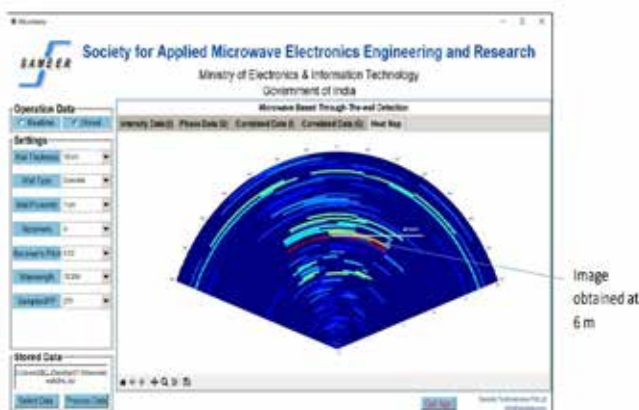
Fig: GUI for TWI Radar obtained for a target at 4m.

The through-the-wall radars image the targets behind the wall by transmitting short pulses and processing the signal returns from targets behind the wall. The TWI Radar technology is particularly useful in behind-the-wall target detection, surveillance, reconnaissance, law enforcement, and various earthquake and avalanche rescue missions. One such system is being developed by SAMEER, funded by MeitY. All subsystems, including the Ultra Short Pulse Generator, Modulator, Transmitter, Receiver antenna array, image processing algorithm and signal processing algorithm have been developed. The target image location is visible on display (GUI).

1 kW microwave oven for gel drying for Board of Radiation & Isotope Technology(BRIT)

Fig: 1 kW microwave oven for radioactive gel drying.

A 1kW microwave oven comprising a microwave head with a magnetron, an applicator for housing the gel to be dried, a high-voltage power supply, PLC, and display was developed and delivered to BRIT, Navi Mumbai, for drying the gel.

9.2.4 NexGen

Surveillance Receiver

Fig: Lab validation setup for spectral anomaly AI model detection using SAMEER prototype.

SAMEER-Chennai has enhanced the capabilities in AI-related areas under the MeitY Sponsored project "Analysis of Deep Learning Techniques for Electronic warfare 5G applications" and successfully implemented and demonstrated the Spectral Capture-based Anomaly Detection System (SCADS) Framework. As a result, SAMEER has bundled the AI model for spectral anomaly detection into an in-house developed "Surveillance Receiver" prototype hardware and validated using spectral data acquisition in the 433MHz ISM band. The "Surveillance Receiver" was practically validated for spectral anomaly detection using four user setups: three normal users and one designated as an anomaly user (BPSK, QPSK, 8-QAM & FSK). User signals are generated using four Universal Software Radio Peripheral (USRPs), and the spectrum is captured & analyzed using the in-house developed prototype which detects the intruder anomaly through the Spectral anomaly detection module. The output of the module was validated using a Spectrum Analyzer/VSA.

The present model distinguishes between a normal spectral user, Spiky presence abnormal user, and Frequency Hopping Anomalous user. Efforts are underway to improve the acquisition time and deploy it in the field of electronic surveillance.

Quantum Technology

Fig: SPDC simulation results for designed BBO crystal at 400 nm.

The Quantum Technology laboratory has been established to carry out R&D in Quantum Communication. Experiments are currently underway to generate entangled photons using the Spontaneous Parametric Down-Conversion (SPDC) process for secure communication. The two communicating sides make use of the quantum channel for sharing the secret key. This key is used to encrypt and decrypt the message sent through the public channel, a fiber optic, or a wireless link.

9.2.5 Services

9.2.5.1 EMI/EMC

SAMEER has carried out more than 225 EMI/EMC testing assignments for more than 90 industries and completed more than 90 EMC Calibration assignments for 20 laboratories. EMC design consultancy was offered to various companies, and shielding effectiveness tests were completed for various paints and shielded chambers.

A study of conducted and radiated emission from the propulsion system (4 BLDC thrusters) with a camera pertaining to the manned submersible – MATSYA 6000 was carried out for National Institute of Ocean Technology (NIOT), Chennai.

Shri Rajeev Chandrasekhar, Hon'ble Union Minister of State for Electronics & Information Technology and Skill Development & Entrepreneurship, Government of India, dedicated to the Nation the fully automated state-of-the-art Electromagnetic Interference and Compatibility (EMI/EMC) laboratories for qualifying the electronic equipment and systems for Military and Civilian Applications on 7th July 2023. These laboratories have been established at SAMEER-Centre for Electromagnetics, Chennai. The project of establishing the MIL STD Testing Laboratory at SAMEER-CEM, Chennai, is funded by MeitY, Govt. of India.

Fig: EMI/EMC Qualification of 1 MW Rotary Main Motor Generator (RMMG)

EMI/EMC Qualification and Measurement tests for indegenously developed 1 MW Rotary Main Motor Generator (RMMG) by BHEL Bhopal was carried out by SAMEER. The Equipment Under Test (EUT) is of national importance and was an indigenously developed system under AatmaNirbhar Bharat. The

EUT was successfully installed and commissioned in the Naval submarine at Visakhapatnam. Apart from this, EMI/EMC qualification of indigenously developed Electrical/Electronic equipment like alternators, periscopes, Diesel generator (DG) sets have also been carried out helping national missions like AtmaNirbhar Bharat etc.

Military Institute of Technology (MILIT) staff officers visited India's Largest Electromagnetic Pulse (EMP) facility at SAMEER CE3 Visakhapatnam under E3 Management course in November 2023.

9.2.5.2 Thermal analysis

Thermal design was carried out for optimal performance of Solar Low Energy X-ray Spectrometer(SoLEXS) and High Energy L1 Orbiting X-ray Spectrometer (HEL1OS) payloads for Aditya L1 in compliance with the specified acceptance criteria of URSC/ISRO, Bengaluru. Thermal analysis has been done for Radar Altimeter and OAM systems being developed by SAMEER.

Memorandum of Understanding (MoU)

- SAMEER has signed an MoU with Machine Tool Prototype Factory (MTPF), Ambarnath, a unit of Armoured Vehicle Nigam Limited, for the development of Advanced Control Systems under the Make-in-India and AatmaNirbhar Bharat initiatives.

- SAMEER signed an MoU with National Centre for Nanosciences and Nanotechnology, University of Mumbai.

- MoU was signed between SAMEER and Dr Homi Bhabha State University, Mumbai (earlier known as Institute of Sciences, 100 years legacy) under Govt of Maharashtra. MoU signing was done in the presence of VC, Dr Rajanish K. Kamat.

- MoU was signed between SAMEER and Paras Defence during ICARE-2023 in May 2023.

- MoU was signed between SAMEER and MahaPreit during ICARE 2023.

- MoU was signed between SAMEER and Vedang Radio during ICARE-2023 in May 2023.

Conference/ Workshop

SAMEER organized the International Conclave on Advances in Radiology and Radiotherapy (ICARE)- 2023 during 16-18 May 2023.

9.3 Centre for Materials for Electronics Technology (C-MET)

C-MET has been set up as a registered scientific society in March 1990 under MeitY, as a unique concept for development of viable technologies in the area of materials mainly for electronics with the objectives of:

- To establish the technology up to pilot-plant scale for a range of electronic materials and transfer the same to industry for commercialization.

- To establish relevant advanced analytical facilities.

- To undertake applied research activities in the area of its operation.

9.3.1 Core competence at C-MET Laboratories

C-MET's R&D activities have been implemented in three laboratories i.e., Pune, Hyderabad and Thrissur. In the campus of Pune laboratory, C-MET headquarter is functioning which monitor the administrative activity and central technical coordination. Each of these laboratories has its own area of specialization with requisite infrastructure and expertise. This approach has proven to be successful in creating core competence at each laboratory.

9.3.2 Products developed by C-MET for different applications

- Carbide derived carbon (CDC).
- Hafnium sponge for space applications.

- 25F capacitance, <25mW ESR, <200µA Aerogel Supercapacitors for power modules for VVPAT of EVM.
- Graphene supercapacitors upto 200F capacitance and <8 mW ESR.
- Digital thermometers with data logger for industrial applications using indigenously developed thermal sensor.
- Coin cell graphene supercapacitor modules of 0.01F to 0.05F and voltage of 14V using CR 2025 and CR 2016 graphene coin cells.
- 70F, 16V graphene supercapacitor modules were prepared using 12 numbers of 200F graphene supercapacitors.
- 3D analysis system and automatic report generating system for wearable device.
- IoT enabled smart digital thermometer.
- IoT enabled humidity sensors.
- IoT enabled CO sensors 2.
- IoT enabled fire alarm.
- 48 channel data acquisition system for thermal sensors.
- Polybutadiene based Substrate Integrated Waveguides (SIW) for microwave and millimetre wave Circuit applications.
- Flexible microwave absorber.
- RFID tags for NFC and UHF applications.

Centre of Excellences (CoE)

a) CoE rechargeable battery technology (Pre-Cell)

The CoE aims on the development of indigenous materials technology and indigenization of related machines. The cathode materials for Li-ion batteries such as $LiFePO_4$, NMC-622 & 532 have been prepared with a novel indigenous process developed by C-MET. The process for $LiFePO_4$, NMC- 622 & 532 has been optimized at 100 gm scale. The active materials for anode i.e. $Li_4Ti_5O_{12}$ was

optimized at 250 gm scale. The pouch cells of Li-ion batteries using the inhouse developed $LiCoO_2$ and Graphite have been fabricated of 2 Ah capacity and demonstrated two-wheeler battery. The cathode material for Na-ion battery, $Na_3V_2(PO_4)_3$ has been developed at 200 gm scale with capacity 100 mAh/g. The pouch cell Na-ion has been fabricated successfully. Three Indian patents have been submitted in this project. Na-ion battery for mobile was demonstrated.

b) CoE on additive manufacturing

Vertical A

The project involves development of materials (metals, semiconductor and ceramics, their composites, composite spools, inks) and machines (with the help of industries) suitable for 3D printing applications in the field of electronics. The 3D printed rechargeable battery and antenna for communication are the envisaged prototype products. Installation of jet 3D printer, binder jet 3D printer, induction thermal plasma reactor is completed. Synthesis of ceramic and semiconductor powders has been upscaled to 250g batch scale. Ceramic-polymer, metal-polymer and semiconductor-polymer composite spools have been prepared. Carried out the preparation of anode and cathode inks for ink-jet 3D printing of rechargeable batteries and their characterization is in process. 3D printing of metal, ceramic and semiconductor components binder jetting 3D printing process was carried out and their sintering studies are in process.

Vertical B

The vertical B of the CoE involves additive manufacturing for development of LTCC based packages and devices for optoelectronic application. Indigenous development of Digital light projection (DLP) based 3D printer (Version A: resolution 50 μm) is done in collaboration with the industry partner and functional materials (dielectric and conductor) and their composites with UV sensitive resin is developed at C-MET, Pune. Process for preparation of functional materials (LTCC dielectric, Ag and Ag-Pd based conductor materials), 3D printable composite of in-house formulated UV sensitive resin with LTCC, Ag, Ag-Pd and commercial graphite (sacrificial material) has been set up. 3D printing process based on prepared composite for multi-material and multi layering features has been also set-up. Designing of 3D printer machine (Version B: resolution 2 μm) is in process.

c) National centre for quantum materials technology

The National Centre for Quantum Materials Technology is being established at the C-MET, Pune. Centre has signed an MOU with M/s Hind HiVacuum Company Pvt. Ltd. Bangalore, India for indigenous development of equipment required for the development Quantum Materials Technologies.

d) Establishment of CoE on e-waste management

CoE on e-Waste Management has been established at C-MET, Hyderabad with funding from MeitY, Govt. of India, Govt. of Telangana and Private Industries in ratio of 40:40:20. M/s Greenko Energies Pvt. Ltd. Hyderabad joined CoE as industry partner by funding ₹7.16 Crore as 20% of the total project outlay of ₹5.80 Crore.

Various cost-effective recycling and environmentally benign e-waste recycling technologies have been developed from lab scale to technology readiness level (TRL) 4 to 6. Developed technology for Lithium – ion battery recycling for recovery of valuable metal contents through hydrometallurgical

route @100 kg per day capacity (TRL 5). The developed technology is tuned to suit for assorted type of lithium-ion batteries, viz. lithium nickel manganese cobalt oxides (NMC), lithium nickel cobalt aluminium oxides (NCA), lithium cobalt oxide (LCO), and lithium manganese oxide (LMO). The PCB recycling technology is up-scaled from 100 kg per day capacity to 1000 kg per day capacity (TRL 6) and necessary process equipment such as Smelting Unit and Automated depopulation systems were designed and developed indigenously. In addition, technology for permanent magnet recycling has been developed (TRL 4) at 4 kg per batch scale through hydrometallurgical route. Technology development is in progress for End-of-life (EoL) solar panel recycling. A cost effective and environment friendly methodology has been developed for separation of glass and other valuable materials from discarded PV modules.

Along with R&D activities, CoE also aims at nurturing start-ups through technology dissemination, extend consultancy services and promote industries for e-waste recycling businesses. Facilitated incubation to six numbers of start-ups namely; i) M/s Spegsy Pvt. Ltd, Hyderabad; ii) M/s ScrapQ, Hyderabad; iii) Pallavi Chaudhary, Mumbai, Maharashtra (Individual); iv) M/s BESA Lithium Batteries Pvt. Ltd, Pune, Maharashtra, v) M/s Remine India Pvt. Ltd., Sitarganj, Uttrakhand for LIB recycling and M/s CENALL, Hyderabad (Start-up) for developing LCD panel recycling technology. In addition, consultancy services were extended to five industries namely; i) M/s ELGREEN Recycling Pvt. Ltd, Noida, DL; ii) M/s Spegsy Pvt. Ltd, Hyderabad; TS iii) M/s Namo e-Waste, Faridabad, HR; iv) M/s BESA Lithium Batteries Pvt. Ltd, Pune, Maharashtra; and v) M/s SBS Paper Recycling Pvt. Ltd, Chennai, TN on LIB recycling.

During 2022-23, six different skill development training programs on E-waste dismantling/ segregation were organized for SMEs under CoE during April 11-13, 2022 (1st); June 8-10, 2022 (2nd); July 20-22, 2022 (3rd); Nov 17-19, 2022 (4th); Feb 21-23, 2023 (5th); and March 27-29, 2023 (6th). Awareness program for more than 100 students from Gatik Junior College & ZPHS and Cherlapally School organized in connection with "International E-waste Day" on 14th October 2022 at C-MET, Hyderabad. Road show was also conducted on the same day for e-Waste awareness & collection drive within Hyderabad city. The e-Waste awareness and knowledge dissemination was also carried out to open public through various national level exhibitions. The e-Waste recycling technologies developed at CoE were displayed in the "e-Waste Management Technology Stall" at "Digital India Week" exhibition held at Gandhinagar Gujarat from July 4-9, 2022 and at "G-Ex Kerala '23; Global expo on Waste Management Technologies" organized by Suchitwa Mission, Govt of Kerala during Feb 4-6, 2023 at Kochi, Kerala.

Another innovative content of the CoE activities is creation of expert manpower and/ or human resource development through M. Tech in e-waste resource engineering and management course jointly with IIT Hyderabad. Regular classes for M. Tech. course in "E- Waste Resource Engineering and Management" are being conducted. 1st batch of M.Tech. program was successfully completed in May 2022 and all the students were placed through campus recruitment in companies working in core areas. 2nd batch of M.Tech. students are currently pursuing their project work and 3rd batch of students are undergoing their first semester classes.

e) Establishing CoE in intelligent internet of things (IIoT) sensors

CoE in Intelligent IoT Sensors is being established by C-MET, Thrissur and Indian Institute of Information Technology & Management Kerala (IIITM-K). The main objective of CoE is to establish state-of-the-art facilities for sensor manufacturing, intelligent sensor system hardware, AI software development etc. The CoE will host an incubation facility for startups in IIoT sensors and promote innovation and entrepreneurship through grand challenges.

A spectrum of IoT products were developed under CoE and are ready for commercialization. IoT enabled smart digital thermometer, humidity sensors, CO sensors, fire alarms were developed. Indigenous technology for the development of chip thermistors and chip thermal sensor was transferred to M/s Thermosen Technologies Pvt. Ltd, Bangalore based on the technology developed at C-MET. The grand challenges were floated in the domains of Disaster Management, Robotics & automation and Smart cities.

f) India Innovation Centre for Graphene (IICG)

IICG is being implemented by C-MET, Thrissur, Digital University Kerala (DUK) and Tata Steel Limited (TSL) financially supported by MeitY, Government of Kerala, TSL and industries and is envisioned to investigate the science and technology of graphene and other 2D materials. This centre envisages partnering effectively with industrial-academic activities to promote innovative and adventurous research emphasizing applications. IICG will attract internationally leading research on graphene into India and bridge the gap between scientific development and industrial applications of graphene in our Nation. The institute is under the process of creating class 100 clean room facilities and sophisticated equipment to promote research in alignment with industry requirements.

9.3.3 Technologies transferred to industries

- Technology of NTC fast response thermal sensors was transferred to M/s Thermosen Technologies Pvt. Ltd, Bangalore at a ToT cost of ₹10.08 Lakh plus ₹ GST on 23.05.2022.

- Technology for thermal sensor based wearable device for breast cancer detection was transferred to M/s Medirays Corporation with a ToT cost of ₹8.86 Lakh plus GST on 20.01.2023.

- Technology for 3D analysis system for wearable device for breast cancer detection was transferred to M/s Medirays Corporation with a ToT cost of ₹6.57 Lakh plus GST on 20.01.2023.

- Technology for Multichannel data acquisition system for thermal sensors was transferred to M/s Murata Business Engineering India Pvt. Ltd. with a ToT cost of ₹10.929 Lakh plus GST on 03.03.2023 in the presence of Secretary, MeitY.

9.3.4 Technologies/ Processes ready for transfer to Industry

- Tri-band composite NavIC Antenna
- 7N Zinc for detector applications
- Purification of scrap Germanium to 7N Germanium
- Li-Ion Battery Recycling: Hydrometallurgical route
- Li-Ion Battery Recycling: Pyrometallurgical route
- Thermistor based digital thermometers
- Graphene through Chemical route technology
- 3YSZ ceramic Tapes for oxygen sensor applications
- Graphene supercapacitors
- Lead free X-ray absorbing materials

- 3D analysis system for wearable device for the prediction of tumour parameters
- Wearable Device and Analysis System for Early Detection and Screening of Breast Cancer
- (a) Environment friendly treatment of PCBs and production of black copper enriched with (b) Recovery of valuable and precious metal from spent printed circuit boards (c) Recovery of valuable and precious metals from black copper obtained from spent printed circuit boards
- Aerogel Supercapacitors for Electronics & Energy Storage Applications
- Transparent thin film heater
- Process for Nano-ZnO powder
- Piezoceramic Compositions and Components
- Lead Free X-Ray Absorbing Materials & Medical Apron
- Microwave substrates with dielectric constant 6.15 and 3.0
- Microwave Substrates of Dielectric constant 10.2, 13 & 14.8.
- Modified Silica filler for space applications
- Quickly Rechargeable Emergency Lamp
- Photo patternable Silver and Photoconductor thick film pastes for Photo Sensors
- Nano silver screen-printable ink for flexible Electronics Applications
- Silver Screen Printed RFID tags technology for NFC applications
- Process for making low ESR aerogel supercapacitors
- Process for making snap in type graphene supercapacitor having capacitance above100F
- Process for making coin cell graphene supercapacitor modules
- Process for making 70F, 16V graphene supercapacitor modules
- Process for making IoT enabled smart digital thermometer

- Process for making IoT enabled fire alarm
- Process for making IoT enabled humidity sensors
- Process for making IoT enabled CO sensors 2
- Process for making 48 channel data acquisition system for thermal sensors
- Process for polybutadiene-based MW substrates
- Process for plasmonic based gas and bio sensors

9.3.5 Research Performance Indicator

- 40 research publications in peer-reviewed journals
- 130 presentations in conferences and symposia
- 87 invited talks
- 10 awards and honours
- 4 patent applications awarded
- 4 technologies transferred

9.3.6 C-MET's futuristic area of research

The following activities are planned to explore the cutting-edge technologies in advanced electronic materials:

- Development of multilaterals 3-D printing machine and inks, microwave devices for strategic and commercial applications.
- Development of metal, ceramic and semiconductor based FFF filaments for 3D printing of electronic components.
- Development of conductive inks for RFID tag antenna and flexible applications.
- High energy storage devices by researching on active materials for batteries for e-vehicle applications (supercapacitors, lithium-ion battery).
- Development of 3-D printing inks and microwave devices for strategic and commercial applications.
- Development of 3-D printing machine and materials for fabrication of LTCC packages and circuits.

- LTCC based liquid cooling devices for high performance computing.
- Development of TiO, Si and Ge based nanomaterial for Additive manufacturing of Optical computing chips 2
- Development of Perovskite and thin film Solar Cells.
- Development of Li-S battery, Na-Ion battery and solid-state battery.
- Development of Organic battery.
- Indigenous sensors for internet of things (IoT) and smart cities applications.
- Microwave substrates, terahertz and millimetre wave materials.
- Cost effective and environmentally friendly recycling technologies and RoHS testing.
- Silicon carbide electronic device grade substrates for strategic and commercial applications.
- NTC materials for low temperature applications for airport weather monitoring system (-90° C to +50 C).
- EMI-shielding materials, nano powders of aluminium, iron, boron, Boron nitride, boron carbide, aluminium nitride for strategic applications.
- Graphene based electrical, optical and acoustic attenuators for medical, consumer and strategic applications.
- Cost-effective plasmonic materials based portable biosensors and gas sensors
- Plasmonic for photostable nanoparticles in medical applications such as Plasmonic devices for cancer detection.
- Stretchable electronic devices.

Graphene, MXene and other 2D materials for electronics applications:

- Plasmonic based gas sensors
- Development of lithium-ion capacitor/ hybrid supercapacitor

- Development of DRA for millimetre wave applications.
- Wearable/flexible sensors.
- Materials and devices for mm waves and THz frequencies.
- Indigenous IoT sensors for various applications.
- 2D materials and devices for electronic/opto-electronic/sensor/actuator applications.
- Disposable plasmonic sensors for cervical cancer and other biomarkers.
- Flexible, wearable and stretchable electronic devices.
- Advanced energy storage materials and devices.

9.4 Education and Research Network (ERNET) India

9.4.1 VSAT Network

ERNET India has a VSAT network operating in C-band on GSAT satellite which provides Internet & Intranet access to education and research institutions located all over the country. The Master Earth Station (MES) is located at Bengaluru and functions as the Network Operations Centre (NOC). The network provides three types of VSAT links, viz., DVB-S2 ACM/MF-TDMA based Broadband VSATs; Normal Single Channel Per Carrier (SCPC) VSATs and High Capacity SCPC VSATs. Presently, the network has 111MHz transponder bandwidth on GSAT satellite and this bandwidth is successfully used in providing connectivity services to remotely located educational institutes in Lakshadweep Islands, Andaman & Nicobar Islands and North-East States of the country. The following are major projects under VSAT Network.

- **High Capacity SCPC VSAT links for National Knowledge Network (NKN)**

  ERNET India has established two High Capacity SCPC VSAT links for NKN project

of MeitY located at (i) NKN Kavaratti, the U.T. of Lakshadweep Islands functional from 1.3.2017; and (ii) NKN Port Blair, the U. T. of Andaman & Nicobar Islands functional from 9.1.2018. Presently, the VSAT link at Kavaratti is working with 124Mbps; and VSAT link at Port Blair is being used as backup link of terrestrial connectivity and working with nominal 4Mbps data rate. The NKN is using these links for providing connectivity to the Knowledge institutions of the respective areas.

- **High Capacity SCPC VSAT links for LITSS Lakshadweep**

  ERNET India has established nine High Capacity SCPC VSAT links for Lakshadweep Information Technology Services Society (LITSS) in 09 Islands of Lakshadweep viz., Agatti, Amini, Andrott, Chetlat, Kadmat, Kalpeni, Kavaratti, Kiltan and Minicoy. Initially, the satellite bandwidth of 25.5 MHz was allotted w.e.f. 31.10.2019, which has been further enhanced from time to time as per the availability of satellite bandwidth. Currently, these 9 links are operating with 50 MHz of satellite bandwidth. All the links are functional and are being used by LITSS, Lakshadweep.

9.4.2 eduroam (education roaming) services- Global Wi-Fi Roaming Services

The 'eduroam' stands for education roaming services. It is the secure, world-wide roaming access service developed for the research and education community. It allows students,

researchers and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions. The 'eduroam' service is available in 106 territories worldwide.

ERNET India is a National Roaming Operator for providing eduroam services in India. This facility has been successfully availed by Indian and foreign participants in the universities/institutions. Academic and Research Institutions including IITs, IIMs, NITs, Central and State Universities and various other renowned institutions are benefited from these services.

9.4.3 Establishment of Intelligent Educational Infrastructure (Smart) in Eklavya Model Residential Schools (EMRSs)

The Project, jointly funded by MeitY and Ministry of Tribal Affairs (MoTA), is setting up Intelligent Educational Infrastructure in 328 EMRSs spread across the country. The objective of the project is to set up Intelligent Educational Infrastructure at EMRSs along with facility of Internet connectivity. It will help in the growth and development of the tribal students and to bridge the digital divide by using the latest technology. ERNET India is the implementing agency of the project. Under the project, the first year target of setting up of INTELLIGENT EDUCATIONAL INFRASTRUCTURE along with Internet Leased Line (ILL) connectivity at all 48 Nos of EMRSs has been achieved. The work of setting up of smart classes with connectivity in other 127 EMR schools covered in Phase-2 is in progress. Also, Phase-3 covering 153 EMR schools for setting up of smart classes has been approved by MeitY in March 2024 and work actions for these schools have been initiated.

9.4.4 Setting up Wi-Fi Enabled Campus Network at Patna University, Patna

The project is to set up a Wi-Fi enabled campus network at Patna University, Patna, Bihar and

is funded by MeitY. The objective of the project is to setup a model Wi-Fi Enabled Campus Network at Patna University. This shall enable on campus students, faculty, teachers, staff, guests, etc. to have entry to cyber world having intelligent Wi-Fi devices such as tablets, smartphones, laptop, etc. to access, retrieve and post information at any time. The network at Patna University is planned to be a controller based high speed wireless network with security and centralized monitoring & management systems. In March 2024, ERNET India has completed the work for setting up of a Wi-Fi enabled campus network at Patna University, Patna, Bihar and made it operational for usages.

9.4.5 Web Hosting Services

ERNET India has set up web hosting infrastructure on cloud and is providing Web Hosting as a Service on both sharing and dedicated mode to various academic & research institutions, organizations and departments of Government for hosting their websites, etc.

9.4.6 Participation in International Collaboration

ERNET India is a primary member of **Asia Pacific Advanced Network** (APAN) association from India and participates in its activities. APAN association is the International partnership of the National Research and Education Networks (NRENs) across the region. It provides a forum for user communities to come together with network engineers to help promote and exploit opportunities to enhance research and education in relevant disciplines, like Tele-health, Natural disaster mitigation, Research collaboration, Knowledge

discovery, etc. During APAN 56 meeting held in August 2023, the Director General of ERNET India had been selected as Board of Directors of APAN. Further, an official of ERNET India has also been awarded fellowship under Fellowship program of APAN 57 meeting scheduled to be held in January/February 2024.

ERNET India is also primary member of **Asia Pacific Network Information Centre** (APNIC). **APNIC** is a Regional Internet Registry (RIR) for the Asia Pacific region for providing Internet number resources to its members. It is one of the world's five RIRs and is part of the Number Resource Organization (NRO).

9.4.7 Domain Registration

ERNET India is an exclusive domain registrar for education and research domains; registering the domains under **ac.in, edu.in & res.in** from 2005. The domain registration, renewal and modification process is fully automated with online payment facility for registering and renewing domain names on just a click. The automated website is GIGW compliant and runs on dual stack IPv4 and IPv6. ERNET has also started providing DNS services to its domain users. In automated system, customers can modify online their DNS entries and other permissible information related to their institutions, thus avoiding security breaches. ERNET India also registers domain names under विद्या.भारत, शिक्षा. भारत *and* शोध. भारत under Internationalized domain names (IDN). More than 17,800 domains are active as on date.

9.4.8 Development/ renovation of Government/ State Govt. websites accessible for Persons with Disabilities (PwD) as per GIGW/ WCAG-2.0 (A, AA level)

To achieve the target of making available web content to every Indian including Persons with

disability, under Accessibility India Campaign, Department of Empowerment of Persons with Disabilities (DEPwD) has funded ERNET India to make State Govt. websites accessible to all complying to International Web Content Accessible Guidelines (WCAG-2.0) and Guidelines for Indian Government Websites (GIGW). Under the project, 698 websites have been made accessible to Divangjans as on date. The project closure is in progress.

9.4.9 Optical Wireless Access Network for Rural and Urban Communication

Fig: Experimental Setup of Hybrid LiFi-WiFi
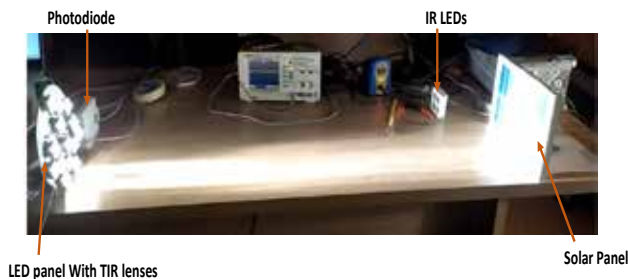
Fig: LiFi setup with solar panel

ERNET India has implemented Optical Wireless Access network for rural and urban communications,

jointly with Indraprastha Institute of Information Technology, Delhi (IIITD), funded by MeitY. Under the urban scenario, handover algorithms for hybrid LiFi-WiFi co-existence and link aggregation were developed. Further, evaluation of the co-existence algorithm in a physical hybrid LiFi-WiFi testbed at ERNET Chennai was performed and the experimental results were presented at the international conference IEEE COMSNETS 2023 on "Demo of Hybrid LiFi/WiFi Network for an Indoor Environment", and received Best Demos-Exhibits Awards (Runner Up).

Under the rural scenario, an optical link was established from LiFi transmitter to solar panel as an optical receiver. The experimental evaluations were carried out in outdoor environment. The peak data rate of 10 Mbps was achieved at a distance of 4 meters using OFDM modulation. The designed system supports the connectivity upto 10 meters of distance between the solar panel and transmitter. The project has been successfully completed.

9.4.10 Designing Reliable and Low-latency Networks for Tactile Cyber-Physical Systems

ERNET India jointly with Indian Insititute Of Science (IISc) Bangalore is executing a project on "Designing Reliable and Low-latency Networks for Tactile Cyber-Physical Systems" funded by MeitY, with an objective to design and implement Tactile Cyber-Physical System that addresses the challenges of achieving real-time interaction between physical and virtual worlds in prominent applications like teleoperation and virtual reality that require ultra-reliable low latency communications (URLLC).

WAN link setup between ERNET Chennai and Bengaluru has been configured with DSCP Expedite Forwarding (EF) strategies for transmitting both priority flows and best effort flows. The WAN link

configurations are currently being experimentally evaluated with the Geomagic Touch (Haptic) device setup at one end (ERNET Chennai) and robotic arm at other end (IISc Bangalore). Further, the IEEE TSN strategies developed under the project are evaluated in the end-to-end network for demonstration with teleoperation or AR/VR use case using haptic device and robotic arm.

9.4.11 Network Management Innovation and Experimentation with MAQAN

MAQAN is proposed between IIT Madras, ERNET India, SETS and C-DAC. This is a testbed with multiple short haul links, to explore implementation of quantum communication and develop standards around them. Indigenously built hardware for differential phase reference QKD will be extended to other QKD protocols such as measurement device independent QKD, continuous variable QKD and other communication paradigms such as secret sharing. The scope of this project covers subset of project activities to include ERNET India as part of the MAQAN project team and enable hosting of MAQAN Quantum node and participation in the experimental work. Following activities have been carried out:

Fig. Field testing of MAQAN testbed project between IITM, ERNET India and SETS.

- ERNET India has achieved phase one field testing with Software Defined Network (SDN) integrated QKD nodes.

- A new 24 core optical fiber cable has been laid between ERNET India and Society of Electronic Transactions Security (SETS) for the QKD node setup at the SETS end for the field testing of the MAQAN.

- Similarly, a new optical fiber cable connection between ERNET India and BEL located at IITM-RP has been laid. The OTDR traces for the OFC cable have been taken and analyzed.

- To establish an alternate Free Space Optics (FSO) communication link between IITM and ERNET India at IITM-RP for the MAQAN testbed, site survey for Line of Sight (LoS) and initial link testing has been completed. FSO unit will be installed at IIT Madras Research Park (IITM-RP).

- Network Monitoring and analyzing the OFC links using Optical Time Domain Reflectometer (OTDR): OTDR data extraction and plotting from the raw file (.sor) using open source pyOTDR has been completed. Dashboard to view the real time OTDR network monitoring has been integrated in Quantum Key Distribution SDN (QKD-SDN).

- Participation in TSDSI TRIP Forums and other relevant national and international standardization organization.

9.4.12 Quantum Key Distribution-based Ultra-Secure and Reliable Optical Networks using Shared Fiber Topology

ERNET India jointly with IIT Indore and IIIT Delhi is executing MeitY funded project on "Quantum Key Distribution-based Ultra-Secure and Reliable Optical Networks using Shared Fiber Topology", with an objective to analyze a physical layer model of a quantum channel integrated with the existing optical networks, demonstrate co-existence of

quantum and classical data channels, investigate new disaster aware strategies for providing survivability against natural disasters in optical networks integrated with QKD, and strategies for optimal placement of trusted repeater nodes (TRNs) in a metro area network.
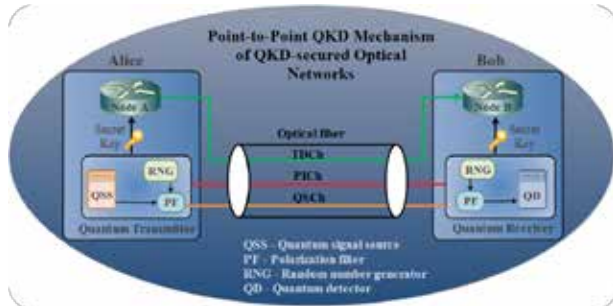
Fig. Proposed architecture of QKD-secured Optical Networks

9.4.13 Advanced Optical Communication Testbed - QKD Network Security

ERNET is a member of the Indian Institute of Technology Madras (IITM) led consortium in Advance Optical Communication (AOC) testbed project for the Work Package on QKD Network Security. The AOC testbed is funded by DoT under the Telecom Technology Development Fund. Under the work package, ERNET will setup point-to-multipoint QKD network testbed supporting Coherent One-Way QKD (COW-QKD) protocol, develop SDN enabled path control in dynamically choosing alternate Quantum Secured Paths for the QKD against emulated DDoS attacks, develop SDN framework for real-time QKD network management and monitoring, and participate and contribute in relevant standards organizations jointly with IITM at the national and international SDOs.

9.4.14 Work Based Learning (WBL) Programme

ERNET alongwith C-DAC Mohali is implementing a MeitY funded project titled "Work Based Learning

(WBL) Programme" to strengthen and empower SC/ST/Women/EWS graduate engineers for duration of 5 years (April 2022 to March 2027). Under this programme, 6 months paid Internship is offered to the candidates under selected categories. Overall, ERNET across its three regional centres (Delhi, Chennai and Bangalore) will provide opportunity to 180 WBL beneficiaries over the 5 year project period (36 Interns per annum). So far, 47 WBL interns have been benefitted.

9.5 Government's IT infrastructure: National Informatics Centre (NIC)

9.5.1 About NIC (https://www.nic.in)

NIC under MeitY is the technology partner of the Government of India. it was established in 1976 with the objective to provide technology-driven solutions to Central and State Governments.

NIC MANDATE:

- Technology partner of the Government

- Design and Develop IT Systems for the Government

- Provide ICT Infrastructure to the Government

- Explore & Advise on use of Emerging Technologies

Since its inception, NIC has been a driving force for digital advancements that promote sustainable development. With over 47 years of experience, NIC has played a crucial role in providing support for ICT and eGovernance. Through the creation of NICNET, the ICT Network, NIC has established connections with Central Government Ministries/ Departments, 36 State Governments/UTs, and more than 758 District administrations in India, aligning itself with the goals of the Digital India program.

NIC National Cloud (MeghRaj) currently hosts critical applications on over 24,900 virtual servers, supporting over 1690 e-Governance Users/ Applications as part of Digital India. NIC's video conferencing service aids Government officials in remote and effective communication.

NIC has utilized cutting-edge technologies like Cloud, Mobile Apps, Data Analytics, Business Intelligence (BI), Advanced Geographic Information System (GIS), Blockchain and AI to develop user-friendly eGovernance products/applications. The establishment of Centres of Excellence further strengthens the country's digital infrastructure, contributing significantly to the upcoming decade's digital transformation.

Internationally, NIC's products and services have garnered recognition, with many countries expressing a keen interest in seeking NIC's support in IT and eGovernance.

9.5.2 Network Services

9.5.2.1 NICNET

Core of NICNET backbone is fully upgraded to multiple 10 Gbps capacity with sufficient redundancy. States are connected through multiple 1/10 Gbps links and districts 34/100 Mbps links with redundancy built at State and District links. Last mile redundancy for NICNET has been extended to a greater number of districts, with primary link from BSNL and secondary links from RailTel/PGCIL. Most of the Bhawan Links at Delhi are upgraded from 100 Mbps to 1 Gbps depending upon the requirement.

Direct peering of NICNET with BSNL, PGCIL and RailTel are completed at Delhi and Hyderabad for saving Internet Bandwidth and faster access of each other's Network and Data Centre. Peering with Google, Microsoft, Facebook, and Akamai Content Delivery Network has facilitated faster access to Google services and other important international web sites. Re-structuring of Video Conferencing network has enabled to minimize delay and handle large scale important video conferencing such as PRAGATI and GST Council Meetings.

High speed Internet services are provided to all National data centers to ensure applications hosted are accessible to users across the globe with minimum latency. Capacity planning and upgradation of Internet Gateway at regular interval has been undertaken to provide smooth Internet access to all NICNET users throughout the country. To maintain accurate timing and synchronization of all network elements and servers on the network Stratum-1 clocks are installed at Delhi and Hyderabad.

9.5.2.2 National Knowledge Network (NKN)

NKN empowers Digital India, as it is the primary backbone for all e-Governance initiatives in the country. It is the only network globally that carries R&E, Internet, and e-Governance traffic as independent verticals under one umbrella. NKN has multiple 10G links that are combining a core bandwidth of close to 1000G, providing secured and highly resilient connectivity across major Institutions for research, education, and e-Governance.

NKN has a strong backbone connectivity with 31 Points of Presence (PoPs) in various State Capitals and 96 core links connected with meshed and partially meshed topology. Moreover, currently over 22.96 Petabytes of data is flowing within the NKN backbone every day. Over 77 links of 57 Institutes (premier Institutes, SDC (State Data Centres) & SWAN (Statewide Area Network) of many states) have been upgraded to 10 Gbps. NKN has also established a High Capacity SCPC VSAT Connectivity at Kavaratti, Lakshadweep and Port Blair, Andaman & Nicobar Island. NKN

has established International PoPs at Singapore, Geneva & Amsterdam and connectivity to SAARC nations, viz., Bangladesh, Bhutan, Sri Lanka & Maldives.

NKN was instrumental in e-Governance and remote learning during the Covid phase. It continues to serve high-end research initiatives across the spectrum which could be seen in its support to ISRO in its space exploration mission of Chandrayaan - 3 in 2023.

9.5.3 Data Centre & Cloud Services

9.5.3.1 Data Centre

NIC has set up state-of-the-art National Data Centres (NDCs) at Delhi, Pune, Bhubaneswar, and Hyderabad to provide cloud services to various central and state Government Ministries, departments, and PSU etc. at all levels. These Centres combine round-the-clock operations and management of systems with onsite skilled personnel. These are designed to provide a full stream of hosting services which extend from physical to shared hosting, dedicated servers with managed hosting solutions to infrastructure services like collocation & bandwidth, Disaster Recovery (DR) etc. Many missions critical applications/web sites of various State and Central Government departments are hosted at these Centres.

At NDC, the storage capacity was augmented, and the capacity has been increased to approx. 100PB. It includes All Flash Enterprise Class Storage, Object storage, Unified storage etc. Around 5000 odd servers are being used for various cloud workloads. NDC Delhi and NDC Bhubaneswar are ISO 27001:2013 certified.

Another state-of-the-art NDC (Tier-III) of 200 Racks expandable to 400 Racks is being established at Guwahati, Assam.

Presently, NDCs of NIC/NICSI at Delhi, Hyderabad, Pune, and Bhubaneswar are dedicated to host NIC National Cloud under the umbrella of MeghRaj Cloud, a Government of India initiative which has been providing a wide range of services which include but not limited to IaaS, PaaS and SaaS, which can be used to host websites, portals, web & mobile applications. NIC Cloud Service offers various services including virtual servers, Kubernetes containers, DevOps and provides hosting support to all types of applications. This allows cloud users to avail the services from multiple locations as per their choice and prepare the DR setup. In recent years, government organizations have been adopting cloud technologies and hosting their ICT applications on cloud platforms. NIC National Cloud is the de facto platform to host any applications & workloads.

Keeping in view of the benefits of the cloud, NIC has also established NIC State Clouds in its Mini-Data Centers in the State Capitals. So far NIC State Clouds have been established in approx. 24 States.

9.5.3.2 Cloud Services

NIC launched National Cloud Services in 2014 under MeghRaj Government of India Cloud Initiative. NIC Cloud Services are being provided from multiple locations of the National Data Centre. Container as a Service is, and multiple AI based services are now offered on NIC Cloud platform.

- **Container as a Services** is a highly scalable, high-performance container orchestration service that supports Docker containers and allows you to easily run and scale containerized applications. Some of the prominent features of CaaS are Improved Developer Productivity, Secure and Highly Available Image Registry, CI/CD Support etc.

- **External Endpoints** let you connect your applications running on Containers as a Service to external servers/systems like a Database Server, an SMTP Server, an SMS Gateway etc.

- **Software as a Service** is a delivery model wherein Cloud provides various readymade Services for direct consumption of its users. NIC is presently offering the following Software Services over its National Cloud.

- **WAF as a Service:** It provides an effective protection mechanism against cyber-attacks at web layer. It blocks an ever-expanding and sophisticated web-based intrusion & attacks listed under Open Web Application Security Project (OWASP). It would also help in tracking emerging attack vectors at application level and helps in restricting the same.

- **Agile as a Service** provides a combination of frameworks, tools and software practices for development and delivery of fast paced user centric software solutions. Practices and frameworks touch upon all the aspects of software development from planning (Scrum) to deployment and monitoring (DevOps).

- **Resource Monitoring as a Service** enables a cloud user to have real-time as well as past visibility of cloud resource usage like VM uptime, CPU & Memory, disk, network, etc., It also enables users to monitor availability applications & websites through remote network ports or URLs.

- **Data Analytics (DA) as a Service** enables users to build infrastructure for examining & analysis of large data sets to underline insights, patterns from retrospective to prospective in helping the decision makers to investigate the future and plan accordingly. Infrastructure hosted in the NIC National Cloud and provides an alternative for data analytics infrastructure.

- **Application Performance Management (APM) Service** is an agent-based solution for managing the performance and user experience of applications in the NIC Cloud. This requires installation of monitoring agent software for collection of performance data from various components of application. The data is analyzed in the APM server for actionable insights through a dashboard.

- **Load Testing as a Service** helps users in validating their application design and server Infrastructure on Cloud for expected concurrent user load wherein the system's response is tested under varying load conditions simulating concurrent virtual users accessing the application under test.

- **AI – Manthan** is a Development Platform to Build, Train, and Test AI based Deep Learning Models. AI is the simulation of human cognitive processes by machines. Machines learn from both structured and unstructured data to accomplish this. AI models can be built using supervised learning, or semi-supervised learning, where the system can be used to search for patterns in the data and cluster them, and in the next stage, use such classes for further model training.

- **AI – Tainaatee:** Inference Testbed for production ready AI Manthan trained Models.

- **AI – Satyapikaanan**: Put simply, face verification is needed to verify that you are who you claim to be. It is needed for contactless online security. Your unique face is the most secure way of verifying your identity online, and it's the only way that government services can be assured that you and only you have access to your data.

- **AI – VANI**: Conversational AI in the form of virtual assistants, chatbots, and voice-bots has gained popularity as it can be used to automate

the task of answering user queries that are repetitive in nature. A chatbot is a piece of web-based software that conducts a conversation via auditory and/or textual methods and is often designed to simulate how a human would behave as a conversation partner. Chatbots and voice-bots can help provide services to the end user in an efficient manner 24x7.

- **AI – Panini**: Text Translation API based Services is about using NMT to transform the text from one language into another. This is a service for the automatic translation of text from different Indian languages to English and vice versa. This service can perform translations for 11 Indian languages, i.e., Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Oriya, Punjabi, Tamil, and Telugu.

- **AI – Shruti**: Automatic Speech Recognition (ASR) is all about using computers to transform the spoken word into a written one. ASR is a subfield of AI in which a computer recognizes spoken words and transforms them into text. The process is also commonly referred to as "speech-to-text" or "transcription services." The process can be applied to live speech or audio recordings.

- **AI-Saransh** is a technique that shortens a long piece of content with main points outlined that gives an idea of the whole content. It becomes critical when someone needs a quick and accurate summary of very long content. Summarizing text can be expensive and time-consuming if done manually. Machine learning and natural processing language are helpful in creating an automatic text summary.

To cater the projects envisioned under the Digital India program and growing requirements of existing Projects, over 24,900 Virtual Servers were provisioned and allocated to over 1,690 Users/Applications for e-Governance Projects.

NIC has taken various steps to augment the existing Cloud Infrastructure of the NDCs to provide SLA based managed Cloud services in collaboration with industry stakeholders. To achieve this goal, the National Government Cloud (NGC) is being set up. NGC shall consolidate the cloud services across NDCs via a single Cloud Management Platform.

NIC has been establishing NIC State Clouds in its Mini-Data Centres in the State Capitals. So far NIC State Clouds have been established in 23 States and these are operational and resources of over 3100 virtual servers have been allocated and over 900 users, 1100 applications of Govt. Departments.

9.5.3.3 Command and Control Centre (CCC)

CCC has been operational at NIC HQ with the objective of providing a single window solution for monitoring, troubleshooting and technical support for applications hosted in NIC Cloud, National and NIC Mini Data Centers across the country. In the last one-year demand for services offered by CCC have increased manifold. CCC has been providing following services:

(i) **Resource Monitoring Service:** employs open-source tools like "OpenNMS," Zabbix, and Grafana to continuously monitor services and resources within the ICT infrastructure hosted across NIC Data Centers and applications on the NIC Cloud on a 24x7 basis.

(ii) **CDN service:** Many critical websites/applications have been using CDN service including President of India, PM of India, Supreme Court of India, MyGov, Swaas, National Portal, MHA, MoHFW, Min of Ayush, DigiLocker, iGOT, CVC, ECI Results, UMANG, CBSE, NITI Aayog, important webcasts etc. More than 50 TB per day traffic is being served through CDN.
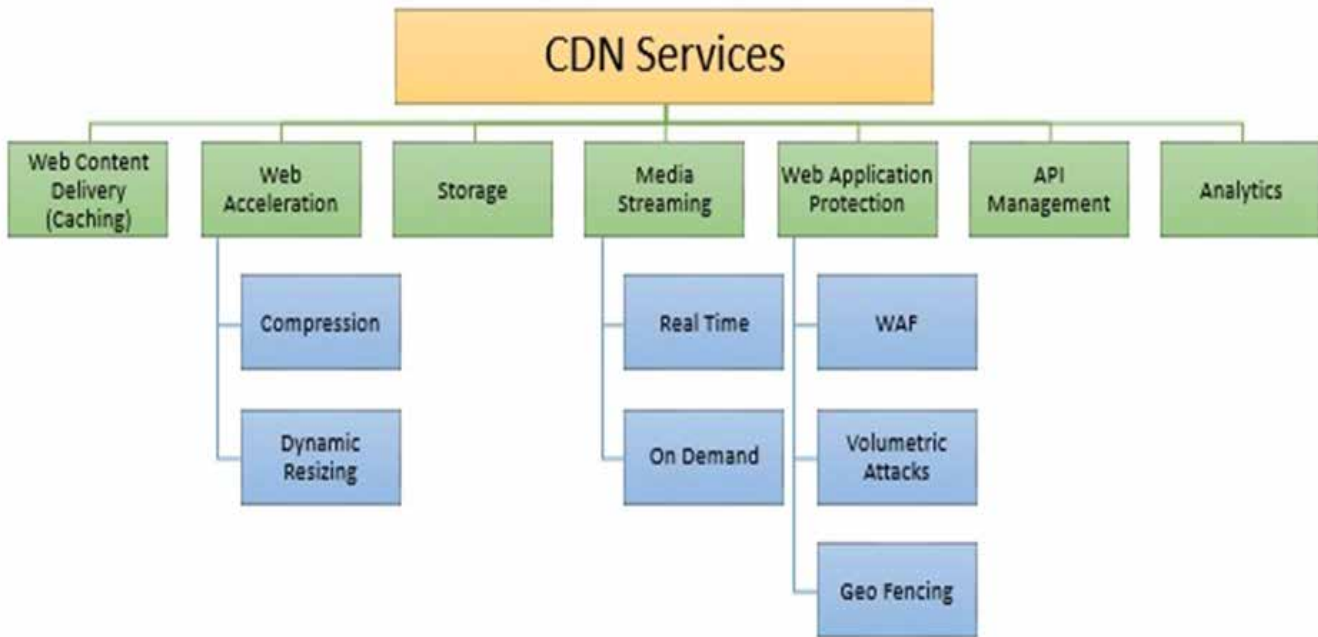
(iii) Application Performance Monitoring (APM): is a set of practices and tools used to manage and monitor the performance related aspects such as availability, resilience and reliability of software applications. Using specialized software tools, users are able to monitor an application's behavior in real-time and focus more on business transactions that have performance issues and alert the development team appropriately. This includes capturing telemetry data from different tiers of applications and providing alerts when thresholds are exceeded. Modern APM solutions have inbuilt ML/AI capabilities that goes one step ahead and prompts remediation on observed performance issues and trends.

On demand APM service is offered by CCC to troubleshoot and streamline application performance.

(iv) NIC Assurance (Load Testing as a Service): A self-service model for load testing on the applications hosted on NIC cloud and data centers.

(v) Troubleshooting & technical support: Support to applications in resolving various issues ranging from basic OS/software configuration to troubleshooting issues in live applications, software upgrades and patching, resolving security issues (VA), SSL configuration and renewals etc.

(vi) DC service: Operations and management of 52 racks DC hosting the storage, network and SAN related to CCC services and ICT infra of few major projects/services such as AI, Webcast, Video Conferencing, Near DR of email/ messaging etc.

9.5.4 Cyber Security

Cyber Security incorporates the security standards and procedures followed to ensure protection of sensitive data, personal information, intellectual property etc. Multi layered access mechanisms are implemented on information systems for prevention from security breach and unauthorized access.

To prevent the misuse of the power of social media, Indian Cyber Crime Coordination Centre (I4C) has set up a workflow-based Open-source Information Sharing System (OSISS) through NIC. This initiative aims to provide a secure platform to various stakeholders like Ministries, States, Law Enforcement Agencies (LEAs), Specialized Cyber Space Agencies and senior officers in MHA to feed and share open-source threat data among them for proactive, preventive, and protective actions by individual entities. The information is crawled to OSISS with the help of open-source social media analytic tools and Hydra application. OSISS has been hosted in the NIC cloud and integrated with Single Sign-on (SSO) platform, Parichay of NIC. The platform assists to search from open-source contents and enter the events related to Threat Categories like Cyber Crime, Left Wing Extremism, North-East, J&K Terrorism, National Sentiments Separatist, Trending issues, Radicalization, JMB, etc. Now the system is being rolled out in all the States to make it wider utilization.

9.5.4.1 Network Security

During the year, the Network Security Division (NSD) was constantly engaged in ensuring Cyber Security of NICNET information infrastructure through assessment, planning, deployment, management and administration of state-of-the-art security appliances and solutions. The security span of NSD comprises National and State Data Centers, over 1000 LANs of Govt. offices and MPLS networks, more than 2 Lakh end-points and a series of networking devices deployed across the country. Multi-layer security was provided to NICNET users with high availability infrastructure and specialized teams were deployed to work on different Layers of security. Critical Security Controls were maintained for effective cyber defense and change control management. Distributed Denial of Service (DDoS) attacks towards NIC infrastructure were prevented using Anti-DDoS Appliances deployed at gateway level in NDCs. Network Firewalls are being used to provide the requisite security to the digital assets in NIC's National and State Data Centers. Network Intrusion Prevention Systems (NIPS) were maintained in monitoring and blocking mode for performing deep packet analysis. Up-to-date signatures were applied on a regular basis in all IPS Sensors deployed in NICNET across the country. Geo-fencing of applications was also facilitated wherever it was needed.

As a part of enhancing endpoint security, the Host Intrusion Prevention System (HIPS) solution was deployed in server systems in National Data Centers. Next Generation Antivirus solutions with AI & ML, Endpoint Detection & Response (EDR) and Sandboxing for malware analysis were deployed in client and server systems in NICNET. Necessary support was provided to server owners to fix the vulnerabilities and improve the VA score so that the applications can be securely deployed. Audit of Network and Security devices was conducted at NDCs, SDCs and various State & Bhawan networks.

The 24x7 Security Monitoring Centre was constantly engaged in identifying suspicious activities towards NICNET based on real time log correlation using SIEM solution. Attacks were handled based on the correlation of security alerts from various security solutions deployed in NICNET. Cyber-attack incident reports for major security issues were regularly shared with the respective application/asset owners along with suggestions for further necessary fine tuning. Separate attack trend reports of strategic sectors were also prepared and shared with the concerned agencies.

Several awareness programs and capacity building programs were conducted on Cyber Security.

9.5.4.2 NIC-CERT

NIC-CERT focuses on handling security incidents, gathering security intelligence, and identifying security gaps in ICT Infrastructure, and works with the stakeholders for mitigating the security issues. Some of the key activities carried out by NIC-CERT are its setup of a central log management platform and integrated logs from over 600+ websites, applications, network, and security devices. It has developed Machine Learning models for detecting advanced security attacks and training of the models is underway. NIC-CERT setup a central portal for facilitating the free SSL Certificate generation through Let's Encrypt CA. More than 2700+ SSL Certificates were issued through this portal. It has configured and sent automatic SSL Certificate expiry alerts, SSL Vulnerabilities, and misconfiguration alerts. It has published more than 300+ Security Advisories covering various hardware, software, and other critical technology stacks. It has sinkholes and blocks more than 1 billion C2 and other malicious traffic hits. NIC-CERT handled more than 660+ Security Vulnerabilities affecting Govt. Applications, Websites, and related ICT Infrastructure.

Portal has handled 48 website defacement incidents, 300+ Phishing incidents & 2700+ C2 communication incidents. Also, shared daily security status reports to the Ministry/Bhawan's IT Team. It has shared monthly summary security status reports with the CISO's of various Govt Ministries and Departments. It has undertaken training and capacity building sessions for NIC Officials, CISOs & Other Govt. officials. It has delivered cyber security trainings and lectures in various conferences, workshops organized by C-DAC, MeitY, NeGD, IB etc. It has shared with CERT-In, the Threat Intel identified during investigation of security incidents. NIC-CERT undertook R&D activities to build a Cyber security Platform in a project sponsored by NSCS. It has carried out pro-active red team activities to identify more than 600+ security issues affecting various ICT components managed by NIC.

9.5.4.3 Application Security

Security Audit of hosted Web Applications / Websites is taken up as per the NIC Security Audit policy. The Security Audit activity comprises Source Code Analysis, Automated scanning and Manual Audit process. Periodic Audits in the form of Post deployment vulnerability Testing (Penetration Testing) and Vulnerability Analysis, SSL compliance testing, Version Detection for application hosting environment with infrastructure compliance checks are also undertaken. Response provided to Application Security issues received through RTI, Parliament questions, grievance, and LEAs. Capacity building programmes for NIC, Government officials in the Information Security domain are taken up on a regular basis.

9.5.4.4 Virtual Private Network (VPN)

VPN is a secure method of connecting **remote** users to their private and corporate networks

over the Internet. NIC's VPN service is used by Government officials, Central and State Government departments, PSUs, and Autonomous bodies under Central and State Governments to

a. access e-governance applications, and

b. update their web sites and remotely manage the servers hosted in NIC's Data Centers.

NIC is also offering new remote access technologies like WebVPN. This customized product is completely Indian and in addition to being lightweight and scalable (requires only a Web Browser) is also secure (through two factor authentication). NICNET has been extended through site-to-site VPN with other independent networks like Indian Missions Abroad.

VPN services are secured using best of security practices and routine detailed log analysis. The upgraded VPN service entails an enhanced security in authentication mechanism and client software. Very soon this service will be extended

in a Disaster Recovery mode.

9.5.5 Web, Messaging and Support Services

9.5.5.1 Domain Name Registration

(https://registry.gov.in/, https://registry.gov.in/pdfdocs/Gov.In_Guidelines.pdf)

NIC is an exclusive domain registrar for Gov.in. The allocation of Domain Name under Gov.in is made in compliance with the registration guidelines released by MeitY.

A domain name apart from English could also be registered in different other official languages (IDN) and contributes to making the website completely in regional language starting from Domain name to web page content. Domain name registration could be done online by login into registry portal Different online services with e-Sign feature provided through the portal make the process easy and quick by cutting the overhead time and making the Services completely online.

As of now, there are 4,947 of total Active Domain (3rd level) 1,44,021 of Total Active domain at 4th level (Registered under 3rd level Domain Hosted in NIC).

9.5.5.2 email

With a vision to transform India into a digitally empowered society, MeitY launched the 'Digital India' programme in 2015. The programme focused on bridging the digital divide and ensuring digital accessibility across the country. The programme entails many e- governance initiatives to streamline public services, enhancing efficiency and transparency.

E-mail serves as the backbone of all e-Governance initiatives in the country. The service was implemented by NIC and has been massively used by both Centre and State Governments. The service provides 24x7x365 support to a user base of more than 33 Lakh officials under Ministries/ Departments/ Statutory bodies/ Autonomous bodies of both Central and State/ UT Governments.

The prominent features supported by the service are multi-lingual support, Internationalized Domain Name (IDN), Standardized Official Template, User Persona, Video Conferencing Integration, Undo Send, Briefcase etc. The security features offered in the service are Multifactor Authentication, Geo-fencing, Device Mapping, Mail encryption etc.

The first phase of the project "email Service of Government of India" was completed in March 2022 and the next phase was initiated by NIC in April 2022.

(i) **Integration of NIC meet:** It allows the Government officials to interact with each other on a secure connection network with inbuilt one-to-one, one-to-many calling function. NIC meet has been integrated with email. The user can thus schedule and share a calendar invite with the NIC Meet link.

(ii) **Added feature to Update Mobile and profile:** Self-serving portal to update mobile number and user profile details like display name, designation, date of birth etc.

(iii) **Introduction of ID retrieval**: Additional feature to allow users with IDs on Government server to use the service without creating a new ID. This can be done by submitting a registered mobile number and OTP for verification. The user can further access email by resetting the password.

(iv) **Incorporation of caution email:** Enables the users to send email with caution/ awareness header which intimates the recipient to treat the e-mail with "caution".

(v) **Addition of sticky note:** The feature allows users to make quick notes and attach it to a particular email. Once attached, the sticky note will automatically pop-up the next time the user opens the email.

(vi) **Dashboard development:** This feature allows the user to view various elements at-a-glance. Examples of elements are storage occupied and available, email addresses/ alias assigned, past 15 days login history including IP addresses, protocol, date & time, and country of access and more.

In addition to the above related with existing email services of NIC, empanelment of M/s Zoho was finalized for new Cloud based email solution of NIC

under directions of MeitY. In the pilot phase around 13000 email ids were successfully migrated to Zoho email platform and users are availing hassle free services up to their satisfaction level.

9.5.5.3 SMS

NIC SMS gateway, hosted at NDC Delhi and Hyderabad, provides PUSH PULL SMS services. It is TRAI TCCCP regulation 2018 complaint. There are 3,450 applications integrated, which send 6 to 7 Crore SMS per day to citizens as well as international subscribers. Major applications include UMANG, DigiLocker, Parichay, UIDAI, GSTN, UWIN, Bharat Ke Veer, MyGov, CGHS, EPFO, Courts, Sansad, PMO etc. On an average 9 SMS campaigns per month have been executed for information dissemination and citizen engagement like Rozgar Mela, Yuva Pratibha, Digital India Week, Garib Kalyan MahaQuiz, Chandrayaan Quiz, Trinity Quiz, UPSC, Cooperative Society, PPC etc. The gateway is integrated with all major TSP (telecom service providers) with a combined bandwidth of 26,000 TPS (transaction per second). Currently 16 short codes are integrated. Major short codes are 1,921 (MyGov), 15,544 (Mid-day-meal), 1,947 (UIDAI), 155246 (UMANG), 14,409 (GSTN), 14,444 (Digi Vaarta). In year 2023, till the writing of this report 2,000 Crore SMS were transacted. NIC SMS gateway delivers more than 90% of SMS and 95% of OTP SMS, which is at par with industry standards.

NIC SMS Gateway also provides voice services like OBD (Out Bound Dialing) and Miss Call services. Total around 7 Crore missed calls have been generated by citizens accessing various services like EPFO, UMANG, MNRE, eKAMAAN etc. Similarly, 20 Crore OBD made under MyGov, Punjab Ghar Rozgar Yojna, Mera Aaspatal, CM Office Haryana etc. This resulted in more than 97 Crore seconds duration voice calls to citizens.

Major achievement includes finalization of

empanelment for providing IVR and OTT services like WhatsApp Messaging. This year, NIC SMS gateway reached the milestone of 15000 Crore SMS transactions since inception. Feedback for the 100th episode of Mann Ki Baat was executed. UPSC used OBD services to enable exam center change by applicants belonging to Manipur. NIC SMS Gateway deployed middleware in the DC (data center) of Madhya Pradesh to enable on boarding of applications under MPSEDC (Madhya Pradesh State Electronics Development Corporation).

Performance Indicators	Total	Monthly Average
SMS Accounts created	213	17.75
SMS sent (In Crore)	2,653	221
Campaigns	221	18
SMS sent IN campaigns (In Crore)	172	14.3
Pull SMS Keywords Created	24	2
Pull Requests In Crore	4	38
Missed Call Received (IN Crore)	9	79
Number of OBD	44	3
OBD Duration (Seconds IN Crore)	104	8.6

9.5.5.4 Single Sign-On (SSO) Parichay

SSO is a centralized session and user authentication service in which one set of login credentials can be used to access multiple applications. Its beauty is in its simplicity; the service authenticates the user on one designated platform, enabling the user to then use a plethora of services without having to log in and out each time.

Parichay: SSO framework for the **Government to Government (G2G) Services** along with an added layer of security by providing a strong authentication mechanism.

Parichay application allows the user to access multiple applications through single sign-on. Once the user login to the Parichay application, all the applications that comply with Parichay integration will be auto logged in by sharing Parichay sessions. After login to Parichay, the user can move seamlessly between two or more applications.

Jan Parichay (Meri Pehchaan): SSO framework for **Citizen-Centric (G2C) Services** that authenticates user using any of the user identifier like email/ Mobile/ Aadhaar/ PAN/ Other Government Ids.

Parichay is an application that supports the goals of scalable network architecture by allowing the integration of multiple secure domains. The application authenticates the end user for all the services the user has been given rights to and eliminates further prompts when the user switches services during the same session. On the back end, Parichay is helpful for logging user activities as well as monitoring user accounts.

Parichay Offerings:

(i) Multi-factor Authentication

(ii) Integration Standards
(iii) Authentication Auditing
(iv) User On-boarding
(v) Identity Verification
(vi) Security Capabilities

9.5.5.5 Government Instant Messaging System (GIMS) - Sandes

SANDES stands as a secure and indigenous open-source instant messaging platform developed by NIC. It is designed to facilitate communication between Government entities (G2G) and between the Government and citizens (G2C) with a strong focus on security and privacy. Every message within Sandes is encrypted end-to-end (E2EE) for enhanced protection. The key features of Sandes encompass one-on-one and group chat functionality, audio and video calls for both individual and group conversations, seamless contact synchronization with your phone's address book, the ability to share media files and message broadcasting. The Sandes adheres to the social media Intermediary Guidelines and the government's Privacy and Data Retention policy, ensuring compliance with official regulations.

Components & Features

This versatile platform is actively used by various Government ministries and State departments, including Delhi Police, Defense Production, AIIMS, BSF, and more. Additionally, it has been seamlessly integrated with a range of e-Governance applications, such as NIC email, eOffice, Digilocker, PFMS etc. for secure messaging, alerts, and the delivery of OTP. Notably, Delhi Police employed Sandes to maintain confidential communication during the G20 summit. The Sandes app is readily available on both the Play Store and the App Store, making it easily accessible to authorized users.

9.5.5.6 Service Desk

NIC Service Desks (NSD) has been steadfast in its mission to provide a single-window platform for resolving issues related to a wide range of services offered by NIC. NSD serves as the Single Point of Contact (SPOC) for government entities, statutory bodies, and the general public, enabling them to raise queries, calls, complaints, and suggestions for any issues they encounter in their day-to-day activities with different NIC services.

NSD is a facility to help in the generation of tickets, once the ticket is generated it is then forwarded to the concern division for resolution.

Image 1: Showing web portal of NIC Service Desk
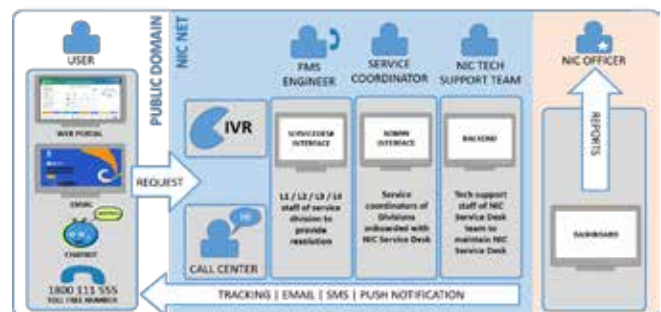
Image 2: Showing request flow of the NIC Service Desk

NIC Service Desk plays the role of communication channel between NIC and users. Presently, users from both central and State Government departments as well General public rely on the NSD system to register their complaints and seek resolutions. It enables 24x7 support through a toll-free call center (1800111555) and a user-friendly web portal (https://servicedesk.nic.in), where complaints related to any NIC services can be effortlessly lodged.

Description	FY 2023-2024
Central department (Including 58 Delhi Bhawans)	294
Total registered users	5,42,409
Total core services	35
Total Executives (Resources from NIC/Support)	3,108

Table 1: Showing the number of stakeholders the NIC Service Desk serves.

The main objectives of the NSD are:

- It Service Desk continues to serve as the primary avenue for users to register complaints via Call Centre, Web portal, and e-mail simplifying the process and improving accessibility.

- The system ensures resolution by routing complaints to the relevant department/ division, ensuring that concerns are addressed promptly.

- It maintains a high level of transparency and accountability throughout the complaint resolution process.

- It has created a single repository for all issues raised and resolved, ensuring that historical data is readily available for analysis and future improvements.

- It upholds timely issue resolution with provisions for escalations, ensuring that user concerns are addressed promptly.

- Detailed responses to user issues, coupled with a feedback mechanism, enhance user satisfaction.

Description	FY 2022-2023
Central Ministries	71
Districts	752
State Organization/Institutes	17,671
Organizations (Institutes)	1,687

Table 2: Showing the number of stakeholders the NIC Service Desk serves.

After the complaint is registered, an auto ticket is generated, and details are forwarded to the concerned divisions/services. The resolution officers and support staff of all on boarded services attend to the complaints and provide solutions via web portal and e-mail. It is a completely transparent system that tracks all actions from the point of complaint registration till closure.

9.5.6 Video Conferencing Technologies and Services

9.5.6.1 Video Conferencing Services

NIC provides Video Conferencing from more than 2400+ studios spread across the country including state capitals, districts, UTs, departments at ministries etc. Video conferencing Infrastructure over NICNET was strengthened by augmenting with state-of-the-art technology as per international standards.

NIC is also providing state-of-the-art Desktop based Video Conferencing solutions, which enable services from Anywhere, Anytime, and Any Network. In 2023-24 about 2.76 lakh multisite conferences with more than 22.55 lakh participants in 15.41 Lakh site hours.

Video conferencing services are being used for monitoring of various Government Projects, Schemes, Public Grievances, monitoring of law and order, Hearings of RTI cases, Tele-education, Tele-medicine and launching of new projects/schemes etc.

NIC is providing Video Conferencing services to users of various Departments of Central Government & State Governments. NIC's VC services are being extensively used by Hon'ble President of India, Hon'ble Vice President of India, Hon'ble PM of India, Union Ministers, Governors, Chief Ministers of States, Cabinet Secretary, Chief Secretaries, Chief Information Commissioner and various other senior officials across country. NIC has developed an in-house Webinar Application by integrating with Bharat VC and Webcast streaming application. This can be used to organize training, events and skilled development programmes.

Video Conferencing during Jan-23 to Mar-24

276100+
Total VC Sessions in 2023-2024

15,41,900+
Total VC Hours In 2023-2024

NIC is offering VC services since 1995

10000 +
VIP VC Sessions in 2023-2024

2400+
Total NICNET VC Studios
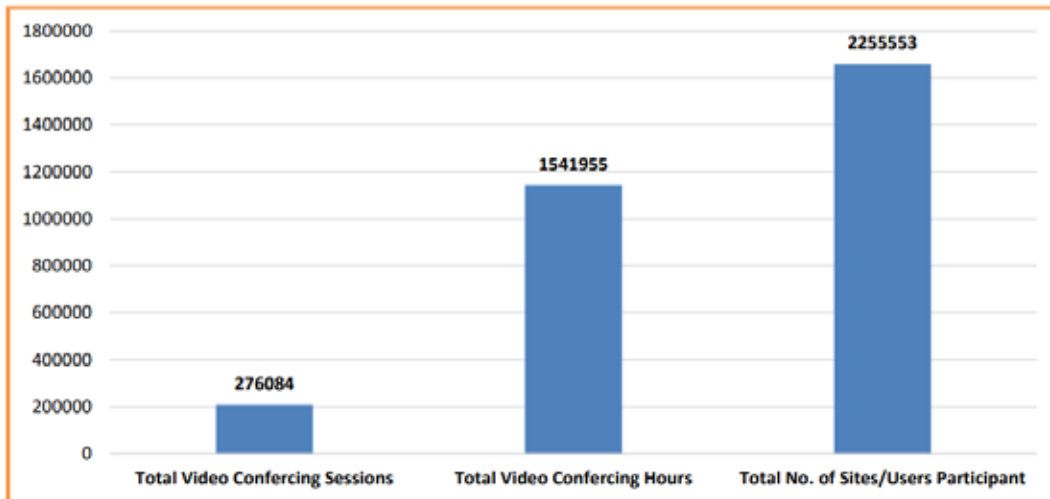
NIC has largest Videoconferencing network in the country spread across the country including state capitals, districts, union territories, departments at ministries including apex bodies etc.

NIC is also providing Desktop based VC solutions using various palform which enable services from Anywhere, Anytime, Any Device and Any Network.

9.5.6.2 Webcast & Webinar Services

NIC has been providing webcast services for the last two decades:

- NIC webcast service covers Events like Union Budget, President and PM's addresses, PM's Mann ki Baat, Independence Day and Republic Day celebration (New Delhi), PIB Press conferences, Army and Air force day celebrations, State Assemblies proceedings etc.

- NIC has its own indigenous webinar solution for training, seminars etc. with large scale of participation.

Important Events Details - 2023

9.5.7   GeoSpatial Technology and Services

(https://mapservice.gov.in/,   https://stategisportal.nic.in/stategisportal)
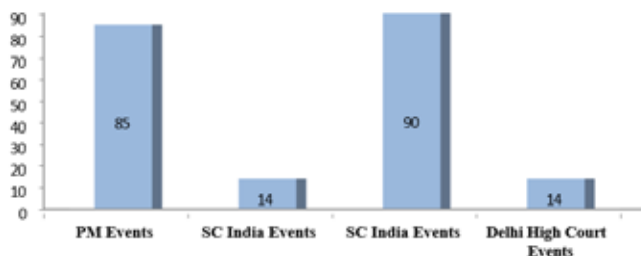
To fulfill the objectives of Digital India and to establish end to end geospatial electronic delivery systems as part of National GIS Mission Mode Project, GIS Platform was established by NIC using NICMAPS Services. It has been revamped as "BHARAT MAPS". This depicts core foundation data as "NICMAPS", an integrated multi scale, multi-resolution base map service using reference data from Survey of India, ISRO, FSI, and RGI and so on. This encompasses large number of layers containing administrative boundaries, transport layers such as roads & railways, forest layer, settlement locations etc., Service offerings include India specific Basemap services, updated Admin boundary database, coding and reverse geocoding services and All-India rural focused navigation services.

Map Services are being provided to various ministries and departments through map services platform. About 250 applications are using these

services. The ministries are the Ministry of Drinking water and Sanitation for SBM (Gramin), Jal Jeevan Mission, etc. Similar Services are being provided to Department of Land resources, Department of Labor, Vahan/ Sarathi Project, CGHS, HMIS etc.

NIC is also helping various ministries in managing their Point of interest databases like Schools, Banking Infrastructure, Post Offices, health infrastructure etc. through geoportals.

STATE GIS PORTAL empowered by BharatMaps is a simplified user interface for all the states and UTs of India. Six Centers of Excellence in GIS have been established in Madhya Pradesh, Tamil Nadu, Odisha, Bihar, Andhra Pradesh, and Assam. They are also offering GIS services to various departments. "Geo-Spatial" is a core foundation to improve or enhance Governance Systems and Structure to facilitate location specific planning and decision making.

SVAMITVA Dashboard Application is one of the major achievements. It provides role-based access to update status on KPIs of SVAMITVA scheme dealing with drone survey of village Aabadi areas and activities involved there on ultimately resulting in Property card generation and distribution. The key stakeholders are the Ministry of Panchayati Raj, Survey of India, State Govts and NIC. The Portal was also used to distribute property cards to beneficiaries through SMS. The drone data which is generated under SVAMITVA project being integrated with Grammanchitra application for rural planning.

Geo-Spatial Division is playing a very important role in another flagship project PARIVESH for Ministry of Environment, Forest and Climate Change where GIS based decision support is integrated in the workflow of Clearance process from Stakeholder level to decision authority level https://parivesh.nic.in/.

Geo-Spatial Technology and Services also plays a crucial role in the management and planning of utility service systems. Utility Service Systems mainly includes Global Positioning System, CORS, Topographic/Cadastral Mapping, UAV / drone survey Photogrammetry and AM/ FM/GIS.

The division has launched One Map Series for cities wherein all city level modules like plot information, Utility workflow management, Solid Waste management, Vehicle Tracking and Road information are incorporated. Some of the major projects accomplished in this financial year are One Map Greater Noida Geo portal, One Map Noida Geo portal, Mega City Portal, Delhi Jal Board, E-Dharti web and Goa State Urban Development Agency (GSUDA).

9.5.8 Digital NIC

The Digital NIC is a single window G2E portal for all NIC Employees, a comprehensive and integrated platform designed to streamline and automate various aspects of employee management and organizational data processing and promotes a paperless and efficient work environment. It provides data and insights that help in making informed decisions, managing resources, and tracking various aspects of the organization's performance.

Key features:

- Single Window Access
- Role-Based Workflows
- Alerts and Notifications
- Application Submission

Digital NIC is integrated with several external services, such as eSign (for electronic signatures), PFMS, email, and Sandesh (instant messaging service), DigiLocker, eHRMS 2.0. These integrations facilitate a paperless flow of applications and communication.

The portal offers role-based dashboards, such as

a Personnel Dashboard and Finance Dashboard. These dashboards provide customized views and data for different departments or roles within the organization, making it easier for users to access relevant information. This can empower employees to make informed decisions and take actions more efficiently.

9.5.9 ICT Solutions for North-Eastern Region (NER)

The ICT support for implementation of development projects under various schemes for the North-Eastern Region by various Ministries/ departments has improved tremendously. Two MIS for monitoring the implementation and progress of projects under various schemes have been implemented by the Ministry of Development of North-Eastern Region (MDoNER).

Reaching the last mile; giving momentum to developmental activities in Northeastern Region in line with working towards realizing Hon'ble PM vision of 'Ashtalakshmi'.

Hon'ble MoS, MDoNER, launched the 'POORVOTTAR SAMPARK SETU', a powerful portal to make Ministerial visits to NER, more effective, transparent and impactful. The portal provides valuable insights and graphical information about State wise/ District wise visits to NER. The portal generates a curated list of 24 Hon'ble Ministers who are scheduled to visit the North-East in the next upcoming month. After their visits, the Hon'ble Ministers can submit their tour reports along with their recommendations on the portal. After analyzing the recommendations, the MDoNER can forward the recommendations to respective line Ministries/Depts/State Govts for quick action. The efforts will ensure the benefits of central schemes reach the last person in North-East India.

Towards the growth and the development and empowering the NER like never before, Hon'ble MoS, MDoNER, launched the 'MDoNER Data Analytics Dashboard' for the Development of North-Eastern Region. The Dashboard will help in Data driven decision making, Ease of operations, Centralized monitoring, Policy level decision tool, and Information integration. The Dashboard has data of 141 schemes across 55 Departments and Ministries. The dashboard will keep a close watch on NER aspirational districts, NE border districts and the most backward districts. The Dashboard will benchmark KPIs of schemes in North-Eastern Region. Equipped with the latest innovations in e-governance, the Dashboard will display information across multiple departments and Ministries on a single platform.

9.5.10 Capacity Building

Training Division, NIC is established with an aim to develop technical, administrative and management skills of all the technical and non-technical officers and officials of NIC stationed at various locations & offices in the country, such as NIC HQ, Ministries and Departments of Central Govt. in Delhi, States UTs and District HQs, Hon'ble Supreme Court of India, High Courts, President's Secretariat, PMO, Lok Sabha and Vidhan Sabhas, with an objective to provide ICT Infrastructure Support and Services, develop and deploy eGovernance Applications, to playing an important role as Technology Partner of the Govt. and to help in introducing Latest Tools and Technology in dissemination of Govt. Services to the stakeholders.

Keeping the work profile of NIC officers and officials in mind, the Training Division of NIC is engaged in Capacity Building, in terms of Knowledge, Skill and Attitude, of all the NIC employees through use of various means of learning. This includes Online Learning Management System of NIC – named "VidyaKosh", daily Webinar series, Workshops & Seminars with PAN India participation, Induction & Refresher Trainings, Technology based Trainings and Customized Trainings on Cyber Security, Financial and Administrative Matters. In addition to all these inputs, the Training Division is also concerned about sharpening the Leadership & Management skills of NIC officers, for which, special courses are also being organized in association with top business schools of the country, such as IIMs.

9.5.10.1 VidyaKosh – A Learning Management System (LMS)

VidyaKosh, the e-Learning initiative of NIC, provides the facility of anywhere and anytime learning experience to the learner by providing a rich set of professionally tutored courses through efficient administration of self-learning, for all the technical officers in NIC. A new pack of more than 300 technology and management related courses has been made available on this platform, for the year 2023 on Emerging Technologies, such as, Cyber Security, Application Development & Mobile App Development, Micro-Services, IOT, Data Analytics, Block Chain, AI & ML, Python, Data Science, Database Systems, Open Source Technologies, System Administration, Cloud Technology and Infrastructure, Management Skills, Leadership Skills, Personal Development & Communication Skills etc. More than 3000 technical officers of NIC are getting benefitted through VidyaKosh platform by enrolling themselves for various online courses.

Given the limitation of organizing residential classroom trainings for all, the e-Learning management system comes handy due to its accessibility and cost effectiveness as the trainings are available in online mode, which is highly cost effective, in terms of the expenditure otherwise involved towards travel, boarding & lodging of participants at offsite locations, especially in the cases where basic knowledge of a subject needs to be rapidly disseminated to a large workforce, in a short period of time.

For the benefit of the top management, a dashboard facility has also been provided on VidyaKosh to monitor the progress of training and to identify the right kind of people for deployment in a particular task or technology, based on their learning curve.

For better management of trainings (online & classroom based), under the technical development & management development streams of Training Division, a Training Management System has also been developed and implemented, which provides a platform for end-to-end management of trainings, starting from the announcement of training, seeking nominations from the HOGs and SIOs, selection & acceptance of eligible nominations, issuing officer orders, working schedule & faculty list, marking course attendance, getting feedback from the participants, uploading course material & presentations, conducting online examination at the end of a training program and up to the stage of settlement of course bills at the end. During the current financial year (2023-24), around 95 training programs, online & classroom, have been announced using this module of VidyaKosh. This platform has proved quite useful to the nominating & recommending authority in selection of the right kind of candidates for a particular training program.

9.5.10.2 Webinar

NIC has also created an online Webinar platform,

which aims at sharing the knowledge among peer groups, updating individual knowledge on emerging technologies, sharing various technical experiences & challenges faced in work and improving communication skills. This platform encourages the technical officers of NIC to come forward and deliver an online webinar, which is held every day for 30 minutes during the lunch time. This year, till date around 215 webinar sessions have been delivered by as many officers, which have been attended by 69,520 participants from PAN India.

These webinars are being conducted on topics such as Kubernetes Platform Security, Information Security-Roles and Responsibilities, SQL Server Performance Tuning, Block Chain, Cyber Security, Introduction to Chat GPT 3.0, Monolithic Vs Microservices Architecture, Implementation of Slow-hash function, Elliptic Curve Cryptography, Robotic Process Automation, Unified Modelling Language (UML), Microservices Architecture and APIs, Python Programming, DevOps, Backend As a Service, Data Security and Privacy, Cloud Computing, RavenDB, Laravel-The PHP framework, Native Apps vs. Progressive Web Apps and many more such topics.

9.5.10.3 Classroom based Training Programs (MDP)

Training Division has been instrumental and driving force in organizing various need-based training programs for all the NIC Officers at NIC HQ, NIC State & District centers and some other institutions. Various training programs have been conducted in NIC itself making best use of the existing infrastructure such as the convention hall, VC facility, webcast. Training Division of NIC has also tied up with other premium institutions of the country, such as IIMs, IITs, ASCI, ATIs, AJNIFM,

NITTTR, NIMSME and RRU etc., to utilize their infrastructure and also the faculty, to make the participation in training programs feasible for all the officers across the country. During this year, about seven Management Development Programs (MDPs) have been organized at IIM Indore, IIM Calcutta, ASCI Hyderabad, ATI Himachal Pradesh for the benefit of senior technical and non-technical officers of NIC. Similarly, two customized training on Financial Matters were also organized at AJNIFM Faridabad for the IFD officers working in different State Centers of NIC. The Training Division also got NIC officials trained on courses organized on Public Procurement by NIFM and Establishment Rules organized by ISTM.

Since, most of the senior officers in NIC (such as Scientist-G and Scientist-F), besides handling technical assignments, are also engaged in management and leadership roles. Keeping in mind their need and to sharpen their Leadership & Interpersonal Skills, about 20 customized training programs covering more than 500 such officers, are also planned to be organized at IIT Kharagpur, IIM Indore, IIM Udaipur and IIM Shillong, within this financial year.

9.5.10.4 Classroom/online Training (TDP)

Training Division, NIC has been conducting multiple numbers of residential training programs and workshops on various emerging technologies. Sixty-eight programs have been conducted during the year 2022-23, out of which nine were five days residential training programs, two were five days online training programs, one was one day online training program, twenty-seven half day workshops in hybrid mode (both online & offline) and twenty-six webinars. Eleven webinars were held during the **"Cyber Security Month"** during October 2022 and twelve webinars were held on

"**Cyber Jagrookta Diwas**" on the first Wednesday of every month, as per directives from MeitY. Four webinars were held on the Support Digest Series on OSS Services. A webinar, each on API and Appscan, were also held out of the total of 29 webinars. Areas covered in the residential training programs are Linux, PHP, PostgreSQL, Mobile App Development, Data Analytics & Data Governance, User Experience Design, Micro-Services, Cyber Security & Incident Response.

9.5.10.5 Induction Training

As per DOPT O.M. No. 28020/1/2010–Estt. (C) dated 30th October 2014, newly recruited employees in Government of India have to undergo mandatory Induction Training for minimum two weeks, which is a precondition for clearance of probation. Accordingly, two numbers of Induction Trainings have been organized for 76 non-technical officers and officials of NIC, who joined NIC HQ or NIC State Centers within the last two years. On similar lines, Induction Training of three weeks duration is also being planned within the current financial year (2023-24), for more than 300 Technical Officers, who joined NIC within the last 2 years.

9.5.10.6 Digital India Internship

Training Division, NIC is also enrolling engineering students as interns for two months, under the Digital India Internship (DII) scheme of MeitY. 11 Students from various engineering colleges in the country were selected on merit basis during summer, 2022 and 15 in summer, 2023 for undergoing DII at NIC HQ & other State Centers of NIC. These students successfully completed their internship projects on various technical topics, namely AI and Machine Learning, DevOps, Data Analytics, UI/UX, Chatbot, Mobile Computing, Cyber Security and Open APIs.

9.5.11 Innovation and IPR

Intellectual Property & Know-How Informatics Division takes care of IPR Management of NIC-developed software solutions with particular emphasis on Copyright Registration and Trademark Protection. Activities involve safeguarding NIC's IPR interests in applications developed for NIC's internal use and for use of Central and State Government Ministries / Departments / Organizations, spreading IPR awareness through Knowledge transfer. It reviews agreements with NICSI/MeitY/user departments in connection with NIC's IPR ownership and registration. The division secures NIC's IPRs before internationalization of NIC's software solutions/products aimed at Digital Diplomacy.

NIC's IPR Profile

- Total Copyrights Registered - 90;

- In 2023 Registered – 7, Applications pending at Copyright Office - 1, Under Process (in house) - 1

- Total Trademarks Registered - 1 Trademark in the USA; In 2022, Different logos for NIC identified is pending with Trademark Registry accepted by Registrar

- Total Patents Granted - 1 Patent in the USA; In 2022

9.5.12 eGovernance Services and Products

NIC is playing an instrumental role in executing key IT projects, in close collaboration with Central and State Governments, making the last-mile delivery of government services to the citizens a reality, through a variety of digital solutions. NIC endeavors to cater to ICT needs at all levels of governance including central, state, districts, judiciary, and legislative layer.

9.5.12.1 eOffice

eOffice is a digital workplace solution with a vision to achieve a Simplified, Responsive, Effective and Transparent paperless working in Government offices by providing a convenient way for officials to access information related to their government files and knowledge sharing. The Open Architecture on which eOffice has been built, makes it a standard reusable product amenable to replication across the Governments, at the Central, State and District levels and is also being accepted at international level. As on 31.03.2024, eOffice has been implemented in 1014 organizations, which includes 402 Central Government organizations and 612 organizations at various State/UT Governments.

eOffice has instilled transparency in the system of office procedures, as files/receipts can be easily searched, retrieved and action can be taken on forthwith. eOffice also provides an effective monitoring mechanism to monitor the performance of individuals, the pendency of files, files cleared, and files worked on, leading to increased accountability and responsibility of staff at all levels. **The 24*7 accessibility provided by eOffice has made the working environment more flexible, thus leading to Enhanced Productivity.**

9.5.12.2 MyGov

A platform for citizens' Engagement towards Good Governance

(https://saathi.mygov.in/, https://andaman.mygov.in/, https://rajasthan.mygov.in/)

MyGov platform has been able to provide the citizens with a voice in the governance process of the country. The Platform has also created a framework for the citizens to become stakeholders not only in policy formulation, but also in implementation through actionable tasks and discussions. MyGov platform is a unique first of its kind participatory Governance initiative involving the common citizen at large.

In the year 2023-24 MyGov Platform reached 474.29+ Lakh registered user's mark. During the year MyGov State Instances like Andaman and Nicobar Islands and Rajasthan were also launched. Now MyGov has 23 State instances. Till March 2024, 110 'Mann Ki Baat' episodes have been on air. MyGov.in portal is now available in 11 languages to users.

Almost all Government Departments leverage MyGov platform for their citizen engagement activities, consultations for policy formulation and also to disseminate information to citizens about various Government schemes and programs. MyGov is amongst the most active profiles on social media – Twitter, Facebook, Instagram, YouTube & LinkedIn with the username @MyGovIndia. MyGov has a significant presence on several Indian social media platforms like Koo, Sharechat, Chingari, Roposo, Bolo Indya and Mitron.

A total of 474.29+ people have already registered on the platform with 75 Groups, 15,24,602 submissions made in 1,581 Tasks and 54.91 + Lakh comments in 1001 discussions themes, 314 Polls/Survey and 1329 Blogs. 50+ Lakh user's downloaded MyGov Android App and 4.5+ Lakh

user's downloaded MyGov iOS till March 2024.

During 2023, MyGov launched two unique portals named as MyGov Ambassador Programme with a vision of building youth ambassadors for New India and increasing their contribution to nation building (https://campus.mygov.in/) and MyGov Saathi with a vision to create a network of "Saathi 2.0" that can spread awareness about government schemes, policies, and initiatives and encourage people to participate in them.

9.5.12.3 India Portal

The India Portal started in 2005 as a mission mode project under the National e-Governance Plan. The aim was to serve as a single window for government information and services, promote standards for e-governance, and encourage innovative digital initiatives.

Initiatives/activities under the aegis of India Portal are:
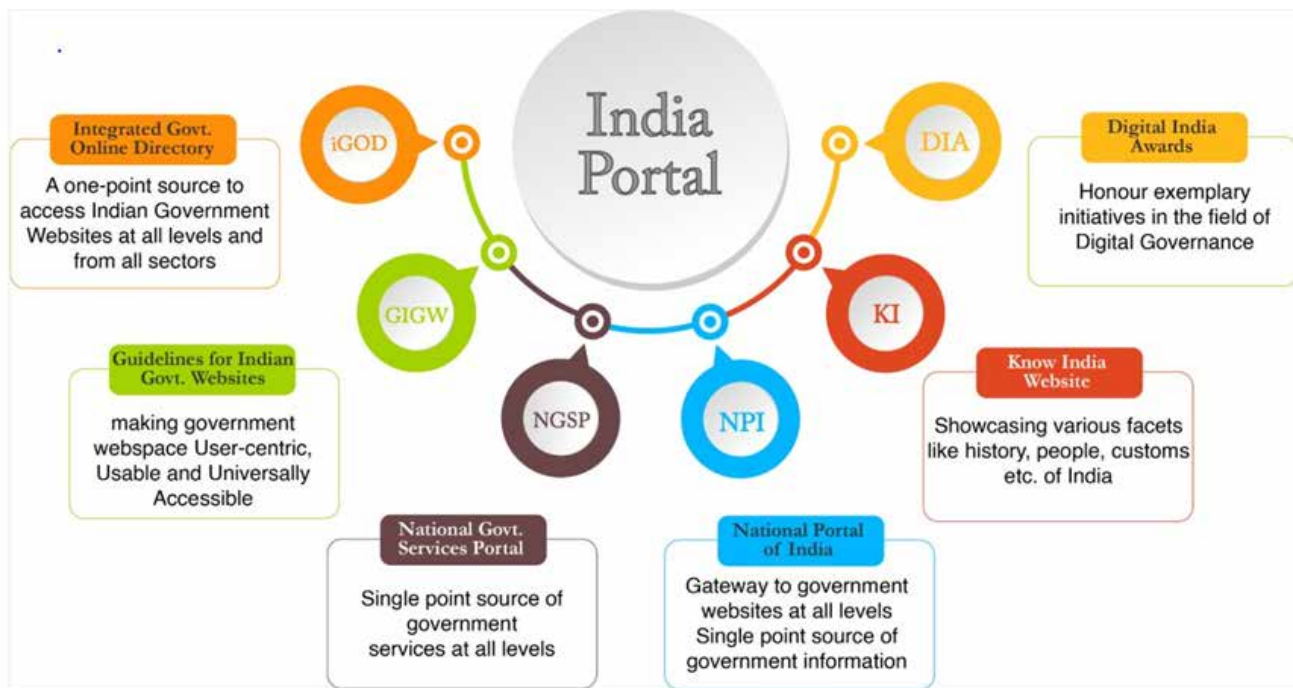
National Portal of India (https://www.india.gov.in)

NPI provides single window access to government information and services for citizens, businesses, overseas Indians etc. It set benchmarks in usability, accessibility, and user-centric design.

Over the years, NPI has successfully met its goals to promote e-governance and encourage technology innovation. The India Portal has over 38 million visitors (83.40 million-page views) and 10.35 Lakh registered users.

National Government Services Portal (NGSP) (https://services.india.gov.in)

NGSP serves as a centralized hub for services provided by various government entities. This portal has been designed with intuitiveness in mind, allowing users to navigate through categories, filters, and sectors to quickly access the services they require. The portal lists over 13,500 services

that can be searched by categories and has had over 47.40 million visitors (114.80 million-page views).

Integrated Government Online Directory (iGOD) (https://igod.gov.in)

iGOD platform serves as the central directory of websites of government entities at all levels. It comes equipped with various filters, and categories that have been thoughtfully designed to streamline the process of accessing government websites.

Guidelines for Indian Government Websites (GIGW) (https://guidelines.india.gov.in)

Launched in February 2023, GIGW 3.0 is a collaborative effort with STQC and Cert-In. This updated version prioritizes Security, Accessibility, Quality and Lifecycle management. It has the responsibility of the three stakeholders viz. Organization, Developer, Evaluator with respect to each guideline and the risk associated with non-compliances.

Know India Portal (https://knowindia.india.gov.in)

The Know India Portal celebrates our nation's rich cultural tapestry, offering a glimpse into India's soul. It serves as a repository of our heritage, symbols, and traditions, allowing users to explore our country's cultural diversity, unique traditions, and more. It provides comprehensive information about states, districts, national festivals, PMs' and Presidents' addresses, and details about awardees.

India Portal 2.0

India Portal 2.0 is gearing up for a major transformation to enhance citizens' access to government information, services, and engagement. Information will be structured to cater to various user profiles and sector-specific views, simplifying access to services.

Integration with websites/platforms such as S3WaaS, MyGov, PIB, DD News, OGD, and Parliament website will provide seamless access. A single sign-on mechanism will make government digital services easily accessible. Multilingual support will ensure inclusivity, and an AI-powered chatbot will enhance search functionality.

Under the hood, a microservices and cloud-native infrastructure will revamp the backend, ensuring robustness, scalability, and security.

Digital India Awards 2022

The Digital India Awards (DIA) are a crucial component of the Indian government's Digital India vision, aiming to transform the nation into a digitally empowered society and knowledge economy. These awards recognize and encourage innovative digital initiatives by government entities at all levels, from central to local bodies. In its seventh edition in 2022, the awards were presented in person by the Hon'ble President of India, Smt. Droupadi Murmu, signifying the importance and significance of these initiatives. The awards showcased 22 digital projects across seven categories, exemplifying India's resilience, and progress, particularly in the post-pandemic era, and their commitment to making digital governance accessible to all citizens, including the differently abled.

The ceremony held in Vigyan Bhawan, New Delhi, featured the presence of key government officials, including Shri Ashwini Vaishnaw, the Minister

of Electronics & Information Technology, and Shri Alkesh Kumar Sharma, Secretary of MeitY. This edition of DIA highlights how these digital innovations contribute to a better quality of life, improved ease of doing business, and secure access to authentic government information, even at the grassroots level, across the country, thereby realizing the Digital India vision.

9.5.12.4 S3Waas (Secure, Scalable & Sugamya Website as a Service)

The platform "S3WaaS" is a website development framework based on SaaS (Software as a Service) model hosted on the National Cloud of NIC. S3WaaS has been built with an objective to empower the Government entities to generate, configure, deploy, and manage secure, scalable accessible and multilingual websites for publishing citizen-centric information and services without much effort and technical know-how. The S3WaaS generated websites are W3C Web Content Accessibility Guidelines (WCAG) 2.1 compliant with special focus on website aesthetics and content. The platform supports 18 languages to cater to the needs of a diverse audience as a lot of people are more comfortable using websites in their regional language.

Implementation and Adoption of S3WaaS: The S3WaaS solution has been implemented and adopted by 653 District Sites, 103 Departments and 35 NIC State Units, so far. This includes websites of Raj Bhawan, Departments of Haryana and Maharashtra, Divisional Commissioner websites, and State Portals. Additionally, 7 Ministries/ Departments (Department of Justice, Legislative Department, Department of Water Resources, RD and GR, Department of Atomic Energy, Ministry of Panchayati Raj, Ministry of New and Renewable

Energy, Department of Empowerment of Persons with Disabilities) and 50 e-Counselling websites have been migrated to S3WaaS. The Supreme Court of India website, 713 District court websites and Kendriya Vidyalaya Sangathan website have also been migrated to S3WaaS, with migration of over 1500 Kendriya Vidyalaya websites currently in progress. S3WaaS themes have been developed using the best practices to ensure that they meet the highest standards in terms of quality, usability, and accessibility. The Accessibility Certification Scheme for S3WaaS Websites launched by STQC aims to deliver the certificate for assuring the accessibility of websites that are generated using S3WaaS. Currently 58 District websites have already obtained the Certified Accessible website logo under this scheme.

9.5.12.5 OGD - Open Government Data 2.0
(https://data.gov.in)

MeitY under the aegis of National Data Sharing and Accessibility Policy (NDSAP) initiated OGD Platform India, to share government data with its citizens. The Platform has been set-up and managed by the NIC.

OGD 2.0 - Micro Services Based Architecture Leveraging Cloud Technology has been initiated from May 2020. The Platform provides G2G service by allowing Ministries/Departments/ States/Organizations to publish and manage their datasets on the Platform through a Chief Data Officer (CDO). The datasets are available to all free of cost.

As on 31st March, 2024 OGD India has 6,23,177 dataset/resources, 13,090 catalogs, 3,138 Visualizations created, and 2,28,818 Application Programming Interfaces (APIs) created. OGD

India has 33.92 million times viewed and 10.11 million times datasets have been downloaded. All these datasets are updated with their respective granularity. Some of them are updating multiple times during a day (real-time) e.g., Real time Air Quality Index (AQI), Current Daily Price of Various Commodities from Various Markets (Mandi), etc.
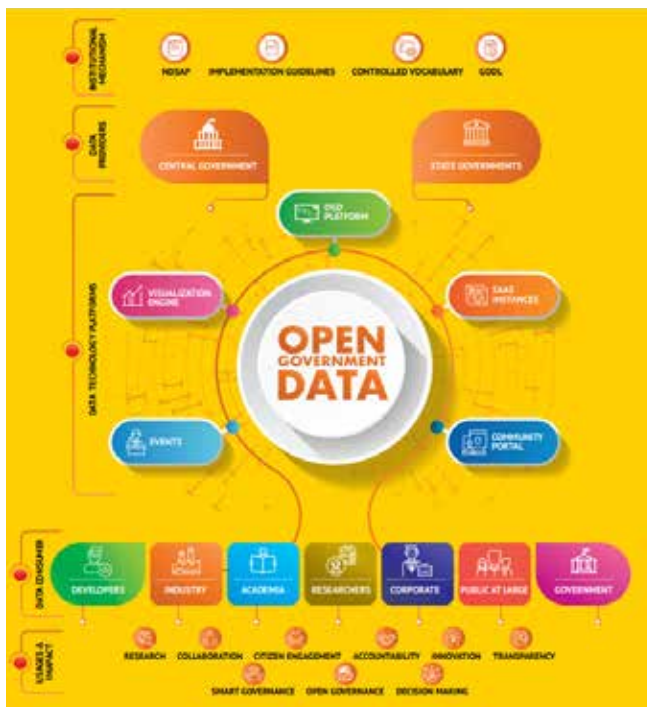
Fig: Open Government Data Platform Ecosystem

OGD is also available as a SaaS (Software as a Service) model for State instances. States such as Sikkim (https://sikkim.data.gov.in), Tamil Nadu (https://tn.data.gov.in), Karnataka (https://karnataka.data.gov.in), Kerala (https://kerala.data.gov.in), Punjab (https://punjab.data.gov.in), Andhra Pradesh (https://ap.data.gov.in), Uttarakhand (https://uk.data.gov.in) and Odisha (https://odisha.data.gov.in) have created their own Data Portals using OGD SaaS. A dedicated Data Portal for Smart City Mission (https://smartcities.data.gov.in) has also been launched to facilitate data contributions from 100 Smart Cities.

9.5.12.6 Electronic Transaction Aggregation and Analysis Layer 3.0 (eTaal 3.0) (https://etaal.gov.in)

eTaal 3.0 was conceived in April 2022. The key objectives of the eTaal 3.0 portal are to measure qualitative aspects of eService delivery for efficient performance comparison across Central Ministries/ States/ UTs/ Smart Cities and to integrate and display regional comparison of eServices and eTransactions up-to district level. The new portal displays a single comprehensive view for status of all eServices. In addition, eTaal 3.0 will offer a plethora of emerging technology-features such as AI enabled Chatbot and Predictive Analysis and Business Intelligence (BI) dashboards to generate meaningful insights.

Achievements:

- During FY 2023-24, eTaal portal recorded total 24,043 Cr. eTransactions which is 40% more than previous FY.
- Also, total 4,276 eServices have been integrated till 31st march 2024.
- Addition of 232 new eServices during FY 2023-24.
- Around 66 Cr Average per day eTransactions has been recorded on the portal.
- Thriving on innovation, the portal underwent a redesign. The user interface and experience have been enhanced. Chatbot also made operational.

9.5.12.7 Gov.in Secure Intranet Portal

With the vision of Hon'ble Minister of State, MeitY and Ministry of Skill Development and Entrepreneurship, Gov.in Secure Intranet was developed as a secure platform that shall act as a single gateway to provide access to multiple applications used in day-to-day operations of government officials.

Gov.in Secure Intranet is an initiative in the domain of G2E with the target audience comprising all Ministries and Departments. It provides a plethora of features and access to multiple applications through a single sign-on without logging separately into those applications.

Users can access calendar schedulers, manage tasks and appointments, and work with reports and dashboards. The application also allows users to monitor the status of ongoing tasks assigned to a person or a team.

- Users can access 18 PARICHAY Applications such as Bharat VC, Sparrow, Swagatam, Sandes Web etc. with a single sign-on in Gov. in Secure Intranet without logging in those applications separately.

- Users get notification of login, upcoming meetings & appointments, and other engagements through SANDES application.

- API based Integration with PIB for latest news and updates on Gov.in Secure Intranet

- Users and administrators can review status by filtering through Business Allocation Rules for Ministry and monitor progress.

- Development of AI based features such as Word Cloud, Phonetics Search, Smart Search, AutoCorrect, and Engagement Optimizer

- Mobile Application on both Android and iOS

9.5.12.8 CollabFiles

CollabFiles is an indigenous platform to Connect, Create, Share and Collaborate Office Documents. It is a web-based, cloud-enabled and scalable platform to create and manage documents, spreadsheets in a collaborative mode with a strategic control so that Government users could use it through secured and privileged access to Parichay, the Single-Sign-On platform for Government officials.

The Platform is enriched with features viz., Personalized User Dashboard, Share & Collaborate on files in real time, Send Reminders to collaborate, Chat during Collaboration, Withdraw Share, Transfer files (Useful during Official transfers/ retirements), Archive (Files no longer useful in main-stream), Search for Files, Address Book to create & manage contacts and user lists, Export & Import Files, Daily Stats & Monthly stats over email and SMS, Chatbot for general queries, User Feedback management, Super Admin to manage platform, Department Admin to manage departmental users.

CollabFiles is visualized to provide a user- friendly system, which is integrated with other Government applications such as NIC email (e-mail system of GoI), Sandes (A messaging app from GoI), e-Office (electronic file management system of GoI), DigiLocker (secure cloud based platform for storage, sharing and verification of documents & certificates), Tejas (A Visual Intelligence Tool from GoI), [Gov-Drive (A centralized storage solution to save and access files)], AI tools such as Language Translation, Transliteration, Document Summary.

CollabFiles is envisioned to emerge as an ecosystem, that is self-contained as well as an open system that interacts with other Government applications. CollabFiles is

operational in pan India across several government organizations.

- No. of Departments on boarded: 100
- No. of Users: 20,200
- No. of Files: 29,300

9.5.12.9 Direct Benefit Transfer (DBT) 2.0

DBT Bharat portal (www.dbtbharat.gov.in) has been designed with the intention of enhancing the delivery of public schemes and services in India and ensuring that the intended beneficiary receives the in-kind and monetary benefits of government services and programs on time. It monitors and assesses the countrywide progress of DBT Schemes by gathering their Key Performance Index data from implementing bodies like Ministries/ Departments/States/UTs. Counting the number of verified beneficiaries based on Aadhaar and the total amount of electronic payments are significant KPIs that contribute in removal of duplicate or ghost beneficiaries and combat corruption.
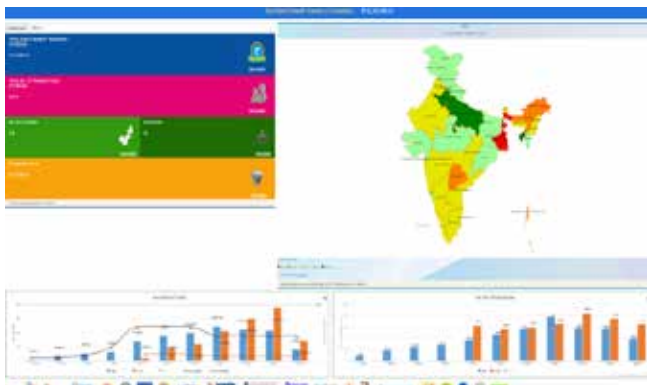
9.5.12.10 TejasVI: Empowering Data-Driven Governance

TejasVI is a comprehensive analytics visualization platform developed specifically to meet the data analysis needs of government departments in the era of digitalization. By leveraging open-source technologies, TejasVI offers an easy, powerful, and affordable solution for processing and analyzing

the vast amounts of data collected through various initiatives such as mission mode projects within the National e-Governance Plan and numerous online services offered by Ministries/Departments.

TejasVI, a versatile data analysis platform, boasts extensive integration capabilities, linking with data sources ranging from flat files like Excel, CSV, JSON, XML to databases like Microsoft SQL Server, PostgreSQL, MySQL, Oracle, and MongoDB. It seamlessly accommodates RESTful API integration using JSON. With over 45 visualization options, TejasVI enhances data analysis through diverse chart types, while its API-based integration facilitates interaction with existing applications. It enriches insights with location-based data from maps such as Bharat Maps and Google Maps. TejasVI's unique data-driven conditional alert system proactively notifies users of significant data changes. It streamlines synergy within the NIC ecosystem, integrates predictive analytics, offers instant data querying, and addresses language barriers through multilingual support, making it an invaluable tool for comprehensive data-driven governance.

9.5.12.11 eSamikSha 2.0

With the help of this portal, PMO and Cabinet Secretariat can keep a track on all the pending work in various departments and direct the concerned authorities to take proactive steps by fastening the pace of projects as per expectation. The portal helps to bring transparency and enhance the interoperability between G2G and G2B.

A new application developed and integrated on eSamikSha platform called 'Global Tender Enquiry (GTE)'. GTE module acts as a Single Window System for processing the proposals up to 200 Crore from various departments requesting exemptions under Global Tender Enquiry guidelines of Department of Expenditure. The portal will enable the Cabinet Secretariat to

analyze key data quickly and meticulously.

Integration of TEJAS Dashboard and Progress & Timeline reports are implemented with respect to meeting module v2.0 for Delhi-eSamikSha Instance. Parichay integration for DEA-eSamikSha & Assam-eSamikSha instances.

9.5.12.12 Digidhan Dashboard for monitoring Digital Payment Transactions

Digidhan Dashboard accurately reports, monitors, and analyzes all digital payments transactions occurring in the country and facilitates in the development of related digital infrastructure by ensuring the deployment of Physical/ Mobile/ BHIM Aadhaar PoS devices. Moreover, it aggregates digital payment transaction data from RBI, NPCI, Public & Private Sector Banks and other sources. The Dashboard presents BI visuals for various stakeholders and data related to various modes of digital payment transactions.

Digital Payment Transactions have been overachieving the set targets since the past 5 years, indicating how strongly the nation has adopted digital payments.

Financial Year	Target in Cr. (₹)	Achievement in Cr. (₹)
2017-18	2,500	2,071
2018-19	3,000	3,134
2019-20	3,500	4,572
2020-21	4,500	5,554
2021-22	6,000	8,840
2022-23	12,000	13,334
2023-24	16,570	18,639

Table I – Digital Payment Transactions

The data from the Dashboard is used for effective planning of a roadmap for increasing the penetration of digital payments in the country.

9.5.12.13 Dashboard for Analytical Review of Projects Across Nation (DARPAN)

DARPAN is a configurable multilingual product of NIC-UP for Hon'ble Governors, Hon'ble Chief Ministers, Chief Secretaries, Divisional Commissioners and District Magistrates/District Collectors. The Product facilitates the presentation of real-time data on KPIs of selected government schemes/projects to all the levels (State, Division, District) of officers for planning, evaluation, and monitoring. This PAN India implementation of DARPAN enables dynamic project monitoring without coding, featuring drilldown capabilities for quick, detailed perspectives. It enhances the analytical capabilities through data collection by consolidating multiple data sources into one centralized, easy-to-access platform. It immediately identifies trends and quickly drilldowns into data to gain enhanced perspectives

of the projects. DARPAN displays information in an objective and quantifiable way that helps the technical administration to see and understand not only its success, but also its pain points and areas in need of improvement.

DARPAN has footprints of State/Central Ministries and as Data Collection Portal for PRAYAS, a dashboard of dashboards.

Current Statistics of DARPAN

Dashboards	Instances	Projects	KPIs
State /UTs	24	1,199	4,964
Central Departments/ Ministries	33	551	1856

Features

Generic, Configurable and Integrated dashboard. Parameterized and Transforming complex government data into easy visuals

Automated with **data integration** of identified KPIs through **APIs/Web Services** as per pre-defined frequency

Allows users to prioritize the information to get enhanced perspectives of the priority projects

Availability of **Graphical/Tabular** reports for monitoring

Provides status of departmental activities through at a glance to drill down picture

Role based access with appropriate authentication and **authorization** mechanism.

Provides **customization capabilities** for Departments to match their requirements.

Automation of activities with email **alert** for pending data.

Descriptive Analytics, *Trend Timeline Series*, *Comparison Series*, *Demographic Analysis*, *Data Quality Index (DQI)*, *Star Rating*, *Formula Based Grading* and *Ranking* offers insights into the performance of Schemes, Departments, Ministries

NexGen DARPAN 2.0

As per the feedback and requirements of various states and ministries, PMU-DARPAN has developed a lightweight DARPAN 2.0 performance Dashboard on an entirely new platform with latest UI/UX Style, more flexible and configurable features.

NexGen DARPAN 2.0 is launched by Hon'ble CM Yogi Adityanath Ji in presence of cabinet ministers of Government of Uttar Pradesh and is being utilized and reviewed by Government officials who are involved in policy and decision making.

(L-R Dy CM Shri Brajesh Pathak Ji, Shri Swatantra Dev Singh Ji, Hon'ble Yogi Adityanath Ji, Shri Suresh Kumar Khanna Ji, Shri Keshav Prasad Maurya Ji, Shri Arvind Kumar Sharma Ji)

Current Statistics of NexGen DARPAN 2.0: Total Instances: 2(Uttar Pradesh/Uttarakhand)

Departments	Projects	KPIs
109	965	6,546

9.5.12.14 PRAYAS – Pursuing Excellence in Governance

PRAYAS is a Dashboard of Dashboards which provides an integrated & consistent view of the performance of selected KPIs under onboarded Government Programs & Schemes and facilitates data driven decisions practice by generating insights from the data. Eventually, this would enable key decision makers and executioners for adequate measures / actions to improve the scheme's progress vis-a-vis envisaged outcomes. The citizen centric scheme's KPIs are getting displayed using appropriate visualization through technology enabled platforms across available granularity and periodicity. PRAYAS dashboard is getting updated directly from the MIS of respective schemes through API at a decided periodicity. PRAYAS is acting as a platform for performance monitoring based on the concept of a single source of truth of information.

Currently, **179 schemes** across **61 Ministries & Departments** are enabled on PRAYAS.

9.5.12.15 Rashtriya Puraskar Portal, a Platform for National Awards ecosystem

Rashtriya Puraskar Portal is an Award Ecosystem of Government of India. It is a configurable platform, designed and developed by MHA Informatics Division II, NIC. This platform has been developed in an endeavour to achieve the vision of Hon'ble PM of India to transform the entire ecosystem of the National Awards instituted by various Ministries/ Department/Organisation of Government of India. It has the capability of accepting nominations for each award as per the defined format, digitized diversified selection process, developed awardees dashboard, scientific analysis for supporting of various decisions, monitoring dashboard for monitoring ongoing nominations etc.

So far, 46 Awards of various Ministries/Department of Government of India have been onboarded on Rashtriya Puraskar Portal including Padma Awards, the highest civilian award. 2,77,764 Unique Registrations and 2,89,688 Nominations have been received.

9.5.12.16 The Government eProcurement system of NIC (GePNIC)

GePNIC marches into the 17th year of its implementation in 2023-24. It provides a platform to conduct online tendering for Goods/ Works/ Services including Global Tenders, Turnkey projects. This is implemented in 31 States /UTs and 750 Central Govt entities. Software as a Service model (SaaS) enables quick onboarding, continuous capacity building and handholding support as part of the implementation. Central

Public Procurement Portal (eprocure.gov.in) is one of the vital implementations of GePNIC in which around 1.8 Lakh tenders with an average value of ₹2.66 Lakh Crore are processed every month. So far 125 Lakh tenders have been processed worth ₹185 Lakh Crore.

Cumulative figures till Oct. 2023

#Tenders: 115 Lakhs

Value: ₹ 169 Lakh Cr.

#Tenders: 17.86 Lakh
#Bids: 47.22 Lakh
#Value: ₹ 34.07 Lakh Cr.
2022-23

#Tenders: 11.11 Lakh
#Bids: 29.42 Lakh
#Value: ₹ 19.69 Lakh Cr.
2017-18

#Tenders: 1.35 Lakhs
#Bids: 3.10 Lakhs
#Value: ₹ 1.58 Lakh Cr.
2012-13

#Tenders: 0.07 Lakh
#Bids: 0.1 Lakh
#Value: ₹ 0.21 Lakh Cr.
2007-08

9.5.12.17 e-Granthalaya (https://egranthalaya.nic.in)
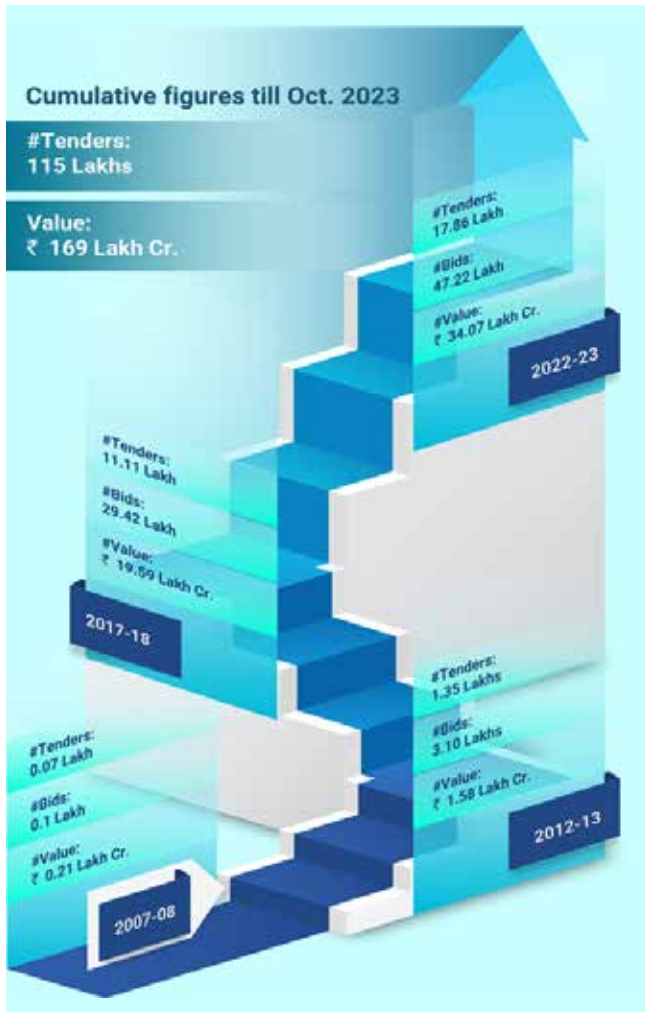
e-Granthalaya is a Digital Platform for Automation and Networking of Government & Semi-government Libraries. The platform provides a complete ICT solution for Library Computerization with integrated Library Management Software, Digital Library Module, Cloud hosting environment and a Library Portal (OPAC) with NICSI empanelled Roll-out Services and support. It is useful to transform traditional libraries to e-Library with Digital Library Services and to provide various online member services using Single Window Access System. Latest version of e-Granthalaya 4.0 is a 'Cloud Ready Application' and provides a Web-based and Mobile based access solution in enterprise mode with a centralized database for clusters of libraries. The ICT solution is compliant with international standards prevalent in Libraries with use of the latest ICT technology and Cloud hosting.

The software has been implemented in 806 libraries in 2022 and 260 libraries in 2023 and thus, a total 7,000 libraries have been automated using this application for providing e-Library services. Out of these, 3,229 libraries are on NIC/NICSI Cloud which have made available over 1.94 Crore book catalog records with thousands of e-Books made available for reading and downloading.

9.5.12.18 Digital Archiving and Management

Digital Archiving is an important activity in a government organization where e-records are captured and removed from the routine workflow and placed in safe, separate, yet accessible and searchable storage for future reference. Digital Archiving and Management Division of NIC explores the imperative need and significant advantages of digitizing and archiving documents in the government sector. For Digital Archiving Projects, DSpace – a robust open-source digital asset management tool is being used to create digital repositories for government organizations.

Many government projects are successfully implemented by NIC in the last few years such as:

• India Code (https://indiacode.nic.in): a

repository of all central and state acts which are in force along with their subordinate legislations. It serves as a valuable resource, promoting legal clarity, accessibility, and informed governance. It is frequently used by legal practitioners, scholars, researchers and the public and has more than 1.7 Crore users till date.

- The Official Debates of Rajya Sabha Digital Repository (https://rsdebate.nic.in): a digital repository of Questions-Answers and Debates held during Rajya Sabha Sessions. Around 6.7 Lakh debates have been uploaded to Rajya Sabha portal with Search, Browse facility.

- Parliament Digital Library https://eparlib.nic.in): a digital repository portal of Lok Sabha debates, Historical Debates, Constituent Assembly Debates, Parliamentary Documents, Budget Speeches, Parliamentary Committee Reports, Presidential Addresses, Publications, Books, Information Bulletins etc has been developed.

- Digital Records of Rajya Sabha Secretariat: an online system for storing digitized office files of Rajya Sabha Secretariat has been created. System provides authorization-based access to various sections of Rajya Sabha Secretariat.

- Other significant projects are: Tribal Research Digital Repository (https://repository.tribal.gov.in), Digital Record Room of NIC, etc.

9.5.12.19 Swagatam

Swagatam is an initiative by the Government of India to facilitate the common man. Swagatam facility enables the citizens to have a smooth and simple process of making an appointment. It will bridge the gap between the Government and the common man and will enhance the opportunity of a common man to meet a government officer, hassle free. It has advanced features of eliminating all the cumbersome and tedious procedures of making a request for an appointment and then visiting the premises.

It is a cloud-based application software developed with an easy-to-use graphical interface and embedded with comprehensive security features. This is a unified and centralized application and can be easily implemented in any Government offices/ Ministries/ Bhawans with some configuration efforts. It assists in maintaining all-relevant information about the visitor, which is automatically saved in a database.

9.5.13 Mobile Apps Store

Mobile Application Division has Nodal center in NIC-HQ Delhi and four competency centers at Chennai, Shimla, Patna, and Kannur. All the centers are collectively working for development and hosting of mobile apps in android and iOS. To bring all these apps under one umbrella for better visibility and global reach from a single point of contact NIC has subscribed to user accounts in Google play store and iOS/ iTunes. Total mobile app count reached 936 published mobile apps on Android App store. Total count on iOS Account reached to 94.

9.5.14 Centre of Excellence and Software Development Unit

9.5.14.1 Data Analytics

Centre of Excellence for Data Analytics (CEDA), a joint initiative of NIC & NICSI, was established in February 2018 and formally inaugurated by Hon'ble MeitY in September 2018. CEDA has undertaken several Projects for various Ministries/ Departments; notable among them are:

PRAYAS PM Dashboard

A Dashboard of Dashboards developed for the PMO
- A Robust Platform with three Components – Data Collection, Analytics layer, Dashboard
- Provides analytical insights for Flagship Programs & Schemes of the Government
- 168 Schemes, 1021 KPIs across 62 Min/Depts. already on-boarded; data updation through API
- Demonstrated successfully to the Hon'ble Prime Minister on 4.9.2020 and to all Union Cabinet Ministers and MoS during Oct-Nov 2021

Data Analytics Solutions

Developed Data Analytics Solutions for Ministries/Departments
eWay Bill - GSTN, Import/Export – D/o Commerce, Immigration Analytics – Bureau of Immigration, Tribal Scholarships – M/o Tribal Affairs, Steel Analytics – M/o Steel, Ministry, D/o Commerce – Trade Analytics, RD Schemes – D/o RD (PoC), Public Distribution System (PoC), National Scholarship Portal (PoC), Ministry of Consumer Affairs (PoC) etc.

Pragyan Platform

Enterprise-ready Data Integration, Exploration & Visualisation Platform
- JAVA written APIs will be provided to fetch the data from any data source such as Database, Datawarehouse and DataMart.
- Ingest Data from, 40+ direct data sources whether it's stored on your database or in a centralized data repository.
- 60+ charts for comprehensive insights into your data, enabling informed, data-centric decision-making.
- Build analytical dashboard and required visualizations as per your own data sources.

DoNER Dashboard

Dashboard for M/o DoNER- (Completed)
- Development of a Data Analytics Dashboard has been completed for M/o DONER to monitor the Schemes/Projects Implemented in North-Eastern Region

Training

Training on Analytics at multiple Government platforms / Institutions
- LBSNAA, NIC, DoNER etc.

9.5.14.2 Artificial Intelligence

Centre of Excellence in Artificial Intelligence (COE-AI) was set up in January 2019 with a vision to improve transparency and efficiency in e governance projects through AI implementation in work automation and to improve Citizen Government Communications. NIC has set up two state-of-the-art AI labs with supercomputing facilities at Delhi & Kolkata and is poised to further increase its AI compute capabilities to train large AI models.

Artificial Intelligence as a Service (AIaaS): NIC facilitates Integration of AI Product/Services on MeghRaj Cloud through API based services in the fields of Computer Vision, Natural Language Processing and Text Analytics, Automatic Speech Recognition and Speech Synthesis to eGovernance Applications.

MULTI-LINGUAL VANI CHATBOT SUPPORT
FROM: 01/04/2023 TO: 31/03/2024
Total Chat Sessions: 1,53,91,197
Application Wise Distribution :

Application Name	Count
Sarathi Parivahan	12898806
Vahan	1081479
e- District	706386
MHA	502724
e-Way Bill	67992
Confonet	37545
Kanyashree	23574
eInvoiceChatBot	21592
MSME	15801
e-Office	13004
CWC	9011
e-Daakhil	6847
eOfficeMegaBot	3771
e-Awas	979
Doris	485
miChatBot	485
Others	116
Total Chat Sessions	**1,53,91,197**

VANI (Virtual Assistance by NIC): VANI is a generic framework for the chat/voice bot which is developed by NIC in-house. With help of this framework NIC has launched 15 Chatbot

services and 8 Bilingual Voice Support Services for different central govt. ministries, departments, and state units. Keeping up in tune with the latest trends, VANI this year graduated to introducing various features like automated hybrid bots with Speech Recognition in 7 Indian languages, and Text recognition in 22 languages.

Chatbot services this year have been extended to Central Warehousing Corporation and MSME Champions bot. Kanyashree Chatbot was launched by Hon'ble CM of West Bengal on 14th August 2023 in English. NIC Service Desk Call Centre has been facilitated through conversational IVRS.

Total Calls: 5299590
Application wise call distribution :

Application Name	Calls
PM Kisan Yojana	39,90,777
IVFRT	4,69,820
VANI-NSD	4,58,479
MKB	1,80,958
MNRE	1,56,704
Parliament	31,706
CONFONET	8,346
VaidyaVANI LHMC	2,760
NDOHA	40
Total Calls	52,99,590

- CONFONET (8346) ● IVFRT (469820) ● MKB (180958)
- MNRE (156704) ● NDOHA (40) ● Parliament (31706)
- PM Kisan Yojana (3990777) ● VaidyaVANI LHMC (2760)
- VANI-NSD (458479)

Call Center Applications :

App Name	Call Transfer Count
IVFRT	362,785
VANI-NSD	387,834
Parliament	20

- IVFRT — Immigration, Visa and Foreigner's Registration and Tracking
- NDOHA — National Dental Oral Health Awareness
- MNRE — Ministry of New and Renewable Energy
- MKB — Mann Ki Baat

Panini Text Translation Services: This API based services for converting from any of the 22 Indic Languages to any other Indic language available over MeghRaj cloud has been facilitated to NIC Tejas, Karnataka High Court. It has also been facilitated by the Supreme Court of India as a Document Translation Pipeline with Image Analytics for scanned pdf orders.

Matra Text Transliteration Services: These API based services have been facilitated in 20 Indic

Languages to National Sickle Cell Anaemia card & Ministry of Ayush in addition to eHospital. It has also been facilitated by the Department of Land Resources for Matribhoomi Portal GIS services.

Saransh Text Summarisation Services: Facilitated for MSME Idea Hackathon 2.0 for summarization and de duplication of unique ideas in different categories. Himachal Education Department has been facilitated with OCR services, Name Entity Recognition and Text Summarization Services.

Image & Video Analytics Assistance by NIC (IVAANI): This facilitates a wide variety of applications from Custom built applications to API based Services. Image Analytics for Online Paperless Licensing has been facilitated for Petroleum and Explosives Safety Organization 28 offices pan India.

Image Analytics has also been facilitated for Unique Disability ID Card. Satyapikaanan API services has been facilitated and integrated with Interoperable Criminal Justice System for tracking of the accused. AI models for Abnormality Detection in Chest Xray Images for early Detection of Tuberculosis along with Clinical data pipeline has been deployed and WHO facilitated for field testing after getting ethical clearance from AIIMS Rajkot.

9.5.14.3 Blockchain Technology

A CoE has been established at NIC, Karnataka with a vision to build niche applications using Blockchain technologies in close coordination with the Government, which can be rolled out across the country. Blockchain networks have been established with Blockchain nodes distributed across NIC data centers. The CoE was instrumental in deploying Blockchain platforms -

'Certificate Chain' - for CBSE & Karnataka & Manipur Education boards. The marks sheets repository is used by the Government of Karnataka to electronically verify the claims made by students for admission to professional colleges.

'Drug Logistics Chain' to track and trace medicines issued to patients in Government Hospitals of Karnataka.

'Property Chain' is a product for storing Rural & Urban property records. Karnataka and Puducherry states are using the property chain for storing the property details. The product facilitates all stakeholder departments to record the transactions on the assets and also use the system to ensure the correctness of the ownership details before initiating any transaction.

'Document Chain for storing certificates issued by Government departments such as birth, death, caste, income, ration card, licenses etc. State Governments of Delhi, Karnataka, Puducherry and Ministry of Consumer affairs are using the Document chain.

These generic platforms can facilitate easy roll-out for any State or Ministry.
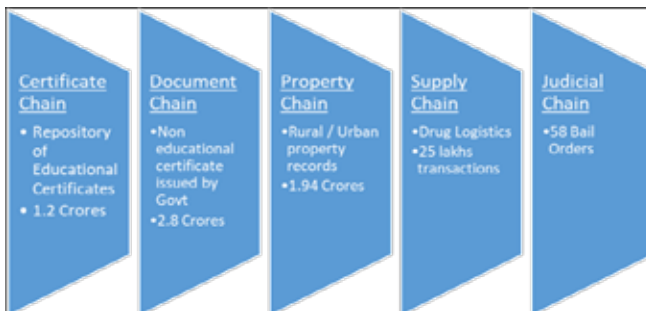
9.5.14.4 Application Security

CoE in Application Security is established to provide state-of-the-art Security solutions & services for the Information Technology needs of the Government of India, and establishing best practices, standards, and initiatives in Application security. The centers are located at Bhubaneshwar, Guwahati, Jaipur, Lucknow, and Thiruvananthapuram. The centers are involved in Application Security Audit Compliance and Testing related activities.

9.5.14.5 NIC Software Development Units (SDU)

SDU of NIC provide state-of-the-art services using latest tools and technology. NIC Software Development and Training Centers are engaged in important e-Governance projects in respect of development of software on turnkey basis, implementation, project level training and subsequent support.

9.5.14.6 Open Technology Group (OTG)

OTG focus areas are to evaluate and recommend Open-Source Software (OSS) for e-Governance Solutions, maintain distribution repository of recommended OSS for usage across NIC, guide and handhold NIC teams in keeping their OSS driven system secure and provide training on OSS. Open-Source Stack 2022 was updated in the portal as per latest versions. As Linux 7 is moving towards end of life, OTG has prepared and provisioned necessary artifacts for adopting Linux 8 and Linux 9 in NIC Cloud Infrastructure. The Almalinux 8.x, 9.x and Rocky Linux 9.x were released in the NIC Cloud. Additional Public Repositories such as NGINX, Docker, GitLab, EPEL, NPM and PGDG, Ubuntu PPA, MariaDB & Python were replicated and made available in NIC Cloud Environment which will reduce the effort required to provide latest packages.

As on date, 42 Repositories maintained at

OTG. The solutions for the newly reported issues through Service Desk are captured as a compendium and online sessions were conducted for all the stakeholders in the form of Support Digest Webinars. As a part of capacity building 4 Training programs were conducted. In addition to the existing activities OTG is also involved in the enablement of managed Cloud Services.
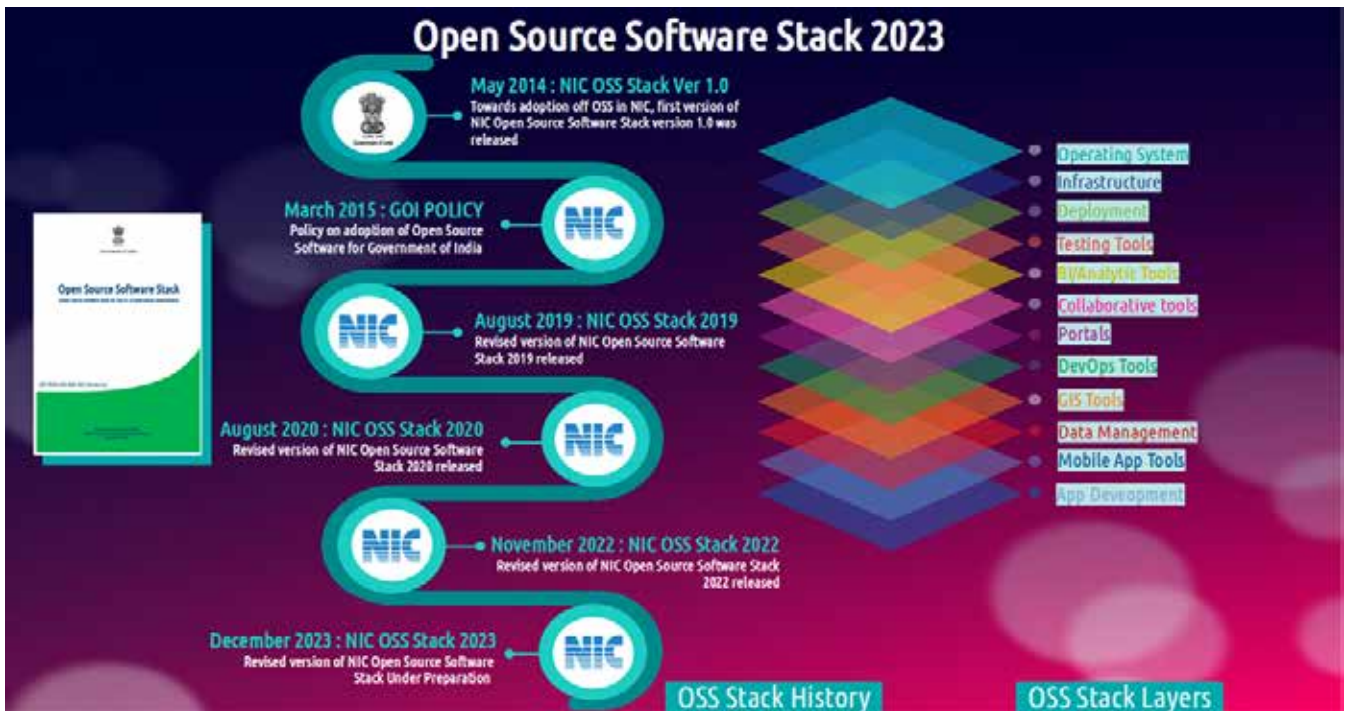
9.5.14.7 Centre of Excellence on Microservices (CEM)

CEM was set up with a vision to facilitate NIC fraternity in adopting agile and DevOps methodology with Microservices for delivering e-Governance services. NIC-CEM acts as the resource center of consultancy, development of microservices based projects and support for identifying and moving feasible monolithic applications to microservices based applications. A state-of-the-art walk-through demonstration-cum-lab on Microservices is completed at Kochi. This enables any individual visiting the center to understand the features and benefits through demonstrations on the design, development, and deployment of Microservices. The Centre has been instrumental in educating the NIC Units across the country about the benefits of using microservices based architecture in designing new software projects as well as migrating existing monolithic applications to microservices based architecture.

The CEM Kochi had provided PAN India support on migrating Monolithic Applications to Microservices enabled applications. The centre has also brought out PoCs, SoPs and Reference Architecture documents for the use of NIC fraternity. The training activities of NIC-CEM Kochi during the last year are summarized below:

- **Workshops**: Residential Training Programmes (5 days) on Microservices, DevOps and Python Containerization with Training Divisions conducted by CEM Faculties, NIC officials and experts from Industry.

- **Consultancy:** Provided to 18 NIC States/ Projects.
- **Webinars**

PoCs / Common Service Development:

- University*Suite- (Migration of Admission module)
- Common file Upload service
- Login Service-Authentication Service
- Vehicle enrolment Service using RabbitMQ / MinIO / Springboot / Angular
- emailQ Service using Kafka (Design phase)

Documents Prepared:

- Reference Architecture for Microservices
- SoP for Deployment of PHP applications in Containers
- Security Concerns of Containers
- Prerequisites for Migration
- Microservices – Languages & Tools
- Guidelines for Migrating Monolithic Applications to MSA
- SOP for Migrating Lightweight Java/ PostgreSQL based Applications.
- SoP for Python Application Containerization
- SoP on Common file Upload service
- Reference document for .Net application containerization

9.5.14.8 NIC Training Unit (NICTU) at Lal Bahadur Shastri National Academy of Administration (LBSNAA), Mussoorie

The coordination, session design, concurrent evaluation, and successful delivery by NICTU contributed significantly to the skilling requirements of the training programmes of LBSNAA. NICTU did it as per the course requirements, feedback and training needs analysis shared by the respective course coordinators of LBSNAA and approved by its Academic Council. In addition, NICTU conducted Training of Trainers (ToTs) for the officers of LBSNAA, NIC Uttarakhand, ITBP and DRDO. Overall, during 2023, around 1600 Nos of Government officers benefitted by the hands-on skilling by NICTU on ICTe-Governance and Digital Transformation. Some of the intended objectives are increasing personal and office productivity, data-driven decision-making and framing up of the requirements needed for attempting digital transformation at the field level by the Government officers, so trained.

NICTU ensured that successful e-Governance implementations and the current trends of generative AI, data analytics, computer vision-based Machine Learning, GIS and Drone technology were explained to the participants of the induction and Mid-term Career programmes at LBSNAA. For this, NICTU coordinated with experienced practitioners in the Government: Central ministries (MeitY, NIC, NeGD, Income Tax, GST, Railways, NITI Aayog), State Governments (Land records, IT agencies, CM Dashboards and other IT initiatives), PSUs/ agencies (State Electricity Boards, Smart Cities, Banks), global organizations (World Bank, Carnegie Mellon University), Academia (CMU, IIT Delhi, IIT Guwahati, IIM Ahmedabad), and Industry (award-winning Tech startups suggested by MeitY and NASSCOM). LBSNAA invited their respective representatives for guest lectures and technology demonstrations. NICTU also ensured that the training participants acquired sufficient hands-on skills in handling public data.

NICTU also contributed to the improved automation of the back-office operations and activities of LBSNAA. Few of the important ones are planned shifting of on-premises deployments of applications to NDC and MeitY-empaneled clouds, tele-medicine facility established between LBSNAA and AIIMS Rishikesh, hiring and deployment of NeGD-sponsored data analysts, equipping the NICTU lab at LBSNAA with 120 Nos high-end machines procured through NICSI, and a series of rich dashboards developed and curated depicting live monitoring of Government schemes across the governments.

9.5.15 National Informatics Centre Services Incorporated (NICSI)

NICSI is a Company registered under section 25 of the Companies Act, 1956, a Government of India Enterprise under NIC, MeitY. NICSI providing procurement and supply of total ICT solutions and services in the entire Government Sector including departments and organizations of the Central Government and State Governments, and its services include state-of-the-art hardware, software, consulting, technical support, design and development, operations and management, quality check as well as end-to-end ICT solutions and services, and it has undertaken various ICT projects of government departments and organizations providing state-of-the-art technology and cost-effective solutions to ensure efficiency, transparency and reliability in their implementation, and has been providing such services since last more than 28 years to most of the departments/organizations both in the Central and State Governments. Some of the prestigious projects include National Data Centre at Lakshmi Nagar, New Delhi, enhancement of NIC Cloud Services, National Data Centre at Shastri Park, New Delhi, NKN, facilitating various projects like e-Procurement, e-Office, e-Hospital, iRAD, Diksha, Contactless Biometric Attendance System etc.

With a turnover of more than ₹1,702 Crore (FY 2022-23), NICSI has successfully executed more than 23,500 projects in India and other developing nations by providing state-of-the-art and cost-effective solutions for all their growing ICT needs.

NICSI has set-up a Product Business Division (PBD) with an aim to productize, standardize and promote Software Products developed by NIC/NICSI at International Level. NICSI has been exploring opportunities for international implementation of NIC/NICSI Products. Several foreign countries have expressed interest in NIC/NICSI Software Products including Ecuador, Venezuela, Kazakhstan, Nigeria, Bangladesh, Paraguay, Guyana, UAE etc.

9.5.16 International Collaboration

A Memorandum of Cooperation (MoC) was signed in April 2023 between Government of India and Government of Mauritius on Cooperation in the field of ICT, for which the draft was prepared and shared with MeitY. In continuation to this the Government of Mauritius had decided to implement the PSCSoft Application (e-recruitment system) in Mauritius. In order to take forward the discussions regarding the implementation of the project, the

Government of Mauritius requested a VC with NIC. The VC Meeting organized on 10-08-2023, was co-chaired by Hon'ble Deepak Balgobin, Minister of Information Technology, Communication and Innovation from Mauritius side and Shri Sushil Pal, Joint Secretary, MeitY from Indian side. Shri IPS Sethi, Deputy Director General NIC, Shri Ajay Kumar Chahal, Deputy Director General NIC and other Officials from Indian High Commission Mauritius, Government of Mauritius and NIC Himachal Pradesh also joined the meeting. In order to better understand the system, access to the test/demo platform is also provided beside the various demo sessions through several VC meetings. The draft Memorandum of Agreement (MoA) on PSC Soft Application (eRecruitment) between NIC/ MeitY and Government of Mauritius Prepared and shared with MeitY.

The Hon'ble Minister for Information and Communication (ICT) of Papua New Guinea & other delegation members on 27th July 2023 visited NIC HQs and had a meeting with Director General, NIC & Senior NIC Officials and discussed possible collaboration in the ICT field.

A Video Conference (VC) based meeting between Turkmenistan Side and NIC Side, was held on March 16, 2023, to discuss the cooperation in the areas of eGovernance. The Officials from the Embassy of India, Turkmenistan and MEA also joined the Meeting.

A VC meeting was held on June 07, 2023, between Mongolia and India teams, to explore future cooperation in the areas of eGovernance. Meeting was co-chaired by Ms. Solongoo Bayarsaikhan, Deputy Minister for Justice and Home Affairs, Government of Mongolia from Mongolian side and Shri IPS Sethi, DDG, NIC from Indian side. The Ambassador of India in Mongolia and Second Secretary (Political & Head of Chancery) from Embassy of India, Mongolia, various Officials from the Ministry of Justice and Home Affairs, Mongolia, E-Mongolia Academy, MeitY, Mongolia and NIC also joined the meeting. A Presentation on eGovernance Products and Services of NIC was given followed by discussions and queries.

On request of the Embassy of Socialist Republic of Vietnam, New Delhi, VC based meetings were held on 07-06-2023 and 12-10-2023. The Vietnam side showed interest to learn from NIC in the area of national data center, national data management, digital platforms, and citizen data sharing usage etc. The Meetings were attended by Officials from National Centre for residents' Data, Vietnam, Ministry of S&T, and Vietnam's Embassy in India, MeitY, Indian Embassy Hanoi, MEA, and NIC. The Vietnam side was briefed that as per discussions they are required to provide the precise requirements and a draft document for proposed collaboration.

Participation in (i) Meeting chaired by Secretary Coordination, organized by Cabinet Secretariat on organizing a Global Food event "World Food India"; (ii) Inaugural Ceremony of 6th IEEE International Conference on Information System and Computer Networks (ISCON 2023) on **03-03-2023** at GLA University, Mathura; (iii) The launching ceremony of InfoBhoomi Web: A smart local land management tool **on 26-04-2023** on invitation of Sabaragamuwa University of Sri Lanka (SUSL).

Inputs provided (i) On 'A Brief on Digital Transformation' was provided to MeitY reg. Ninth IPU Global Conference of Young Parliamentarians Hanoi, Vietnam; (ii) To MeitY reg. Guyana for External Affairs Minister's visit to Guyana; (iii) To MeitY on the experiences/impact of COVID-19 on India regarding ICT and digitally delivered services for Council for Trade in Services (CTS) meeting held at the WTO.

9.5.17 Media and Outreach

NIC effectively promotes its brand, products, services, projects, apps, and software applications through a well-rounded strategy. The official NIC website (https://www.nic.in) and various social media platforms, including X (Twitter), Facebook, LinkedIn, Instagram, KOO, and YouTube, serve as active channels for regular promotion. The official website and social media channels prominently showcase content related to events, inaugurations, awards, and workshops through live posts, YouTube streaming, webcasts, etc. Special events and programs, including initiatives from NIC's State and District offices, receive comprehensive coverage across all digital platforms, publications and in Print Media. This multi-channel approach ensures widespread visibility and engagement with the audience, fostering a strong and consistent brand presence.

Social Media Campaigns for Independence Day, Yoga Day, World Environment Day, Hindi Pakhwada, Vigilance Awareness Week, Special Campaign 3.0 (Swachhata) etc. have been actively covered by the Media Division. Campaign on "NIC across State/ UTs" was carried out to highlight important initiatives of NIC's State/ Centres. NIC proactively participated in MeitY's "Stay Safe Online" Campaign creating engaging and informative content to raise awareness about online risks and safety measures across all age groups. The focus was on promoting cyber hygiene to enhance the overall online safety of the citizens. During the G-20 Summit week, along with the SSO Campaign, NIC launched a vibrant social media campaign showcasing NIC's contribution in domains like Agriculture, Health, Education, and Finance.

9.6 National e-Governance Division (NeGD)

NeGD is an Independent Business Division (IBD) within Digital India Corporation (erstwhile Media Lab Asia), under MeitY. NeGD's major operational areas include program management, project development, technology management, capacity building, awareness and communications related activities under Digital India program. NeGD provides technical and advisory support to Central Ministries / Departments, State Government Departments and other Government organizations in their Digital India initiatives. NeGD has developed and is managing several national public digital platforms such as DigiLocker, UMANG, Rapid Assessment System, OpenForge, API Setu, Poshan Tracker, Academic Bank of Credits, National Academic Depositories, National AI Portal, MyScheme, India Stack Global, Meri Pehchaan, etc. The details may be seen at **Chapter 2.**

9.6.1 DigiLocker

DigiLocker aims at 'Digital Empowerment' of citizens by providing access to authentic digital documents to citizens' digital document wallets. DigiLocker is a secure cloud-based platform for the storage, sharing and verification of documents & certificates.

DigiLocker has now over 265 million registered users who have access to 6.73 Billion issued documents available from over 1,703 issuing and

199 consuming departments. DigiLocker users have been growing YOY at 34% on the registered users and approximately 14% YOY on the available accessible documents for citizens.

Achievements
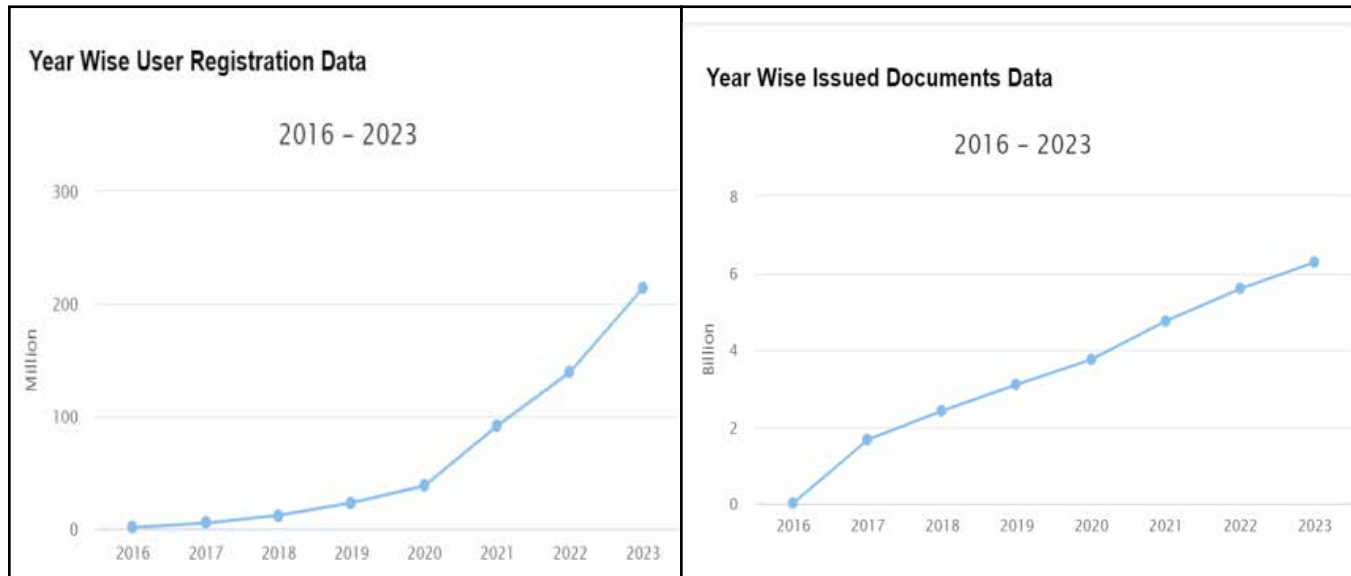
In the recent Union Budget 2023, the Government emphasized on bringing greater ease of living using DigiLocker, which is one of the key building blocks under India stack.

Some of the major onboarding of services are mentioned below:

- DigiLocker is connected with the e-District services of 30 states, the Land Records of 8 states, and the PDS services of 30 states, Electricity bills of 8 states for facilitating ease of living services to citizens.

- The emerging state for rollout has been Jammu and Kashmir with 12 departments catering to 72 types of documents for upbringing digital diversity.

- Focusing on diverse the digital ecosystem towards the North Eastern States, with the launch of citizen-centric services, namely Meghalaya, Arunachal Pradesh, Assam, Mizoram, Tripura, and Sikkim with other states to follow.

- Adaption to MoHUA (Ministry of Housing and Urban Affairs) for Municipal Corporations to over 1300 ULBs in cascading its reach to urban and semi-urban segments of the country.

- DigiLocker is embracing its integration with:

  ➢ CAG and State AG offices for provisioning of e-PPO, GPO, CPO, and GPF statements.

  ➢ Ministry of Defence for issuance of Salary Slips, Form 16, Service Records, Certificates on achievements etc.

  ➢ Indian Railways for varied used cases.

- DigiLocker's integration with 36 State Boards, including those for the X and XII grades, as well as open schools, along with 13 Technical Boards and 3 Central Boards, including CBSE, CISCE, and NIOS, underscores its

comprehensive reach within the education sector.

- The enrollment of 2175 awarding institutes and the authentication of 70 Crore academic awards. Additionally, the Ministry of Education (MoE) and the University Grants Commission (UGC) have designated DigiLocker as the exclusive National Academic Depository (NAD)

- MeriPehchaan is a platform that authenticates citizens easily and securely. It aims at eliminating the need to repeatedly prove user identity to different applications and hold different credentials for each application. It is an extensive collaboration of the three mainstream SSO platforms e-Pramaan, Jan Parichay and DigiLocker. MeriPehchaan enables standardized registration which means users need to provide information once for accessing different services. The platform witnesses an average of 17.9 Million daily transactions with total 125.82 Million transactions during the year.

9.6.2 API Setu

API Setu is a Secure API Platform of MeitY, Government of India. One of the major objectives of the platform is to build a secure and interoperable digital platform to enable seamless service delivery across government departments. One of the aims of the platform is to enable and promote safe and reliable sharing of information and data across various e-Governance applications and systems.

API Setu is one such Secure API platform from MeitY, Government of India that aims to bring digital transformation. It is based on the Government's Open API policy to ensure a swift, transparent and secure exchange of information across diverse digital domains.

The platform is developed referring to the Open API policy that was notified by MeitY in the year 2015, which focuses upon:

- Building an open and interoperable digital platform to enable seamless service delivery across government silos

- Promoting the 'API first' approach; (Re-usability)

- Enabling and promoting safe and reliable sharing of data across various e-Governance applications and systems.

- Promoting innovation through the availability of data from e-Governance applications and systems to the industry and public.

- Providing guidance to Government organizations in developing, publishing and the implementation of using these APIs.

It hosts a vast number of APIs that are published and consumed by various government and private entities, who in turn can develop user-centric innovative products for various sectors such as health, education, business etc.

For Instance, APIs of the Co-win platform powered several vaccine scheduling apps, which ensured that India could fight the pandemic effectively. Or APIs of DigiLocker are transforming document access, sharing and verification through various partners.

API Setu connects with UMANG, DigiLocker, PAN, CBSE Results etc. together breaking the silos and building a digitally empowered Nation.

As on date, API Setu has more than 1500+ API Publishers with more than 5,100 published APIs and 550+ Consumers.

The platform records around 8 Crore transactions

every month. The platform is fully functional and is available at https://apisetu.gov.in.

Some notable APIs include: GSTN, PAN, Educational Boards APIs, Driving License APIs, Vehicle Registration APIs, DGFT APIs and many more.

Notable Use Cases

i. **DigiLocker**

- Uses API Setu to provide Authentic Digital Documents to Citizens from hundreds of issuers.

ii. **Karnataka State Police Recruitment**

- Over 10 Lac candidates apply online; Verification of class X and XII marks of applicants

- The verification duration has now been reduced by 50% and vacancies have been reduced by 8 to 10%

iii. **Indian Army** – The Indian army is leveraging API Setu services for Agniveer and Vayuveer recruitment to verify educational awards of students.

iv. **DigiYatra** - Digiyatra Foundation of the Ministry of Civil aviation is leveraging DigiLocker APIs via API Setu for making seamless Air Travel. Now passengers don't have to stop for boarding pass verification and presenting Identity documents to security personnel at the Airports.

v. **eSanad, Ministry of External Affairs**

- eSanad verifies class X and XII marks of students from 5 state boards applying to foreign universities.

- The data is also provided in consistent machine-readable XML format

- Eliminated the need for redundant integration with each board

vi. **Co-WIN APIs**

- The Co-WIN application has an Eco-system of partner applications such as Aarogya Setu, DigiLocker, UMANG and Common Service Center

- API Setu provided an industry-standard mechanism to share and publish the API specifications

vii. **Delhi University**

- Verification of academic credentials of CBSE students applying to the University

- Access to student data in real-time through APIs with consent and traceability

- Eliminated use of offline data sharing Platform records around 6 Crore transactions every month

9.6.3 Unified Mobile Application for New-Age Governance (UMANG)

The objective is to facilitate ease of living by putting the power in the hands of citizens for availing major government services anytime, anywhere with just a few clicks on a single unified mobile application integrated with DigiLocker, myScheme, NSSO etc.

It enables the citizens of India to access e-Government services in various sectors such as Agriculture, Education, Health, Housing, Employees, Pensioners, Students, Ration Card, Railways, and many more services from the Central and State Governments.

Achievements:

- UMANG is available in 23 multi-lingual languages (for top 100 services), including

English & Hindi and has been hosted on the cloud. UMANG aims to bring power to the fingertips of citizens.

- Till 31st March 2024, UMANG has about 1984 – Central and State Govt. services (including 733 DBT services) from 207 Departments of Central and State Government of 30 States/ UTs and many more are continuously being on-boarded.

- Over 6.31 Crore users are registered and benefiting from services on UMANG

- Around 88 Lakh Advance Claims in EPFO have been raised via UMANG Platform between April 2023 to March 2024.

- UMANG has been successfully integrated with myScheme with the availability of ~1,000 schemes to the users.

- The UMANG app has undergone a transformation and is now offering users a comprehensive experience in discovering and assessing various schemes. With its 360-degree view of schemes, individuals can gain a holistic understanding of available government initiatives. Through personalized access and a redesigned flow, navigating through the app has become seamless, enhancing user engagement significantly. Moreover, the app now boasts an advanced recommendation system, suggesting schemes tailored to users' preferences and needs, alongside providing insights into previously availed schemes.

- To make the app more user-friendly and enhance the experience of the users, AI-Bot (Beta Version) has been launched on UMANG (35 services in 2 languages i.e. English and Hindi).

- More than 1000 services are now automatically tested on UMANG.

- UMANG's International version is helping Indian international students, NRIs and Indian tourists abroad, to avail of Government of India services, anytime. It is also helping in taking India to the world through 'Indian Culture' services available on UMANG and creating interest amongst foreign tourists to visit India.

- UMANG has created huge value by aggregating so many APIs/services at one place, which is nowhere else available in Government.

- UMANG app services are also made available in assisted mode through Common Service Centres (CSCs) and 11 private partners to extend the reach to the users.
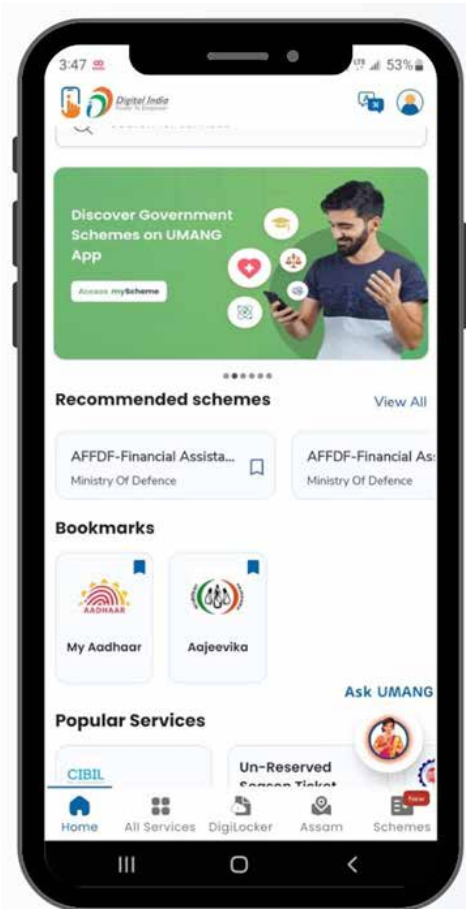
9.6.4 OpenForge

OpenForge (https://openforge.gov.in) is a collaboration platform similar to Github that provides industry-standard tools and features for version control, release management, code repository, requirements/bugs trackers and document repository. It is the Government of India's platform for the open collaborative development of e-governance applications. This platform provides strategic control to government departments over their software source code. In 2015, MeitY, Government of India rolled out the "Policy On Collaborative Application Development by Opening the Source Code of Government Applications", which provides a framework for archiving government custom-developed source code in repositories and opening these repositories for promoting reuse, sharing and remixing. By opening the source code, the Government wants to encourage collaborative development between Government departments/agencies and private organizations, citizens, and developers to spur the creation of innovative e-governance applications and services. IndEA architecture suggests the adoption of Agile methodology for software development. This platform supports agile software development methodology.

Currently, OpenForge has **13,023** registered users and **2,817** projects have been onboarded of which **19** were onboarded last month. Users are using the OpenForge code version control plugin GIT at a mass level. Till now **8,558** GIT repository has been created and **6,71,654** GIT push has been made of which **19,720** were done last month.

Many projects of national importance such as CoWIN, Poshan Tracker, GeM, MYBharat, UMANG, DigiLocker, National Centre Of Geo-Informatics (NcoG), Smart City, National Academic Depository (NAD), Academic Bank of Credits(ABC), API Setu, Industry Information System, Aspirational Districts, Delhi Police OneTouch App, RAS, GOVTALK, TRAI Applications are dependent on this platform for day to day development activities.

A total of **543 NIC users** are onboarded on OpenForge platform and a total of **280+ NIC projects** are registered. Major projects onboarded by NIC are IGOT Karmayogi, Nadakacheri, NRA Digital Platform, JanAkansha, Pbox, DBT Karnataka etc.

Multiple onboarding activities like meetings and workshops have been undertaken to promote the OpenForge platform. 21 awareness workshops have been conducted so far for various states. OpenForge has also been showcased in training conducted on Open Source Development for CTOs and Team Leads for all state departments. OpenForge Workshop for NIC officials was conducted at NIC Headquarters, New Delhi. It was attended by all HoGs & HoDs posted in New Delhi and Senior Members of their team. NIC State HQs & the district offices also attended the session through VC.

9.6.5 myScheme

As part of the UTTARA (Universal Transparent Tracking of Application & Response to Application) initiative, myScheme is a Schemes Marketplace. It serves as a single National Platform for the schemes of the Centre Government and the State/ UT Governments. The myScheme platform may be accessed at ***https://www.myscheme.gov.in/***.

More than 2,000 schemes of the Central and 35 State/ UT Governments across 15 diverse categories have been on-boarded on the platform. The number of visitors on the myScheme platform has crossed the 12 million mark.

The prominent features of myScheme are as follows:

- **Personalized Search:** Search and Discovery of schemes using demographic details.

- **GovForms:** DigiLocker-integrated Application Forms minimize the need for manual & repetitive verification of documents.

- **Apply via myScheme**: Integration of the APIs of the scheme-sponsoring departments for Application and Tracking.

- **Simplified and Curated Information** reduces the need to search multiple websites and study multiple scheme-related guidelines.

- **Check Eligibility Questionnaire:** Users can easily check their eligibility for a particular scheme by answering a set of simple Yes/No type scheme-specific questions.

- **Present on 3 Other Platforms -** e-Shram, UMANG, and API Setu

9.6.6 UX4G Project

Project named **"User Experience for Government Websites & Apps (UX4G)"** aims to examine GIGW compliant Government websites/ apps, identify areas of improvement in UI/UX, create a framework and guidelines to help Government Departments adopt better UI/UX, develop libraries of GIGW compliant ready to use, reusable Web Components, sensitize them and extend necessary technical hand-holding support on use of web components for improving the quality of UI UX.

UX4G initiative is to assist various government departments in improving the user experience (UX) and user interface (UI) of their digital applications by building capacities within the government and assisting in redesigning and revamping applications. The goal is to create a more user-friendly and enjoyable experience for the end-users.

Design System is published at www.ux4g.gov.in			
50+ Case Studies	35+ Workshops	2,200+ Attendees	32+ Departments
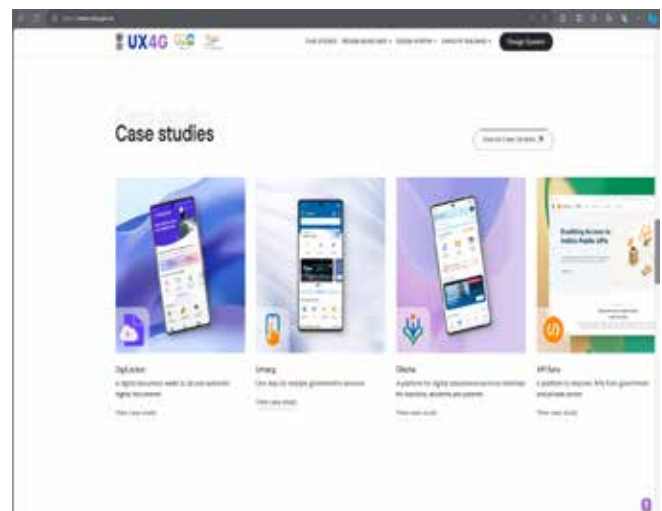
Snapshot of case studies section from UX4G Website

Activities	Remarks
Creation of Design system: A digital library of ready-to-use components that promote and simplify collaboration among designers and developers. The purpose of the design system is to act as a digital repository of reusable components, effectively reducing duplicity in work and saving valuable time. This resource comprises of a pattern library and framework, enabling designers and developers to operate with increased efficiency and enhance the overall experience for end users.	Version 1.0.1 of Design System is released and available for public use at www. ux4g.gov.in
Build capacities within the government departments for better practices on User Experience: To enhance better understanding of the standard UX practices in digital services, awareness workshops on UX design thinking, UX audits, prototype and implementing the design system etc. being conducted.	Till now **more than** 35 workshops have been conducted in which **more than 2200 participants** from different Central and State G o v e r n m e n t Departments have benefited.
Connect with Government Departments for UX enhancements of Website and Mobile Applications and develop the design interface for them.	68 **Website s** and **38 Mob App s** on-boarded fo r UX UI enhancements. Case studi es of all the applic ations on-board are being published at www. ux4g.gov.in.

9.6.7 Capcity Building Schemes

(a) Phase-II (10.01.2015-15.12.2023)-CB 2.0

The Digita l India vision provides intensified impetus to e-governance initiatives to meet the aspirations of its citizens, where the government and its services reach the doorsteps of citizens.

The object ive of the project is to provide professional resources to States and provide training t o political and policy level decision makers, ma nagers and implementors of all States/UTs and Central Line Ministries to build the in-hou se capacity for implementation of various e- Governance initiatives. The major components are:

i. Conduct ing specialised training programmes /workshops on required competencies in e-Governance

ii. Provid e mission team support to bridge the releva nt skill sets and expertise in managing l arge IT/ e-governance projects and to develop an appropriate institutional framework to handle the capacity building requirements of the State

iii. Speci al focus to involve Central Line Ministries , introducing new initiatives for maximum outreach and bringing flexibility,

iv. Amplifying learning through technology-led platforms

v. To handle the other capacity building requirements of States/UTs and Central Line Ministries.

30 programmes/sessions with 6,212 participants were conducted under CB 2.0 which concluded on 15.12.2023, and a new CB project was initiated from 16.12.2023.

(b) Phase III (Initiated from 16.12.2023) -CB 3.0

The new Capacity Building Project is approved for the next 3 years to address the augmentation of the competency requirements of the Government officers of Central line Ministries & State/UT, which help for the speedy implementation of the Digital India transformative initiatives. The project aims to build internal capacities in Government to enable Digital Governance as a larger reform of Government service delivery and functioning. Progressive technologies such as AI, Blockchain, Data Analytics, Drones, Cloud etc. have become a critical facilitator for Governance. It has a highly profound role in driving optimization and efficiency across all sectors.

The capacity building reform components include:

a) Training & knowledge sharing with specialized training programmes & workshops.

b) Deployment of professional resources to State/UT

c) Advanced Learning Platform with experiential learning (LXP)

d) Content development & management

e) Collaboration and partnerships with national and international institutions

f) Continuous engagement and participation of cohort via Centers of Excellence and Communities of Practice.

Progress Report (till 31st March 2024):

i. 10 training programmes and webinars have been conducted with 1747 participation across all Ministries and Dept. (including international bureaucrats/youth).

ii. State Capacity Building Workshops were conceptualized in the F.Y. 2023-24 with a focus on emerging technologies such as AI in digital transformation, Data driven decision making for Government, Cloud computing, Generative AI etc. The scope has been expanded to include State Chief Information Security Officer (CISO) programmes, which have been conducted in two states/union territories.

iii. Future readiness series on Digital Governance are being conducted in collaboration with Government practitioners and industry partners with exposure to build digital readiness amongst them for adoption of emerging technologies such as Artificial Intelligence, Cyber Security, IoT etc. to catalyze public service delivery more efficiently and effectively. 2 masterclasses have been conducted with 373 participation.

iv. Orientation sessions on Digital India and its initiatives: Specialized sessions are conducted for international bureaucrats under different programs conducted by MEA, NITI Aayog and many other institutes to share India's initiatives and schemes in Digital India programme, its journey and best practices, financial/social inclusion, enabling citizen centric services, etc. with the participating countries. 3 programmes have been conducted with the participation of 104 international officials/youths.

v. State e-Mission Team (SeMT) is a team of professionals attached to State IT department to provide technical/ professional support to the State decision and policy-making bodies (State Apex Committee). In this project, along with dedicated techno-programme management

resources in State/UT, a pool of specialised resources will also be deployed centrally on specific emerging technologies.

vi. The existing Learning Management System strives to evolve into an advanced learning platform incorporating experiential learning (LXP).

To know more about program objectives, target audiences, duration, and other details, please visit at https://negd.gov.in/capacity-building/#training.

9.6.8 Learning Management System (LMS)

LMS is an e-learning tool, designed to facilitate anytime anywhere learning for government employees. This year, 6 new departments were onboarded, totaling 119 departments. The new user count has been increased to the cumulative count of 219151. The system now has 6,864 uploaded e-content and with a cumulative learning sessions of 2037+.

9.6.9 Awareness and Communication (A&C)

A&C is an integral component of the DIP. It performs the crucial role of generating and raising the level of awareness about Digital India, its schemes, initiatives and services amongst diverse stakeholders across the country.

Objectives:

1. **Expand visibility of Digital India**: The Project aims to inform, educate, and communicate to the citizens about various initiatives under the "DIP", thereby empowering them and establishing the brand "Digital India" by way of effective branding exercise across various platforms- Events, Social Media, Mass Media, Rural Outreach etc.

2. Help citizens understand the benefits of Digital India

3. Facilitate demand creation for various services leading to more adoption of services

   • Increase in downloads of app-based services

   • Increase in reach on Social Media platforms

I. Key Events

National Creator's Award (March 8, 2024)

On March 8, 2024, MyGov organised the National Creator's Award at Bharat Mandapam, New Delhi. The event was graced by Hon'ble Prime Minister. A&C team provided full support to the event including end to end management including venue arrangements, stage management, audience management, F&B etc.

APAAR (February 13, 2024)

On February 13th, 2024, the A&C team organised the Ministry of Education's APAAR event in New Delhi. A&C executed the event with responsibility of end-to-end management including venue arrangements, stage management, audience management, creative designs for venue and social media, gift procurement, photography, videography etc.

Bharat Tex 2024 (February 26 – 29, 2024)

From February 26 – 29, 2024, the A&C team set up a Digital India exhibit at Ministry of Textile's 'Bharat Tex' which was a global textile events organised at the Bharat Mandapam and Yashobhumi in New Delhi. The event was inaugurated by Hon'ble Prime Minister. At the Digital India exhibit, the India Handmade portal, Digibunai, and eSaras were showcased, highlighting technological advancements in traditional Indian craftsmanship. A&C provided support for the entire stall setup, social

media content writing and creative designs, photography and videography; interviews were taken of various artisans for social media coverage.

Swachhata Pakhwada (February 1 - 15, 2024)

February 1 - 15, 2024, the A&C team organised the Swachhata Pakhwada at MeitY premises. The campaign held over a fortnight featured a diverse array of activities aimed at promoting cleanliness and sustainability. Activities included Beat Plastic Pollution Drives, e-waste collection campaign, paper wastage reduction drive, minimization of food wastage, plantation drives etc. Awareness campaigns were conducted on social media, and through magic shows as well as nukkad nataks, centered on Swachhata.

MeitY's Republic Day Tableau (January 26, 2024)

MeitY's Tableau was part of the Republic Day Parade 2024 at Kartavya Path. It focused on India leveraging AI in Healthcare, Logistics and Education to further Trustworthy AI for Social Empowerment. The Tableau also showcased advances made by India in Electronics Manufacturing

Global Partnership on AI (GPAI) Summit (December 12 – 14, 2023)

As the Incoming Support Chair of the Global Partnership on Artificial Intelligence (GPAI), India stood at the forefront, hosting the annual GPAI Summit from December 12 - 14, 2023, at Bharat Mandapam, New Delhi. The GPAI Summit brought together representatives from 28 member countries and the European Union, forging an extraordinary platform for discussions on urgent matters shaping the ever-evolving landscape of Artificial Intelligence.

Around 30 sessions were organized, which were graced by global AI experts from GPAI, International Organisations, Industry/Startups, and Academia. Some of these sessions were held in closed-door meetings having delegates and experts of GPAI. Other sessions were held in public and live-streamed for wider participation. More than 22,000 persons attended the summit and out of these 15,000+ AI enthusiasts participated virtually.

IndiaAI Expo: As part of the GPAI Summit, the Ministry of Electronics and Information Technology organized a Global AI Expo. The Expo featured organizations (educational institutions, companies, start-ups, MSMEs etc.) that are at the forefront of AI innovation and have technologies that have the potential to benefit society and address critical global challenges. The exhibition was attended by a global audience of industry leaders, policymakers, thought leaders, domain experts, fellow innovators and institutions, start-ups, and other stakeholders from 28 countries and the EU.

The AI Expo was centered around the following themes/sectors:

Agriculture, Food, Health, Water Resources, Environment and Pollution, Education, Culture, Transportation, Highways and Waterways, Railways, Energy, Public Safety, Disaster Management, Legal, Finance, Governance, and Cyber-Security.

Space was available for 100 built-up stalls, 12 pavilions of 100 sq mts each, and 6 pavilions of 50 sq mts each. 261 applications were received for built-up stalls and 48 applications were received for raw pavilions. There were around 18 pavilions where organizations like Reliance Jio, Paytm, Intel, AWS, Meta, Microsoft, and Google participated. Meta and AWS showcased more than 20 start-ups in their ecosystem within

their pavilions. Youth for Unnati and Vikas with AI (YUVAi) program, a joint program of MeitY and Intel, has endeavoured to foster a deeper understanding of AI in school students from classes 8 – 12 across the nation, by equipping them with relevant mindset and skill sets and thus empowering them to become human-centric designers and users of AI. Intel had the YuvaAI students from across the country showcase their solutions in its pavilion.

IITF (November 14 – 27, 2023)

The Digital India Pavilion in Hall No. 5, Pragati Maidan, New Delhi was one of the major attractions at the 42nd IITF 2023 that took place from November 14 – 27, 2023. The exhibit showcased pioneering Digital India initiatives: DigiLocker, UPI, e-Sanjeevani, Bhashini, and Mann Ki Baat.

The Digital India Pavilion was set up by the Ministry of Electronics and IT with logistics support from A&C. The DI Pavilion piqued people's curiosity by providing a unique opportunity to interact with cutting-edge technologies. There were interactive displays, interesting experiences for people of all ages, and a chance to learn about DI efforts straight from professionals.

G20 Digital Economy Work Group (DEWG) Meetings

- G20 DEWG Meeting in Hyderabad (April 17 - 19, 2023)

- G20 DEWG Meeting in Pune (June 12 - 14, 2023)

- G20 DEWG Meeting in Bangalore (August 16 - 19, 2023)

The 2nd, 3rd, and 4th G20 Digital Economy Working Group (DEWG) meetings were held in Hyderabad, Pune, and Bangalore respectively. The DEWG meetings were attended by delegates from G20 member countries, international organizations, Hon'ble Ministers, top officials from MeitY, MEA, State Governments, industry partners, academia, etc.

G20 Delhi Summit

At the G20 Delhi Summit held from September 9-10, 2023, MeitY, Government of India set up two Digital India Experience Zones at Hall 4 & 14 in Bharat Mandapam, Pragati Maidan.

Hall No. 4 was visited by over 2000 media people and journalists not only from National Media but also International Media. While National media gave wide publicity and coverage in various electronic and print media channels such as News18, DD News, Data Quest, News9, ABP Live, PTI, Times Now, DNA, News24, ANI, NDTV, BRUT, Republic TV, CNBC TV18, Aaj Tak, Zee News, India News, News X, CNBC Awaz, Money Control, News 24, Business Today, DD National, Republic Bharat, Navbharat Times, Amar Ujala, the Digital India Experience Zone received publicity through International media such as Russia's Sputnik News and Kanka News from Shanghai. Apart from news channels & print media, prominent news anchors, independent journalists and renowned influencers such as Technical Guruji, RJ Raunac, Kavita Singh, Jay Kapoor provided positive reviews as well.

Hall No. 14 was visited by over 200 people including delegates from G20 and invited countries- Singapore, South Africa, France, China, Indonesia, Japan, Mexico, Oman, Germany, Australia, Spain, Russia, UK, USA, Nigeria, Italy, South Korea and International Organisations such as United Nations, and senior officials from various Ministries and Departments of the Government of India.

Prime Minister of Bangladesh Smt. Sheikh Hasina also visited and lauded the exhibit.

Organization of Global DPI Summit in Pune (June 13 - 14, 2023)

The Global DPI Summit was held in Pune from June 13 – 14, 2023 and attended by over 250 delegates, out of which, there were around 150 foreign delegates from 50 countries. Additionally, the Summit was attended by more than 2000 persons virtually. India signed an MoU with four countries namely Armenia, Sierra Leone, Suriname, and Antigua and Barbuda on sharing INDIA STACK i.e. successful digital solutions implemented at population scale.

Global DPI Summit Exhibition

14 Experiential exhibits were showcased comprising successfully implemented DPIs such as Aadhaar, UPI, DigiLocker, UMANG (Unified Mobile App for New-Age Governance), ONDC (Open Network for Digital Commerce), BHASHINI (language translation solutions), DIKSHA (learning solution), eSanjeevani, and Digital India Journey at the Global DPI exhibition.

Digital India Awareness Campaign at 25 Delhi Metro Railway Corporation (DMRC) Stations (May 25 – June 25, 2023)

An awareness campaign was conducted across 25 DMRC Stations for one month. Digital Public Goods/Services such as DigiLocker, UMANG, myScheme, DIKSHA, MeriPehchaan, API Setu, and Open Forge were promoted to spread awareness amongst citizens using Delhi Metro Service. Banners, standees, and canopies were put up in all the selected metro stations wherein citizens could learn about these initiatives.

Inter-Ministerial Conference on Cyber Security (July 17, 2023)

In order to enhance awareness of cyber security, how to protect and safeguard our ICT infrastructure from cyber threats, deliberate upon appropriate counter measures, and share best practices, an Inter-ministerial Conference was conducted by MeitY on July 17, 2023. The Conference was chaired by the Hon'ble Minister of State for Electronics and Information Technology and Skill Development and Entrepreneurship, Shri Rajeev Chandrasekhar. NeGD organized the entire event, including stage set up, branding, social media etc.

SemiconIndia 2023 Conference in Gandhinagar (July 25 – 30, 2023)

The 'SemiconIndia 2023 exhibition was inaugurated at Gandhinagar by the Chief Minister of Gujarat, Shri Bhupendrabhai Patel, in the presence of Union Minister of State for Skill Development & Entrepreneurship and Electronics & IT, and Jal Shakti, Shri Rajeev Chandrasekhar.

This exhibition marked the start of SemiconIndia Conference's second edition, organized by India Semiconductor Mission, MeitY in close collaboration with industry and industry associations. The Conference was graced by Prime Minister Shri Narendra Modi. The event showcased India's journey towards becoming a global powerhouse in Semiconductor Design, Manufacturing, and Technology Development, aligned with India Semiconductor Mission's vision.

NeGD organized the event including Hall Management, Stage set up, branding design, and the exhibition which had a lineup of 150 stalls representing 80 leading companies that showcased their innovations and products.

Digital India Talk Show cum Interactive Sessions

Under the flagship program of "Digital India", NeGD has developed and is managing several National Public Digital Platforms such as DigiLocker, UMANG, MyScheme, Rapid Assessment System, OpenForge, API Setu, Poshan Tracker, Academic Bank of Credits, National Academic Depositories, National AI Portal, India Stack Global, Meri Pehchaan etc.

A Digital India Awareness campaign was organized by NeGD at various colleges/ universities in Delhi to promote awareness of these citizen-centric apps and services that are useful for common citizens. The workshop was conducted by NeGD Officials from various projects; So far, two workshops were conducted as mentioned below:-

- Jamia Hamdard University (August 21, 2023)

- Delhi University (September 18, 2023)

Digital India Dialogues on The DPDP Act, 2023 (September 20, 2023)

NeGD organized a key Industry Stakeholders' consultation meeting on DPDP Act Compliance chaired by Union Minister of State for Skill Development & Entrepreneurship and Electronics & IT and Jal Shakti, on September 20, 2023. The event was attended by a variety of technology ecosystem stakeholders, including industry groups, startups, IT experts, think tanks, and lawyers attended the discussion.

Swachhata Hi Seva activities at Electronics Niketan in New Delhi (October 2, 2023)

NeGD, MeitY organized a Special Campaign (Swachhata Hi Seva) on 2nd October 2023 at Electronics Niketan, MeitY wherein more than

400 officers/officials of MeitY, its autonomous/ attached offices like CCA, ICERT, STQC, NIC, UIDAI, NIELIT, STPI, ERNET India, NIXI, NICSI, C-DAC, My-Gov, NeGD, DIC, CSC and CISF housed in Delhi and NCR participated in the event.

Rashtriya Ekta Diwas (October 31, 2023)

Commemorating the birth anniversary of Sardar Vallabhbhai Patel on October 31, Rashtriya Ekta Diwas (National Unity Day) was organized to re-affirm the strength and resilience of people to withstand threats to security, unity and integrity of our country. To mark this occasion, NeGD, organized a UNITY Run from the premises of the Ministry to the Jawaharlal Nehru Stadium and back to MeitY. Subsequently, a pledge for observing Rashtriya Ekta Diwas was also administered. NeGD organized the event and made necessary arrangements for the UNITY Run including T-shirts, Banners, Standees, Backdrops, and refreshments for participants.

II. Social Media

A. Major Events promoted on Social Media between April 1 - November 14, 2023

- G20 Digital Economy Working Group Meetings in Hyderabad, Pune and Bangalore

- Global DPI Summit & Exhibition, Pune

- G20 Summit in New Delhi- Promotion of Digital India Experience Zones

- IT Secretaries Meeting under the chairmanship of Secretary, MeitY on the theme 'Digital India Initiatives for Ease of Living and Ease of Doing Business'

- Digital India Awareness Campaign at 25 DMRC Stations

- Inter-Ministerial Conference on Cyber Security, CERT - in Workshop
- SemiconIndia 2023 Conference in Gandhinagar
- Digital India Awareness University Campaign - Digital India Talkshow cum Interactive Sessions
- YUVAi- Youth for Unnati and Vikas with AI
- Capacity Building Workshops
- Swachhata Hi Seva
- Swachhta Pakhwada Slogan Competition
- Rashtriya Ekta Diwas
- Launch of Aditya L1
- MeitY-NSF Workshop
- G20 Webinar in collaboration with NITI Aayog
- GPAI 2023 Summit
- IITF 2023

B. **Social Media Campaigns done between April 1, 2023 - November 14, 2023**

- Mann Ki Baat videos
- Save Paper with DigiLocker
- National Technology Day
- Mission LIFE
- 9 Years of Seva
- World Bicycle Day
- Know Your IT Rules
- G20 Digital Innovation Alliance 2023 – Promotions
- DigiShagun

- YouthSpeak on UMANG
- MyScheme
- Milestone Campaign - 200 Million Users on DigiLocker
- World Cerebral Palsy Day
- e-Waste Swachh Bharat Mission
- Navratri Campaign (9 Din 9 Yojanaye)
- Festivals with UPI, Dussehra with Digital India

C. Other Digital India initiatives were also covered extensively through separate posts periodically. They included initiatives both from MeitY and other Central Ministries and Departments

III. **Video Work**

A. **Social Media Videos**

DigiLocker description in one word, PM on GeM, DigiLocker Features, AI for Youth Student Video- Divyang Roshni, World Cotton Day Reel, Semiconductor Cover Work, Mental Health Day, Digi Bunai in Arunachal Pradesh, Swachhta Pakhwada, C-DAC Videos- IVIS Product, C-DAC OSIS, International Day for Disaster Reduction, Jeevan Pramaan, ABHA for Kids, DigiLocker Testimonial, Aditiya L1, PM Message to Youtubers/Influencers, Engineer's Day, Vishwa Karma Yojana, Youth Celebrating PM Modi Ji's Birthday, DU Student on Digital India Awareness Programme, UPI on Tourism Day

B. **Videos on "Digital India Experience Zone" at the G20 Delhi Summit**

9 Years of Digital India Initiatives, Delhi Preps for G20 Summit, 'Digital India Journey'

- showcasing Digital India Initiatives, G20 DEWG Flashback, Digital India Experience Zone Exhibit Videos- DigiLocker, ONDC, Aadhaar, eSanjeevani, UPI, International and National Media Coverage of the Digital India Experience Zone, Interviews at Digital India Experience Zone etc.

IV. Graphic Design Work

A. Miscellaneous Work

- G20 TOOLKIT on Cyber Education and Cyber Awareness for Children and Youth
- G20 TOOLKIT for Designing and Introducing Digital Up-skilling and Re-skilling Program
- G20 DEWG Brochure
- Calendar Design 2024
- IITF 2023 Branding Design for Exhibits at Digital India Pavilion
- GPAI Summit 2023 Banners and Social Media Creatives
- Design Creatives for G20 DEWG Meetings
- Semicon India Conference 2023

B. Social Media Creatives

RBI Book on Cyber Security Campaign, Guess the Yoga, Hindi Diwas Campaign, 6 Years of UMANG, G20 DEWG Social Media Campaign, G20 Anti-Corruption Working Group, Cytrain Setu Virtual Event, Karmayogi Bharat, Smart Mobility Conference, India Stack Global, eSanjeevani, DIKSHA, India Handmade Portal, Intelligence Transportation System (IVIS), Online Sucro

Crystal Imaging System, Thermal Sensor Based Camera, Jeevan Pramaan, Digital India Survey, BISAG-N, PMGDISHA, DC Portable Charger for Electric Vehicles, API Setu, SemiconIndia Conference, mSeva, Vega Processor, PMKVY, ShramDaan, Cyber Jagrookta (Cyber Security), Open Forge, UMANG, UPI, Khadi Mahotsav, Digital India Whatsapp Channel, E-Auction 2023, Bhashini, myScheme, OSTA, Meri Pehchaan, ABHA, Poshan Tracker, eMobility, Capacity Building Workshop, Mobile Exports, Save Paper With Digilocker, Stay Safe Online, Post Budget Webinar 2023, Swachhta Pakhwada 2023

Digital India Solutions for Digital Nagriks in 2024, Statistics related to Digital India projects, Viksit Bharat, 10th Vibrant Gujarat Global Summit, 5 Reasons why myScheme makes you 'AatmaNirbhar', 5 key takeaways for global fintech industry from IndiaStack, Pariksha Pe Charcha, National Startup Day, Digital Advancements in Ayodhya, Important quote snippets from GPAI (ongoing), National Girl Child Day, Women Empowerment on Republic Day, Promotion of MeitY's Republic Day Tableau, Digitisation of Courts.

Pre-budget: Progress So Far

Major Cabinet Announcements on setting up of 3 Semiconductor Manufacturing Units,

Launch of Lakhpati Didi Portal by MoRD, Extensive coverage of Digital & Technology related aspects of Budget 2024, Swacchta Pakhwada Campaign, Inauguration of Digital India futureLABS, Inauguration of C-MET CoE on e-waste, CISOs' Deep Dive Training at IIPA, Cyber Jaagrookta

Diwas, DNPA Awards, National Event on APAAR, Digital India futureSKILLS Summit, Paperless Governance with DigiLocker, MoU signing with Colombia, Campaign on Bhashini on Mother Language Day, Launch of Indus Appstore by MEIT.

Inauguration of Qualcomm Design Centre, Workshop on Gender Budgeting, 2nd Digital India #futureLABS Summit, Bhoomi Poojan of Semiconductor Fab & Packaging Facilities, National Creators' Award, Launch of NITI Aayog's Viksit Bharat Strategy Room, Announcements under NaMPET, Dekho Apna Desh, Campaign - Colours of Digital India, Digital India Northeast Regional Workshop (MeghEA + IndEA), Campaign - Mythbuster on DigiLocker, Courses on Karmayogi Bharat portal, Universal Acceptance Day (NIXI), Startup Mahakumbh (MSH)

9.7 Standardization Testing and Quality Certification (STQC) Directorate

9.7.1 Introduction

STQC Directorate, an attached office of MeitY, Government of India, provides Quality Assurance services in the area of Electronics and IT. Through an extensive network of laboratories and centers located across the country, STQC excels in providing a diverse range of services such as Testing, Calibration, IT & e-Governance, Certification, and Capacity Building to Public as well as Private organizations.

STQC has earned a distinguished reputation as a pioneer in the nation, particularly in the field of Quality Management System (QMS, ISO 9001), Information Security Management System (ISMS, ISO 27001), and Information Technology Service Management (ITSM, ISO 20000) certifications. The labs and centers under STQC maintain National and International accreditations and recognition in the field of e-Governance, Testing, Calibration, Training, and Certification services.

In the domain of IT & e-Governance, STQC extends its expertise by delivering Software Products/Systems and Process Assurance Services and also working on various emerging area of technology such as Common criteria, IoT etc. The spectrum of activities includes Testing, Audit, Training, and Certification.

Operational across the nation, STQC's extensive network comprises Electronics Regional Test Laboratories (ERTLs), Electronics Testing and Development Centres (ETDCs), and IT Centers. Additionally, specialized centers such as the Centre for Reliability (CFR) and the Indian Institute of Quality Management (IIQM) play pivotal roles in providing targeted training programs related to reliability and quality services, respectively.

Over the course of the last 4½ decades, STQC has firmly established itself as a pioneer in Testing, Calibration, IT & e-Governance, Training, and Certification. Its influence extends to offering nationwide support to a diverse array of organizations, including Public and Private entities, Startups, Micro, Small, and Medium Enterprises (MSMEs). The illustrious clientele served by STQC includes: Ministries, Departments, State Governments, R&D organizations (DRDO, ISRO), Defence establishments (Indian Army, Navy, Airforce), Telecom authorities (DoT, TRAI), Power entities (Power Grid, CPRI), Railway bodies (Indian Railways & Metro Rail), PSUs (IOC, NTPC, Coal India, BHEL, SAIL), Recruitment agencies (SSC, State Bodies), Statutory Bodies (e.g., BIS, UIDAI, CERT-In), and many more.

9.7.2   STQC Labs/ Centres

STQC HQ • Covering corporate activities for IT & eGov, STQC Certification Services, Lab Management & Coordination and Administration (Finance, Personnel, General).

ERTL • Electronics Regional Test Laboratories (Delhi, Mumbai, Kolkata & Thiruvananthapuram)

ETDC • Electronics Test & Development Centres (Jaipur, Mohali, Solan, Pune, Goa, Guwahati, Agartala, Bangalore, Hyderabad, Chennai & Ajmer)

CFR • Centre for Reliability, Chennai

IIQM • Indian Institute of Quality Management ,Jaipur

STQC Certification Services • 4 Regional offices (Kolkata, Mumbai, Bangalore & Delhi)

STQC IT Centres • STQC IT Centres • 12 IT Centres (Delhi, Kolkata, Mumbai, Bangalore, Hyderabad, Chennai, Thiruvananthapuram, Jaipur, Pune, Guwahati, Mohali, & Agartala)

9.7.3 Activities /Services of STQC

IT & e- Governance

e-Governance Conformity Assessment

- Quality Assurance Framework
- Scheme for Empanelment of Cloud Service Provider
- Scheme for Empanelment of e-Gov. Software Test Labs

IT System & Product Certification

- IoT System Certification Scheme
- Common Criteria Certification
- Website Quality Certification
- Trusted Electronics Value Chain Certification Scheme

- E-Procurement System Certification (e-PS)
- Bio-metric Devices Testing and Certification
- Smart Card Testing and Certification
- QR Code Scanner Testing & Certification
- NCMC certification

Software & System Testing

- Software Testing and Assessment
- Software Process Assessment
- Information Security Testing and Assessment
- Software Functional Testing
- Application Performance Testing
- Application Security Testing
- Vulnerability Assessment & Penetration Testing
- Acceptance Testing of e-Governance Projects
- Independent Verification and Validation

- Usability Testing
- Accessibility Testing
- Embedded Device/Software Security Testing
- Security Code review

Electrotechnical Testing

- Component Testing of SMDs (passive and active, VLSI devices)
- Equipment/Subsystem and Module Software Functional Testing
- Environmental Testing
- Testing for Safety of Electronics/Electrical products
- EMI/EMC Testing
- Explosive Atmosphere Compatibility Testing
- Op-to Electronics Testing
- Reliability Testing and Analysis
- EVM /VVPAT Testing
- Medical Electronics equipment testing
- Power / Energy Meter Testing

Calibration

- Electro-Technical Calibration
- Non-Electrical Calibration
- High Precision Calibration
- RF Calibration
- Optical Calibration,
- EMI/EMC Calibration
- Bio-Medical Equipment Calibration
- On Site Calibration

Certification

Management System Certification

- ISO 27001 Information Security Management System (ISMS) Certification
- ISO 20001 IT Service Management (ITSM) Certification
- ISO 9001 Quality Management System (QMS) Certification
- Product Certification

- Product Safety Certification based on IEC Standards (S mark)

Capacity Building

- Quality Management Programs as per ISO: 9001:2015
- ISMS LA program as per ISO: 27001:2022
- IT Service Management as per ISO:20000
- Laboratory Management Programs as per ISO: 17025:2017
- Reliability Engineering Programs
- Environmental Management Programs
- Common Criteria
- Information Security
- E-Governance Quality Assurance
- Software Quality Engineering
- Measurement Uncertainty
- Digital Forensics

9.7.4 Major Activities / Achievements

9.7.4.1 STQC Hq, New Delhi

IT & e-Gov Division

Biometric Device Certification Scheme (BDCS): STQC Directorate has been entrusted by UIDAI as a quality assurance partner. The objective of BDCS is to perform assessment/evaluation and subsequent certification of Biometric Devices and to facilitate availability of quality assessed Pre-certified Hardware, authentication/ enrolment Biometric Devices along with QR Code scanner device for offline authentication to user agencies like AUAs/KUAs as per Aadhaar Act.

STQC is the only Conformity Assessment body to verify the compliances of Bio-metric Devices for Aadhar ecosystem.

STQC has established **Biometric Device Test Laboratories (BDTL)** to support the Biometric Device Certification scheme (BDCS). These laboratories conduct various Tests such as Physical & dimensional, Image Quality, Environmental, Safety, EMC, Functional Performance, Interoperability etc. The main aim of the Biometric Testing is to provide confidence to the user of the Biometric Device that the device is reliable, safe, secure and meet the specified requirements. Currently ETDC Mohali, ETDC Bangalore & ERTL (East), Kolkata have Biometric Device Test facility.

Website Quality Certification Scheme (CQW): STQC has developed a CQW Scheme based upon National and International Standards/Best practices. The certification scheme aims to help in hardening of websites from wide range of Security threats, increasing accessibility, assuring commitment to services and ensuring compliance to the requirements of Guidelines for Indian Government Websites (GIGW) developed by NIC and adopted by Department of Administrative Reforms and Public Grievances (DARPG), Government of India.

Third version of GIGW (GIGW 3.0). While the earlier versions were formulated by NIC with external inputs, GIGW 3.0 has been formulated jointly with STQC Directorate of MeitY and CERT-In. Third version of GIGW (GIGW 3.0) was launched on 1st October 2023.

Indian Common Criteria Certification Scheme (IC3S): IC3S is operated by STQC Directorate, (MeitY). Under IC3S scheme, the Evaluation Laboratories or Common Criteria Test laboratories (henceforth will be referred as CCTLs) perform evaluations of Information Technology (henceforth will be referred as IT) products against the Common Criteria Standards. The purpose of this scheme is to evaluate and certify IT Security Products and Protection Profiles (PP) against the requirements of Common Criteria Standards, at assurance levels EAL 1 through EAL 4.

Common Criteria Test Laboratories (CCTL) are established to support IC3S. CCTLs at Delhi, Kolkata Bangalore, and Mumbai maintain adequate systems to support IT security evaluations.

India is member of Common Criteria Recognition Arrangement (CCRA) as Certificate Authorizing Nation. As per the Article 1 of the CCRA, Certificates issued by one member country is accepted in other countries without re-certification.

STQC has successfully conducted workshop on GIGW 3.0 on 26th September 2023. All the SETL and concerned STQC lab officials participated in the workshop.

Wide ranges of IT products such as network devices, operating system, etc. are certified for security features under this scheme. As on date, 03 certificates are issued under this scheme in Year 2023.

STQC has participated as validator for the CC operations of Australian Countries.

STQC being certification body of Common Criteria representing India in CCRA from April 2023 to April 2025. India has been nominated as chair of CCS Committee (One of the committees of CCRA responsible for audit of certification Bodies of 18 Certificate Producing country)

CCRA meeting at Washington DC

IoT System Certification Scheme (IoT SCS): The objective of this scheme is to promote security of IoT ecosystem. This scheme will facilitate improvement of National Cyber Security profile.

The implementation of this Certification Program will provide confidence to users that the risks associated with the threats currently set forth in the IoT-SCS are addressed by a device/system provider through conformance to this scheme. Demonstration of conformance through this certification program provides formal recognition of a conformance to the industry standards.

Currently ERTL(North) New Delhi is having IoT Device Testing facility to support IoT SCS.

STQC has issued 04 Certificates under this scheme as on date in 2023.

National Common Mobility Card (NCMC) Certification Scheme: NCMC Ecosystem Testing and Certification is an impartial assessment of a product by an independent body. This provides confidence to the users in the functionality, interoperability and security requirements provided in product to be tested. Certification provides independent confirmation of the validity of testing results, and thereby ensures comparability of these results across all testing under the scheme and facilitates to be used in NCMC ecosystem. Certification confirms that the product meets the interface specification.

STQC/STQC empanelled labs at Delhi and Bangalore, maintain adequate systems to support IT security evaluations in keeping with the tests for which it is seeking accreditation and maintain records on all test equipment or test suites used during the testing ion of NCMC Ecosystem.

STQC developed a testing facility at Delhi and Bangalore to test four products of NCMC Ecosystem namely Validation Terminal, Gate Control Unit, AFC System and Acquirer System.

SAB- STQC Empanelled Test Laboratory (SETL): STQC Directorate is the designated approving body for the operation of the scheme. STQC maintains a management system in accordance with international practices (ISO/IEC 17011) and that its approved conformity assessment bodies are competent in their operations of testing and assessments.

The scheme is intended to recognize the competence of IT test laboratories and to provide confidence to the stakeholders that Test results of Solutions tested in these laboratories are reliable, reproducible and repeatable. Under the scheme, after satisfactory completion of the assessment, the laboratory is issued a 'Certificate of Approval' indicating conformance to specified requirements of applicable standards as specified in the scheme.

> STQC has successfully conducted workshop/ Awareness program for all the Lead/Technical Auditors under STQC approval Body (SAB) responsible for empanelment of Public/Private IT lab (SETL) on 26th October 2023.

The scheme covers both private and public (Government) IT test laboratories involved in software and system testing with in-house and/or onsite capabilities.

At present, 11 Nos of SETLs are empanelled under STQC Approval Body based on assessment as per Scheme Criteria.

Implementation of e-Office and e-Hrms

STQC directorate has successfully implemented e-office at its all centres and e-Hrms implementation is under process.

> STQC was one of the members in Cyber Security committee of G-20.

Certification Division

Information Security Management System (ISMS) Certification Scheme: STQC is the first internationally recognized certification body of Indian origin in the country for ISMS. This Certification Scheme is accredited by National Accreditation Board for Certification Bodies (NABCB), Quality Council of India since 2014. The ISMS preserves the confidentiality, integrity and availability of information by applying a risk management process and gives confidence to interested parties that risks are adequately managed.

STQC has conducted ISMS assessment of its Global Clients at the **USA** and **Philippines.**

Quality Management System (QMS) Certification Scheme: QMS certification process involves a review of the Organization's QMS documentation and on-site audits by STQC. ISO 9001 standard promotes the adoption of a process approach when developing, implementing and improving the effectiveness of a Quality Management.

QMS certification of DIPAS (DRDO)

QMS certificate as per ISO 9001 was awarded to Defence Institute of Physiology & Allied Sciences (DIPAS), DRDO.

Safety(S-Mark) Certification Scheme: 'S' Mark scheme is a third-party Certification scheme in Electronics sector operated by STQC Certification Services and accredited by NABCB, India. This scheme is intended to provide adequate level of confidence, by means of system assessment, product testing and subsequent surveillance of the manufacturer, that the product conforms to the specified requirements of appropriate Safety standard published by International Electro-technical Commission (IEC).

e-Procurement System Certification Scheme: e-Procurement is identified as a mission mode project under national e-Governance plan. e-Procurement System Certification is an integral requirement by Government envisaged by MeitY, CVC and other Govt Ministries. STQC has been entrusted for evaluation, assessment and Certification of EPS.

Assessment and notifications of Digital Forensics labs as Examiner of Electronics Evidence

MeitY has entrusted STQC Directorate for assessment and evaluation of Central Govt / State Govt bodies i.e. Forensic science laboratories for notifying as "Examiner of Electronic Evidence" as per provision under Section 79A of IT Act 2000.

> STQC is providing support to Compulsory Registration Scheme and Cloud Service Providers empanelment scheme of MeitY

MeitY under a scheme for the above purpose has notified 15 labs till date as Examiner of Electronic Evidence as provisioned Under Section 79A of IT Act 2000 upon assessment and evaluation of applicant laboratories by STQC auditors.

STQC has also been entrusted to conduct annual surveillance assessment of notified laboratories

and is carrying out surveillance assessments regularly.

LMC Division

Handling of complaint Pertaining to PPP MII for electronics products: LMC is nodal group for coordinating with labs for the complaints related to PPP MII.

EVM Testing: LMC Division Coordinate with ECI and STQC labs for successful testing of EVM and VVPAT.

9.7.4.2 ERTL (North), New Delhi

IT Services

Common Criteria (CC) Test Lab.

CCTL-ERTL [North] is accredited successfully by IC3S for EAL 4 valuation.

Currently the following products are under evaluation:

- VCL- Enigmatron, High Security Data Encryption & Firewall Equipment [M/S Valiant Communications Ltd.]
- Cygnet OSS software [M/S NMSworks Pvt. Ltd.
- Array Security Firewall (ASF) ArrayOS [M/S Array Networks Pvt. Ltd.]
- Odyssey Certrix Suite" for EAL 4+ (Augmented with ALC_FLR.2)
- "Quantum Networks Layer 2 and Layer 3 switches" w.r.t. cPP Network Devices Version 2.2e

Quality Assessment of Biometric Devices:

- RD Services [L1 Device certification]: Completed for Mantra Softech – MFS110 device, ongoing for MARC11 device.
- RD Services [Code review for L1 Device certification]: Completed for ACPL India Pvt Ltd and Precision India Pvt Ltd
- L1 device Process audit: completed for Mantra Softech.
- UIDAI Requesting Entity AUA/KUA Compliance annual audit: Completed for National Health Authority – 2022, ongoing for National Health Authority – 2023

Website Quality Evaluation for CQW

Test and Evaluation of various Central Government Portals/websites like MyGov Website, Cabinet Secretariat, CPC (TDS), CSIR, DARPG, DoPPW, MIB, DOP, DoPT and Ministry of Power was carried out for CQW certification.

e-Voting Related: CDSL and NSDL web based applications for Level 2

9.7.4.3 ERTL(East), Kolkata

IT Services

Functional testing of 117 services of e-District 2.0 application, Govt. of Chhattisgarh is under progress

Completed CVS and IT Conformity assessment of e-Procurement application, e-Bidding application and e-Auction application of different organizations. The systems are successfully used in **electronic procurement** and different **e-Bidding / e-Auction exercises of Govt. of India**.

Conducted functional testing, security audit of VLTD App, developed by a **start-up** organization, to provide a platform offered by manufacturers to their end users to track their vehicles, get notifications on various events, check historical routes and reports etc.

Functional testing of e-District project

Completed Security Assessment of Web Services & API Security of Food & Supplies Department, Govt. of West Bengal, Crime and Criminal Tracking Network & Systems (CCTNS) project, Govt. of Madhya Pradesh.

9.7.4.4 ERTL (West), Mumbai

IT Services

Conducted an IT Infrastructure Audit and Assessment for the CCTNS project at the Data Centre in Itanagar, Arunachal Pradesh. This includes physical verification of hardware supplied to Police department, hand-holding support, Supply & Installation of hardware/software, Data Digitization (Sign off Document) and Web Application-Functionality check for CCTNS.

Engaged in Vulnerability Assessment and Penetration Testing as a component of the "Enhancing Cyber security for the Smart Cities Mission," specifically focusing on Smart Cities.

Contributed as a member of the End-Point Security Testing and Audit Team for Smart Cities as part of the "Strengthening Cyber security for Smart Cities Mission."

Successfully conducted security testing for the e-Seal software application of the Customs Department, the Protector of Emigrants (PoE) software application for the Ministry of External Affairs, and the software application for the Railway Recruitment Board (RRB).

Conducted software testing for the ORS (Online Reservation System) application used by the Maharashtra State Road Transport Corporation. The ORS system facilitates online ticket booking for buses.

Comprehensive Functional, Performance and Security testing of Long-Range Identification and Tracking (LRIT) application, which serves purposes such as National and International Search & Rescue, Security, and Environmental Protection.

Conducted an awareness program on cybersquatting for the Police Department.

Assessment of Cloud Service Providers under MeitY empanelment Scheme Completed assessments of Digital Forensic Labs for Air Force Cyber Group in New Delhi, CFL CERT-In, the State Forensic Lab in Bengaluru, and SFIO in New Delhi.
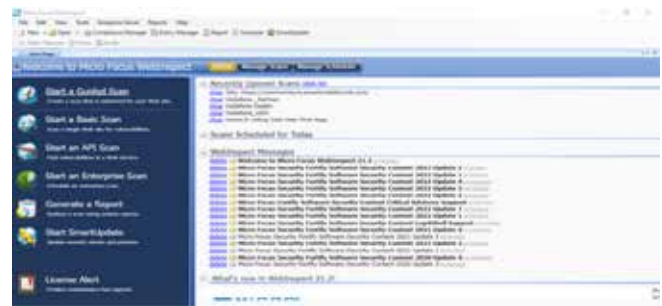
Electro-Technical Testing Services

9.7.4.5 ERTL(South), Thiruvananthapuram

Electro-Technical Testing Services

Continuing participation in Space Programmes

ERTL(S) has supported various space mission like Chandrayaan - 3, Aditya L1 through Components Screening, Packages & Modules testing and Environmental testing.

Component Testing

ERTL(South) is identified by VSSC(ISRO) as the

major test centre for screening of discrete and SMD Devices. The lab undertakes screening of High Frequency Pulse Transformers, Low Voltage Crystal Oscillators, Linear and Digital ICs of different packages, leaded as well as SMDs RTD sensors and new types of Transient Absorption Zener. The Lab also developed the test set-up for Low Voltage SMD technology Integrated Circuits which are mainly deployed in Small Scale Launch Vehicles for saving power consumption and for space miniaturization.
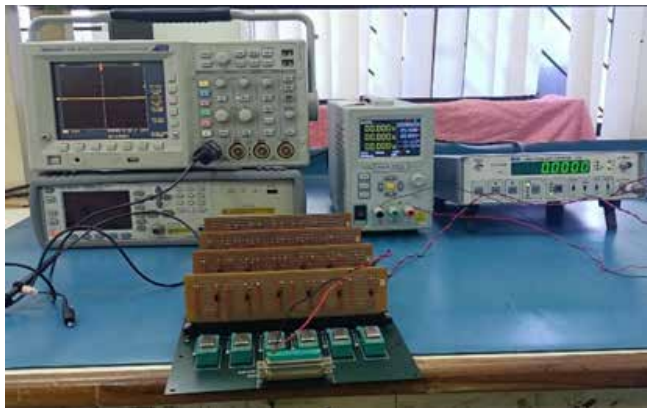
Crystal Oscillator Test Set-Up

Universal Device Test System

Environment Testing

ERTL(South) carried out Environmental screening of Isolators used for mounting various electronic packages used in GSLV/PSLV launch vehicles. The Lab carried out Vibration Tests for VSSC and

its ancillary units for testing their packages and modules as per ISRO specifications.

Vibration Test System

Equipment Testing

ERTL(South) carried out Testing and evaluation of ATS Stacks, Power modules and Data Acquisition Units used in GSLV/PSLV projects of ISRO. The Lab actively contributes to the Gaganyan Mission by way of test and evaluation of packages used in the Launch Vehicle.

Data Acquisition Module testing

Bio-medical Equipment Testing

ERTL(South) provided Safety testing of Medical Electrical equipment viz., wearable ECG device, which can replace clinical ECG for the monitoring of OP patients in a large hospital setup where the patient volume is huge. This device is up- gradable to IOT enabled one. The Lab also tested an optical

imaging multimodal device for the early detection of (pre) cancerous lesions of the oral cavity.

Electrical Safety Analyzer

Calibration Services

ERTL (S) provided NABL accredited Calibration Service for electro-technical parameters viz., Voltage, Current, Resistance, Inductance, Capacitance, Power, Frequency and also AM and FM modulation and Oscilloscope Calibration for the Test & Measuring equipment which are in use in the industry. The Lab served the Organizations viz. KELTRON, TATA ELXSI, ALIND, VSSC/ISRO, Supply agencies for Railways, C-DAC, KEL etc.

Calibration of DC Voltage in progress

IT Services

ERTL(South) is identified by the government of Kerala, as the third-party test centre, for carrying out the application security testing of the websites and web applications developed for the various state government departments which are being hosted in the Kerala State data Centres.

The Lab undertook testing of **Digi-Yatra Central Ecosystem (DYCE) App**, a Ministry of Civil Aviation initiative. DYCE app implements a digital identity wallet for the user from which the airports can securely request passenger Identity, vaccination and Itinerary information prior to his travel and make his experience at the airport a seamless walk-in-park.

9.7.4.6 ETDC, Bangalore

IT Services

Biometric Device Testing Lab (BDTL) was inaugurated by DG, STQC testing of products under UIDAI Aadhaar Ecosystem. The lab is to facilitate availability of quality assessed Pre-Certified Hardware (PCH), authentication and Enrolment Devices along with QR Code scanner devices to meet UIDAI requirements.

The testing/audit of 02 L1 registered device from M/s Precision Biometric and M/s Access Computech Pvt Ltd is completed and 01 Pre-Certified Hardware from M/s Microchip is ongoing. Also, the testing was conducted for 15 Nos of L0 registered devices.

AUA/KUA Audit completed for State Bank of India and Bank of India Requesting entities assigned to STQC IT Services, Bangalore for Audit & Evaluation as per Aadhaar Act and other security & functional compliance requirements of UIDAI specifications.

Surveillance Audit completed for 02 organisations under BDCS (M/s Aratek Innovations Pvt Ltd Hyderabad and M/s Iritech Pune)

Third Party Audit for **State Data Centre of CeG**, Karnataka Government

Electro-Technical Testing Services

System Testing: Acceptance Testing of EVM & VVPAT machines: STQC is recognized by Election Commission of India as third-party testing agency for Acceptance testing of EVMs and VVPATs.

Safety Testing: Safety Lab, ETDC Bangalore, being a major STQC lab in the southern region, has maintained NABL accredited test facilities as per ISO/IEC 17025 : 2017 for safety testing.

IT Equipment- Quantum Secure Smart Video IP Phone.

Electro-Technical Calibration Services

High Precision Calibration:

• Extension of NABL Scope of accreditation
• Extension of Inductance sourcing/ measurement from 100 uH to 10 uH
• Extension of DC Voltage sourcing/ measurement from 10 uV to 1uV
• Extension of DC Current sourcing/ measurement from 10 uA to 1nA
• Extension of DC Resistance measurement from 100 uohm to 1 uohm
• Addition of NABL Scope of accreditation
• Addition of Time Period Measurement
• Addition of Rise Time Measurement

9.7.4.7 ETDC, Chennai

IT Services

STQC IT Services Chennai conducted **Web Application Security Testing** and **Website Quality Evaluation** for various Government departments and organizations. As a special mention, MeitY directed STQC to conduct Website Quality Evaluation for all the Ministries and Departments under Government of India based on CoS recommendation.

9.7.4.8 ETDC, Hyderabad

IT Services

Functional testing of 108 and 102 Applications for the state of Uttar Pradesh

Emergency management services applications of the state of Uttar Pradesh- 108 (Emergency medical response ambulance service) and 102 (Emergency and general services for pregnant women and infants) were tested by IT Services, Hyderabad. As part of this project, whole setup including the infrastructure hosting the applications, Web applications, Android applications, call center facility were audited.

Secure Manufacturing Facility Audits for Electronic Voting Machines

As part of third-party testing and evaluation of Electronic Voting Machines (EVMs), a project of national importance, Secure Manufacturing Facility (SMF) Audits were carried out on the infrastructure that is in place to store the EVM manufacturing data, applications used to track and trace the manufacturing progress, traceability data, alarms in manufacturing, data availability etc.

Verification Testing for Varunastra Mission Computer Software

IT Services, Hyderabad has been a part of Project Varunastra, an advanced heavyweight anti-submarine torpedo developed by NSTL Visakhapatnam laboratory of DRDO by carrying out verification testing of Mission Computer Software and other sub-systems in 3 phases. Currently Varunastra is inducted into Indian Navy.

Functionality Testing for Automated Smart Street Light System for the city of Hyderabad

4th phase of functionality testing was carried out to conform the defined requirements for the automated smart street lights system for the city of Hyderabad. Smart street lights are setup to effectively use the resources with least manual intervention. The features like auto switch off based on set timings, auto on/off based on the intelligent sensing of weather, automatic detection of faults in lights, power consumption statistics, reporting of power theft from feeder pillars, analysis of data, auto calculation of light burn hours, auto adjustment of dimming as per sunlight, issuance of commands from mobile/control center etc. were tested onsite by IT Services Hyderabad to widely cover all the possible scenarios and perform conformity assessment against all the requirements of the smart street light system.

9.7.4.9 ETDC, Pune

IT Services

Functional Testing of **Automated Driving Test Track System for Maharashtra State Road Transport Corporation**, for recruitment of drivers in HMVs and LMVs. The software is extensively used for automating the evaluation process for recruitment.

Website Quality Evaluation: The centre has evaluated websites for various departments for e.g., The Department of Defence Production, Department of Agriculture and Farmers Welfare, Department of Ex-Servicemen Welfare, etc. as per GIGW 2.0. This activity was done as per directions received from Cabinet Secretariat in fast-track mode.

Awareness session conducted in conjunction with **NeGD for Cyber Security** as part of MeitY's "Cyber Surakshit Bharat Initiative".

Testing & Calibration Services

Electrical/Environmental Testing:

No. of Jobs Done:
- Environmental Testing: 16
- Onsite testing: 93

EMI/EMC Testing:

No. of Jobs Done: 6

Highlights:

- Onsite testing of VVPAT batteries done for Election Commission of India.
- Tested 93 lots of 10,000 batteries each lot.
- Total VVPAT batteries tested: 744

Testing of Lithium energy power backup

9.7.4.10 ETDC, Mohali

IT Services

Security Audit of websites/applications as per OWASP TOP 10 (05 Nos)

- e-Auction Application of Haryana Mines
- Indian Biological Data Centre (IBDC)
- Indian Nucleotide Data Archive (INDA)
- Semi-conductor Laboratory
- Embassy of India Thimphu

Testing of following websites as per **GIGW:**

- National Agri-Food Biotechnology Institute
- Central Board of Secondary Education

- Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers
- Ministry of Mines
- Central University of Punjab
- Functional Testing (03 Nos)
- e-Auction Application of Haryana Mines
- Backend Application of MapMyIndia, C.E. Info Systems Ltd.
- e-Auction Application of Haryana Shahari Vikas Pradhikaran

E-Procurement systems conformity assessment certification projects (04 Nos)

- e-Auction Application of Haryana Mines
- e-Auction Application of Supply Valid Pvt. Ltd.
- e-Auction Application of Haryana Shahari Vikas Pradhikaran
- e-procurement/e-Auction Application of Unibrain Consultancy Service Pvt. Ltd

9.7.4.11 ETDC, Goa

Calibration, Testing and Quality Assurance Training services are being provided by ETDC Goa. This Laboratory is accredited by NABL as per ISO/IEC: 17025: 2017 for Electro-Technical, Mechanical & Pressure parameters calibration. Calibration and testing services are provided by this laboratory to the industrial institutions located mainly in the state of Goa and adjoining districts of Goa in the states of Karnataka and Maharashtra. This Laboratory mainly provides its Calibration & Testing services to different Govt. organizations i.e. Goa Shipyard Ltd., Murmugoa Port Trust, Nuclear Power Corporation of India Ltd., Indian Navy, Airport Authority of India Ltd., Indian Oil Corp. Ltd., District Hospitals of Goa Govt., etc. Besides of this Test/Calibration services are also provided to the different private industries i.e. TCS, IFB Industries, Siemens, Goa Instruments, Pharma Industries, Hospitals, Hotels, Test/Calibration laboratories etc.

Under Website Certification Scheme, many government websites were tested as per GIGW 2.0 for certification. Training programs on the subjects of laboratory management and measurement assurance were organized for professionals working in the industries.

9.7.4.12 ETDC, Ajmer

Conducted one online course on Lab Management System as per ISO/IEC 17025:2017 for Indian Airforce as well as Lead Auditor on ISMS as per ISO 27001:2013 for STQC labs.

9.7.4.13 ETDC, Solan

Testing of following websites as per GIGW:

- Department of justice
- Department of Atomic Energy

Capacity enhancement through design, development and conduct of training for the Officers to develop skill to conduct internal audit of ISMS/QMS for: -

- DTU (Delhi Technical University) as per ISO 9001:2015
- TBRL (Terminal Ballistics Research Laboratory), Ministry of defence as per ISO 9001:2015

9.7.4.14 ETDC, Jaipur

IT Services

S3WaaS Scheme: Under S3WaaS (Secure, Scalable & Sugamya website as a service) scheme, the accessibility evaluation of website is carried out as per GIGW guideline.

Security Audit: The web application security audits as per OWASP Top 10 have been conducted for web applications for e.g., SPARROW application of Railway Board, New Delhi.

Website Quality Evaluation: The centre has evaluated websites for various departments/ ministries for e.g., Department of Food & Public Distribution, Department of Consumer Affairs etc. as per GIGW 2.0.

Functional Testing: The functional testing of website is performed referring the Software Requirement Specifications (SRS) document of the website Functional testing verifies the operations and actions of a web application.

9.7.5 Capacity Building

STQC is conducting various Capacity building & skill development programs through regular short term training courses, workshops etc. ETDC Jaipur/ IIQM, CFR Chennai, ETDC Goa & ETDC Solan are dedicated centres for training and have conducted many training courses on Quality Management Reliability, Lab Management, Information Security etc.

STQC has conducted following courses in 2023

Information Security Management System (ISMS)

IIQM Jaipur has conducted following courses on ISMS:

- Lead Auditor training course for ISMS (ISO 27001:2022)-NBQP registered,

- STQC-CISP - Certified Information Security Professional Course (5 days),

- STQC-CIISA - Certified Internal Information Security Auditor (3 days),

- ISMS Transition cum Awareness based on ISO 27001:2022 (2 days).

ETDC Solan conducted training for THDC (Tehri Hydro Development Corporation) officers as per ISO/IEC 27001:2013.

ERTL (E) conducted ISMS Training at Brathwaite, Kolkata.

ETDC Goa conducted awareness Program on ISMS for **Goa govt officials** on 04-09-2023.Total 56 participants attended the course.

9.7.6 Activities in North-Eastern Region (NER)

ETDC, Guwahati and ETDC, Agartala

ETDC Guwahati & Agartala are two laboratories under the STQC Directorate, MeitY, Govt. of India operating in the NE Region and extending the following services to 08(eight) states of the region:

- Test & Calibration services to the Industries, Technology users & Service providers.

- Testing of e-Governance Software as well as portals/websites of Govt. Ministries, Department and PSUs etc.

- Audit of IT Infrastructure /Third Party Auditors for the e-Governance projects like State Data Centers (SDC)/SSDG/e-District/SWAN etc.

- Training services in the field of Electronics & Information Technology/Quality & Reliability

Initiatives in Test & Calibration services:

Test & Calibration services of **ETDC Guwahati** & **ETDC Agartala** are extended to the organizations located throughout the NE Region covering all the 8(eight)-States towards improvement of Quality of their products and services. The services are received by most of the Small, Medium and Large Scale Industries covering the Industrial sectors

like – Oil & Natural Gas, Oil Refineries, Exploration units, Railways, Indian Air Force(IAF), Airport Authority, Power - Generation, Transmission & Distribution, Paper, Cement & Building material, Food & Beverages, Cosmetics, Cable & Conductors, Fertilizer, Plywood, Carbon Products, Steel, and Service sectors like – Aviation, Engineering & Construction, Telecommunication, Automobile, Service & Maintenance units, R&D and Test Labs, Hospitals, Pharmaceutical & Pathological Laboratories etc. About **582 Nos of calibration jobs being executed** by **ETDC Guwahati and Agartala** – covering more than **58 Nos of** LSI, MSI**,** SSI Industrial units, Govt. PSUs, Private and other technology user organizations of NE-Region.

9.8 National Institute of Electronics and Information Technology (NIELIT)

9.8.1 Introduction

NIELIT is an autonomous scientific society under administrative control of MeitY. It is actively engaged in Capacity Building and Skill Development in the areas of IECT such as Future Skills; Cyber Laws; Cyber Security; Cloud Computing; ESDM and related verticals. It offers courses in Degree/Diploma Levels as well as Skilling Courses and is also one of the National Examination & Accreditation Bodies which accredits institutes/organizations for the conduct of courses in the Non-Formal Sector. NIELIT is also rolling out Digital Competency Programmes for many State Governments for its employees and the masses. NIELIT is recognized by NCVET as an Awarding Body and Assessment Agency for NSQF aligned courses.

NIELIT has its presence at forty-nine (49) locations at Agartala, Aizawl, Ajmer, Aurangabad, Bhubaneswar, Buxar, Calicut, Chandigarh, Chennai, Chuchuyimlang, Churachandpur, Daman, Delhi, East Delhi, West Delhi, Dibrugarh, Dimapur, Gangtok, Gorakhpur, Guwahati,

Haridwar, Imphal, Itanagar, Jammu, Jorhat, Kargil, Kohima, Kolkata, Kokrajhar, Kurukshetra, Leh, Lucknow, Lunglei, Majuli, Mandi, Muzaffarpur, Pasighat, Patna, Pali, Ranchi, Ropar, Senapati, Shillong, Shimla, Silchar, Srinagar, Tezpur, Tura and Tezu with its Headquarters at New Delhi.

Besides the own Centres, NIELIT is also well networked through about 710 Accredited Training Institutions for training of O/A/B/C level courses and through a network of about 8800 Facilitation Centres engaged in training of Digital Competency Courses making NIELIT distinctly positioned in terms of its outreach to all corners of the country and all segments of the society.

NIELIT plays an important role in skilling of youth in the area of IECT. The wide repertoire of NIELIT Courses includes: (i) Degree/Diploma Level Courses such as M.Tech, B.Tech, MCA, BCA programmes offered by the NIELIT Centres in association with State Universities/Technical Board; Aurangabad Centre is also facilitating PhD Program in the area of Electronics (ii) Skilling Courses (Long Term) such as O Level(IT), A Level (IT), CHM-O Level, CHM-A Level, MAT-O Level etc. ; (iii) Skilling Courses (Short Term) in niche areas such as IoT, Cloud Computing, Machine Learning, Cyber Security etc. and (iv) Digital Competency Programmes for the proliferation of Digital Literacy in the country; besides specialized programmes in emerging technologies targeted towards empowering the employees of the State Governments and Departments of Central Line Ministries. In addition, NIELIT has also created expertise for the roll out of customized skilling, upskilling and reskilling programmes as per specific needs of public and private sector firms.

NIELIT qualifications are widely accepted across the country. Owing to the quality, some of the NIELIT digital competency courses are linked with both promotion & recruitment by number of state governments viz; Arunachal Pradesh, Bihar, Chandigarh, Daman & Diu, Gujarat, Rajasthan,

Sikkim, Uttar Pradesh. Also, NIELIT is offering its CCC course free of cost in online mode as a knowledge product through its virtual academy. The course is also available at 15+ Indian and International Language, accessible at https://nva.nielit.gov.in/ccc

Since the last 10 years, NIELIT has trained more than 80 Lakh candidates. Taking into the account advancement in IT and Electronics and emergence of disruptive technologies, NIELIT has been making efforts to update its repertoire of courses in upcoming technologies such as AI, IoT, Big Data, Cloud Computing, Robotics and 3D Printing. In this regard, NIELIT Centres at Aurangabad, Calicut, Kolkata have been identified as Technology Resource Centres to offer blended learning programmes under the Future Skills prime initiative which is being jointly conceived by MeitY and NASSCOM.

Further, NIELIT has launched Initiatives for Cyber Security Aware Society (ICSAS), a mobile app of NIELIT available in 16 Indian & 7 international languages i.e. French, Spanish, German, Russian, Mandarin, Arabic & Bahasa Indonesia. This app simplifies cybersecurity with learning resources, and easy reporting of cyber incidents with GeoLocation functionality.

Furthermore, NIELIT applied to the University Grants Commission for Deemed to be University status under the Distinct Category (as per UGC 2023 regulations) in November 2022, with its Ropar Centre (Punjab) as the main Campus of the University and Centers at Calicut, Aurangabad, Gorakhpur, Srinagar, Patna, Agartala, Kohima, Imphal, Aizawl, Kekri (erstwhile Ajmer District, Rajasthan) and Itanagar as constituent units of the proposed deemed to be University. **Now, Ministry of Education, Govt of India on the advice of UGC has released a Letter of Intent dated 24.11.2023 to NIELIT Ropar along with its eleven constituent units located at Aizawl, Agartala, Aurangabad, Calicut, Gorakhpur,** **Imphal, Itanagar, Kekri, Kohima, Patna and Srinagar.**

The LoI also mentions that the final approval for declaration of National Institute of Electronics and Information Technology as an Institution deemed to be University under Distinct category shall be issued by way of notification by the Ministry of Education only after fulfilment of the conditions mentioned in the LoI, its verification and advice of UGC.

Training summary: 2023-24

NIELIT plays an important role of skilling people in the area of IECT. Number of candidates skilled/trained in various courses in FY 2023-24 are as follows:

S. No.	Course Category	Number of Skilled
i.	Degree/Diploma Level Courses (M.Tech/B.Tech/BCA/MCA/ Diploma etc.)	2,567
ii.	Skilling Courses (Long Term) (O/A) Level in IT/Hardware etc., CABA-MDTP)	1,06,751
iii.	Skilling Courses (Short Term)	3,90,811
iv.	Digital Competency Programmes (Appeared in Examination)	4,00,246
	Total No. of Candidates	9,00,375

9.8.2 Inauguration of NIELIT Gangtok Permanent Campus

The permanent campus of NIELIT Gangtok, situated at Bengthang Pacheykhani under Pakyong district was inaugurated on 8th April 2023. The event was graced by the presence of Secretary, MeitY; Director General NIELIT; Secretary, DIT, Sikkim; Advisor, DIT, Sikkim; and the Chairman, DIT, Sikkim besides teachers and students of various

schools across the Pakyong district. The permanent campus of Gangtok includes laboratories featuring cutting-edge technologies like the Augmented Reality (AR) and Virtual Reality (VR), the IoTs, an innovative E-Waste Management Lab, and a cutting-edge Cyber Forensics Lab.

9.8.3 Capacity Building Projects

9.8.3.1 Initiative for Cyber Security Aware Society in NE States

Project is sponsored by MeitY vide Administrative Approval No. AAA.22/2/2022-CSRD-MeitY dated 22/02/2022 with financial support of ₹725.19 Lakh over a period of three (03) Years. Project is being implemented by NIELIT Kohima in the state of Nagaland with the objective to raise comprehensive complete awareness about risk in cyber space targeting different sections of society. Under the project, 103 workshops have been conducted, process of upgradation of awareness material, creation of resource portal are in progress.

9.8.3.2 Design and Development of EEG Based Real-Time Depth of Anaesthesia (DoA) Monitoring System

Project is sponsored by MeitY vide Administrative Approval No. 1(1)/2022-ME&HI MeitY dated 28/03/2022 with financial support of ₹455.23 Lakh over a period of three (03) Years. Project is being implemented by NIELIT Imphal in the state of Manipur. The objective of the project is to pre-process publicly available EEG data. Under the Project, Development of EEG data and EEG database are completed and Prototyping of the proposed hardware architecture FPGA, Development and Validation of the hardware architecture etc. are in process.

9.8.3.3 Skill Development of Youths in Aspirational Districts in area of IECT leading to enhancement in Employability

Project is sponsored by MeitY vide Administrative Approval 1411/10/2019-HRD dated 28/02/2020 with Financial Support of ₹29.81 Crore over a period of three (03) Years. Project is being at 18 States in 60 Aspirational Districts. Under the project, a total of 12,249 candidates are registered and 11,125 candidates have been trained so far against the target of 21,600.

9.8.3.4 Empowerment of SC/ST Youth & Women on Enhancement of Livelihood activities using IT & Tool and PMU for IT for Masses

Project is sponsored by MeitY vide Administrative Approval No. L-14011/3/2018-HRD dated 27/09/2018 with financial support of ₹241.76 Lakh over a period of two (02) Years. The project is being implemented by NIELIT Kolkata in 2 selected districts of West Bengal i.e. Darjeeling and Alipurduar to empower the SC/ST & Women on Functional IT for enhancement of day-to-day Livelihood activities Under the project, a total of 645 candidates have been trained of the total training target of 800 Candidates.

9.8.3.5 Training of visually Impaired Persons in Manipur on Course on Computer Concepts (CCC) of NIELIT

Project is sponsored by MeitY vide Administrative Approval No. L-14011/2/2018-HRD dated 26/03/2019 with financial support of ₹30.21 Lakh over a period of two years six months i.e., 2.5 Years. The project is being implemented by NIELIT Imphal in the state of Manipur with the objective to train visually impaired persons on CCC course of NIELIT. Under the Project, 125 visually-impaired candidates have been trained against the assigned target of 200.

9.8.3.6 Enhancement of livelihood activities for SC candidates of Delhi NCR through Capacity Building using ICT

Project is sponsored by MeitY vide Administrative Approval No. 14011/20/2019-HRD dated 16/01/2020 with financial support of ₹120.12 Lakh over a period of two years. The Project is being implemented by NIELIT Delhi with an objective to promote inclusive growth among potential candidates from SC community as ICT professionals. Under the project, 1248 SC candidates have been trained so far out of the assigned target of 1250 SC Candidates.

9.8.3.7 Skill Training for Empowering SC/ST in Kerala & Karnataka

Project is sponsored by MeitY vide Administrative Approval No.14011/18/2019-HRD dated 07/02/2019 with financial support of ₹265.31 Lakh over a period of two years. The primary objective is to provide free training in job-oriented skill courses to 1500 candidates belonging to SC/ST category in the selected districts of Kerala and Karnataka. Under the project, 1361 Candidates have been trained so far against the target of training of 1500 candidates.

9.8.3.8 Awareness Campaigns/Events for empowerment of Senior Citizens in e-Services through ICT Tools

Project is sponsored by MeitY vide Administrative Approval No. 14011/11/12019-HRD dated 27.02.2020 with financial support of ₹532.98 Lakh over a period of two years. The Project is being implemented by NIELIT Aurangabad with an objective to bring awareness among elderly persons about mobile applications for fulfilment of various needs related to health, monitoring, personal, social and commuting needs etc. Under the project, 11,047 senior citizens have been trained so far against the target of 15,000.

9.8.3.9 IT enabled Incubation Centre for Handloom and Handicraft Sector

Project is sponsored by MeitY vide Administrative Approval No. L-14011/9/2020-HRD dated 23/03/2020 with financial support of ₹708.79 Lakh over a; period of three (03) years. The project is being implemented by NIELIT Leh Centre with the objective of modernization of the development of looms and crafts with the added value of technological intervention through ICT in the right direction towards innovative products development. Under the project, a total of 1542 artisans have been trained so far against the training target of 2100 artisans.

9.8.3.10 Capacity Building and Training in Emerging Technologies for Enhancing Employment Opportunities and Skilling

Project is sponsored by MeitY, vide Administrative Approval No. L-14011/11/2021-HRD dated 26/03/2021 with Financial Support of ₹248.05 Lakh over a period of three (03) Years. The project is implemented by NIELIT Agartala to enable entrepreneurship & sustainable development among Youths of Tripura by providing Skill Development Training. Under the project, 993 candidates have been trained so far against the training target of 1,400.

9.8.3.11 Digital Intervention of Handloom and Handicraft Sector for Livelihood enhancement of artisans of NE States

Project is sponsored by MeitY, vide Administrative Approval No. L-14011/12/2021-HRD dated 30/03/2021 with financial support of ₹619.12 Lakh, over a period of three (03) Years with the objective to setup Digital Enabled Common Facility Centre. Under the project, a total of 2,428 candidates have been trained so far against the total training target of 6,920.

9.8.3.12 Capacity Building in IECT including training in Digital Skill sets and Current Industry Demanding Technologies for various sections of society in the NE States [NECB 2.0]

Project is sponsored by MeitY vide Administrative Approval No. L-14011/33/2021-HRD, dated 02/02/2022 with financial support of ₹9232.76 Lakh over a period of two (02) Years. The project is jointly being implemented by NIELIT Guwahati, Kohima, Itanagar, Imphal, Shillong, Aizawl, Gangtok and Agartala with the aim of overall up-liftment of the socio-economic status of NE Citizens by creating a smart ecosystem with necessary IT education and skills. Under the project, 1,30,731 candidates have been trained so far against the total training target of 1,66,500.

9.8.3.13 ICT intervention in Travel & Tourism (T&T) Industry through Capacity Building in New Age Digital Technologies

Project is sponsored by MeitY, vide Administrative Approval No. L-14011/23/2021-HRD dated 18/02/2022 with financial support of ₹144.25 Lakh over a period of three (03) Years with the objective of empowering the youth with Digital skill including understanding of e-commerce digital transactions and associated concepts. Under the project, Infrastructure Creation is 83% completed, Creation of VR Content for Tourists & it's hosting is 75% completed, Mobile Application Containing multilingual e-audio contents for e- Tourist Guides/ Tourists is 70% completed, e-Content Development is 85% completed, LMS is 95% completed and 92 stakeholders/ youths have been trained.

9.8.3.14 Self-employment Capacity building of the Engineering pass-out students belonging to SC/ST community

Project is sponsored by MeitY vide Administrative Approval No. L-14016/2/2021-HRD dated 30/03/2021 with financial support of ₹443.73 Lakh over a period of three (03) Years. Project is being implemented jointly by NIELTI Patna, Haridwar, Chennai and Delhi (PMU). The objective of the project is to build the capacity of the Engineering pass-out students belonging to SC/ST community. Under the project, 720 candidates are to be trained out of which 341 Candidates have been trained.

9.8.3.15 Capacity Building for unemployed ST youths of Manipur in Assembly and Repair & Maintenance of Solar Lighting system, Household Electronics/ Electrical & IoT Devices.

Project is sponsored by MeitY vide Administrative Approval No. L-14011/10/2021-HRD dated 24/06/2021 with financial support of ₹50.43 Lakh over a period of 1.5 Years. The main objective of the project is to provide Capacity Building training to a total of 250 youths in Manipur. Under the Project, 288 candidates have been trained so far against the target 280.

9.8.3.16 Creation of IT industries ready Software professionals in Manipur for unemployed Graduate/Diploma holder in Manipur through awareness, motivation and experts training

Project is sponsored by MeitY vide Administrative Approval No. L-14011/05/2022-HRD dated 29/03/2022 with financial support of ₹88.60 Lakh over a period of One and half year (1.5) years. The main objective of the proposal is to provide 6-months training for Creation of IT Industries ready Software professional in Manipur to unemployed IT Graduate /Diploma holders in Manipur. Under the project, training of 585 candidates has been trained so far against the target of 700.

9.8.3.17 Work Based Learning (WBL) programme to Strengthen and Empower SC/ST/Women/EWS Graduate Engineers through MeitY Institutions

The Project is sponsored by MeitY vide

Administrative Approval No. L-14011/19/2021-HRD dated 09/03/2022 with the financial support of ₹5140.18 Lakh over a period of 5 years. The main objective of this programme is to provide an opportunity to SC/ST/EWS/Women candidates to acquire Technical Knowledge Expansion, Real time Working Skills, Technology Use, Problem Solving Skills, Reasoning, Analytical Thinking, Interpersonal Skill etc. on PAN India basis. Total 321 interns are engaged by NIELIT Centres out of the assigned target 2640.

9.8.3.18 FutureSkill Prime project (Programme for Re-skilling/Up-skilling of IT Manpower for Employability)

Project is sponsored by MeitY vide Administrative Approval No. 14011/21/2017-HRD (Vol. II) dated 24/12/2019. Total estimated cost of the project is ₹436.87 Crore (approx.) with GIA of ₹433.21 Crore from the Central Government and ₹3.66 Crore to be incurred by NASSCOM over a period of Three (03) Years. The project is being implemented at NIELIT Calicut, Kolkata and Aurangabad (Lead Centres) and 14 NIELIT Centres are working as a Co-Lead Centres in emerging technologies.

9.8.3.19 Setting up state-of-the-art Digital Forensic Data Centre to provide forensic services Including remote forensics live acquisition and analysis of digital evidence, Virtual Training Services to NE States

Project is sponsored by MeitY vide Administrative Approval No. AAA-22/2/2018-CSRD-MeitY, Dated- 08.02.2019 with the financial support of ₹421.14 Lakh over a period of 2 years. The project is jointly being implemented by NIELIT Kohima, Imphal and Aizawl with the objective to set up Digital Forensic Data Centre, creating web based virtual environment laboratory with training content. Under the project, Development of Virtual Training Environment Courses, Virtualization for

providing Hands on Training, Development of Live Web Acquisition Tools, Development of Forensics Data Centres and Security Audit are completed, also 130 LEA's have been trained through VTE.

9.8.3.20 Skill Development Training of Unemployed SC & ST youths of Tripura towards enabling entrepreneurship & sustainable development

Project is sponsored by MeitY vide Administrative Approval No. L-14011/5/2018-HRD dated 28/03/2019, is being implemented by NIELIT Agartala with the financial support of ₹131.58 Lakh over a period of 2 years. The objective of the project is to enable entrepreneurship & sustainable development among SC & ST Youths of Tripura by providing Skill Development Training. Under the project, 1940 candidates are to be trained, out of which 1949 candidates have been trained.

9.8.3.21 Setting up of Medical Electronics Laboratory at Silchar Extension Centre of NIELIT Guwahati

Project is sponsored by MeitY vide Administrative Approval No. 1(7). 2015-ME&HID, dated – 23/03/2016, is being implemented by NIELIT Guwahati with the financial support of ₹162.20 Lakh over a period of 3 years. The objective of the project is to set up a medical Electronics R&D Laboratory at Silchar EC of NIELIT Guwahati for undertaking repair and maintenance of Medical Electronics equipment of various hospitals in Assam. Under the project, 20 para medical staff have been trained and medical electronic lab has been set up.

9.8.3.22 Development of Cyber Forensic Training-cum-Investigation Labs in North-Eastern States and Cloud based centralized Cyber forensics Lab Infrastructure

Project is sponsored by MeitY vide Administrative

Approval No. 12(03)/2019-CSRD, dated 25/03/2020 with the financial support of ₹1,692.20 Lakh over a period of 5 years. The objective of this project is to setup cyber forensic training cum investigation labs in 8 North Eastern states equipped with associated cyber forensic system and tools. Under the project, Cyber Forensic Lab has been set up, 2091 LEA's have been trained, Resource portal has also been created.

9.8.3.23 Capacity Building and Training on Cutting-edge technologies for employable youth of Tripura

Project is sponsored by MeitY vide Administrative Approval No. L-14011/2/2022-HRD, dated 28/03/2022 with the financial support of ₹441.44 Lakh over a period of 3 years. The project is being implemented by NIELIT Agartala with the objective of enabling entrepreneurship & sustainable development among youth of Tripura by providing Training in cutting-edge technologies. Under the project total 3,480 candidates are to be trained, out of which 476 candidates have been trained so far.

9.8.3.24 Establishment of Design and Assembly Lab of solar LED based products

Project is sponsored by MeitY vide Administrative Approval No. 14016/3/2021-HRD, dated 28/09/2022 with the financial support of ₹211.20 Lakh over a period of 3 years. The project is being implemented by NIELIT Leh with the objective of setting up a complete design and assembling lab of solar LED based products like Solar lanterns, Solar street lights etc. Under the project, 350 candidates are to be trained, out of which 33 candidates have been trained and set up of complete design and assembling lab of solar LED based products is under process.

9.8.3.25 Skilled Manpower Advanced Research and Training (SMART) Virtual Prototyping Lab at NIELIT Calicut

SMART facility or Virtual Prototyping Lab is set up at NIELIT Calicut as part of the Chip to Start-up (C2S) programme of MeitY for proliferation of advanced VLSI and Embedded system design training, research and electronics systems development across the country. The 'SMART' remote lab facility is available 24x7. The students, researchers, and start-up industries can access the facility anytime and anywhere. Approximately 2,700+ Nos of candidates have been trained using the SMART Lab facility, which includes faculty, researchers, students etc.

9.8.4 Synergy through Collaborations and MoUs

MoU with UNESCO

NIELIT and UNESCO have signed a Letter of Intent on 19th August 2023 in presence of Hon'ble MEIT and Secretary, MeitY. The agreement was signed on "Ethics of AI" to advance AI ethics through capacity-building, policy advocacy, joint projects, knowledge sharing, and aimed at promoting ethical AI world-wide.

MoU with NIT Delhi

MoU was signed on 20th July 2023 with National Institute of Technology Delhi for Joint Curriculum development and training in Emerging Technologies, conducting FDPs, Quality Improvement Program etc.

MoU with IETE Noida

MoU has been signed by NIELIT with Institution of Electronics & Telecommunication Engineers (IETE), Noida on 5th August 2023 for setting up of CoE in Chip Design at Noida.

MoU with Intel and CreatorOS

MoU has signed with Intel on 26th September 2023 for launching AI training programs. Another MoU has signed with CreatorOS on 5th September 2023 for developing curriculum in WEB3 Technology.

MoU with GIEEE

MoU has signed with GIEEE on 6th April 2023 with the objective of training and skill development in emerging technologies, development of training programs, to promote industry-academia collaboration and other relevant domains.

MoU with L&T-STA

MoU has signed with L&T-STA, Mumbai on 25th April 2023. NIELIT and L&T-STA collaborated on sharing of knowledge, tailor made training for employees of industry, sharing of technology and content, identification of industry R&D problems, and assigning to NIELIT Research Scholar, joint workshops and conferences, collaboration for Training and Research projects, joint academic programmes as per specific industry requirements.

MoU with SoCTeamup

MoU has been signed on 5th June 2023 with SoCTeamup for setting up CoE in Chip Design. SoCTeamup is a start-up working in Chip and System Design areas.

MoUs with DTU, NSUT, DDUU Gorakhpur

MoUs have been signed with DTU and NSUT of Delhi and DDUU Gorakhpur with the objective of Joint Curriculum development and training in Emerging Technologies, conducting FDPs, Quality Improvement Program etc.

MoUs with ABV-IIITM Gwalior, MMMUT

MoUs have been signed with ABV-IIITM, Gwalior and MMMUT, Gorakhpur on 20th and 24th April 2023 respectively with the objective to develop skilled manpower in the domains of interest such as management, technology, finance, Emerging Technologies etc. through participatory mode such as summer internships, placements, field visits, etc.

9.9 Software Technology Parks of India (STPI)

9.9.1 Introduction

STPI was set-up in 1991 as an autonomous society under MeitY. Its main objective has been the promotion of software exports from the country. It acts as 'single-window' in providing services to the software exporters. The services rendered by STPI for the software exporting community have been statutory services, data communications services, incubation facilities, training and

value-added services. STPI has played a key developmental role in the promotion of software exports with a special focus on SMEs and startup units. Apart from this, It is also executing various initiatives i.e. Centres of Entrepreneurship (CoEs), Next Generation Incubation Scheme (NGIS) etc. for promotion of startup ecosystem in the country.

STPI has been implementing the Software Technology Park (STP) scheme and the Electronics Hardware Technology Park (EHTP) scheme for the promotion of IT/ITES/ESDM industry. The phenomenal success of the IT/ITES industry has been possible, inter-alia, due to pivotal role played by the STP Scheme. Which is a unique scheme, designed to promote the software industry and growth of Start-Ups and SMEs without any locational constraints. As on 31st December, 2023, 4,705 units are exporting as registered IT/ITeS units and 46 units are exporting under EHTP scheme.

Till 31st December, 2023, export from STPI registered IT/ITeS units stands at ₹5,66,212 Crore (tentative) and Electronics Hardware export of ₹6,328 Crore (tentative) under EHTP scheme.

9.9.2 STPI Centres

To provide statutory and incubation services to industry, major thrust was given on the establishment of new centres as well as revamping of existing centres. As on 31st December, 2023, a total number of 63 STPI centres/ Sub-centres are operational across the country, out of which 55 centres are in Tier-II and Tier-III cities.

STPI is working closely with the respective State Governments/local authorities for creation of more space, equipped with state-of-the-art infrastructure facilities, for development of the software industry and increasing exports.

Services:

The main services rendered by STPI for the software exporting community are as below:

- **Statutory Services**

  STPI provides Single Window Clearance to Software exporters under the STP/EHTP Schemes. STP scheme provides these units with various benefits making it a phenomenal success.

- **Incubation Facilities**

  Business and technology incubation stimulates the growth of startups. STPI is offering ultra-modern office facilities to small units and entrepreneurs. Plug-n-Play facilities for startups enable short gestation period. This has encouraged many entrepreneurs to start their own operations and grow in a competitive environment.

- **Datacom Services**

  One of STPI's remarkable contributions to the software-exporting sector is provision of High-Speed Data Communication (HSDC) services. STPI has designed and developed state-of-the-art HSDC network called SoftNET for software exporters. Local access to international gateways is provided through point-to-point and point-to-multipoint microwave radios

which has overcome the last mile problem and enabled STPI to maintain an uptime of more than 99%.

- **Consultancy Services**

  STPI provides Consultancy and Project Management Services and Turnkey Solutions to various national and international organizations in the areas of Communication Networks, Network Operation Centres, Network Management Systems, Computerization, e-Governance Networks, etc. The technology capability coupled with process strengths has enabled STPI to secure a number of projects from time to time.

9.9.3 India BPO Promotion Scheme (IBPS)/North-East BPO Promotion Scheme (NEBPS)

MeitY had launched two BPO Promotion Schemes, viz., NEBPS and IBPS in 2015 and 2016 respectively under DIP. These schemes are aimed at creating employment opportunities and boosting investment in IT/ITeS sector across the country, particularly in small cities/towns including rural areas by incentivizing setting up of 48,300 and 5,000 seats BPO/ITeS operations with an outlay of ₹493 Crore and ₹50 Crore respectively. The seven cities with higher IT/ITeS activity, viz., Bangalore, Kolkata, Mumbai, NCR, Pune, Hyderabad and Chennai have been excluded from these schemes to expand the base of IT/ITeS industry by promoting new economic activity. The duration of these schemes was upto March 2019 and March 2020 respectively to invite new bids, however disbursement may go beyond this period as per schemes timelines.

The IBPS and NEBPS provide financial support up to ₹1 Lakh per seat in the form of Viability Gap Funding (VGF) towards Capital and Operational expenditure in three yearly installments. The

Schemes also provide several special incentives within the overall cap of financial support (₹1 Lakh/seat) as under:

Special Incentives: % of eligible financial support (within VGF cap)

- 5% for promoting local entrepreneur
- 5% for providing employment to women (at least 50%)
- 2% for providing employment to persons with disability (at least 4%)
- Up to 10% for providing employment beyond target
- 5% for setting-up operation at non-Capital location

Under IBPS, till now, 227 BPO/ITES units have set up operations, which are distributed across 93 small towns/cities covering 21 States/ UTs. These BPO/ITES units have reported direct employment to 52,471 persons.

Under NEBPS, till now, 19 BPO/ITES units have set up operations, which are distributed across 11 locations covering 6 States/ UTs of NER. These BPO/ITES units have reported direct employment of 810 persons.

9.9.4 Centres of Entrepreneurship (CoEs)

To ensure India builds leadership in the emerging sectors of IoT, Blockchain, FinTech, AI & Machine Learning, Augmented & Virtual Reality, Gaming & Animation, Medical Electronics & Health Informatics, Data Science & Analytics, Cyber Security, Chip Designing, ESDM etc. and to build next wave of budding entrepreneurs, Honorable Minister of Electronics & IT, Govt. of India made an announcement on 13th February 2018 regarding setting-up of domain-centric CoE by STPI in a collaborative manner across India.

Taking this vision forward, STPI is setting up

several domain-focused CoEs in collaboration with suitable partners in various parts of country. These CoEs function as single-window facilitation centre with anaim to provide comprehensive structural & fundamental support including lab & incubation, training, mentoring, hand-holding, access to funds, networking, market connect etc. through a collaborative effort of Govt. of India, various State Govts., Industry, Academia, Domain & Technology Experts, Venture Capitalists and other startup ecosystem players. This collaborative model of the CoEs is further extended with an eminent personality from industry/academia/start-ups onboarded as "Chief Mentor" who would also act as brand ambassador of the CoE.

The CoEs are planned with dedicated operational team & support staff to take care of strategy, operations, networking, outreach, mentoring & other services with a clear focus on nurturing & promoting startups to develop world-class IT products & IPR domestically and become "job creators".

As on date, STPI has operationalized 23 domains focused CoEs in collaboration with suitable partners in various parts of the country.

The 23 STPI CoEs are as follows:

- Electropreneur Park at Delhi University
- IoT OpenLab at STPI-Bengaluru
- FINBLUE at STPI-Chennai
- Electropreneur Park, an ESDM CoE at STPI-Bhubaneswar
- NEURON at STPI-Mohali
- VARCoE at IIT Bhubaneshwar
- IMAGE at STPI-Hyderabad
- APIARY at STPI-Gurugram
- MOTION at STPI-Pune
- MedTech at SGPGI Lucknow
- Atal Incubation Centre (AIC) at STPI-Bengaluru
- OctaNE - IoT in Agriculture CoE at STPI-Guwahati
- OctaNE - Animation CoE at STPI-Shillong
- OctaNE - AR/VR CoE at STPI-Imphal
- OctaNE - IT Applications in Health care & AgriTech CoE at STPI-Gangtok
- OctaNE - GIS Applications including Drone Tech CoE at STPI-Itanagar
- OctaNE - IT Applications in Graphic Design CoE at STPI-Kohima
- OctaNE – Gaming & Entertainment CoE at

STPI- Aizawl

- OctaNE - Data Analytics & AI CoE at STPI-Agartala
- Efficiency Augmentation CoE at Bengaluru (to be launched)
- FASAL at Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola
- Kalpataru at RINL, Visakhapatnam
- Emerging Technology CoE at Bhubaneswar & Satellite Centre at BPUT, Rourkela

The STPI CoEs are enabling a 360-degree support ecosystem in the form of state-of-the-art Infrastructure, hand holding & funding support, Mentoring & Networking opportunities to nurture innovative start-ups in emerging technologies and making India a "Product Nation". Collectively, 22 operationalized CoEs through well-publicized Open challenge programs and contests have selected a total of 776 startups, out of which 376 are onboarded. As an outcome, these start-ups have transformed their brilliant ideas into 434 path-breaking products, 244 Ips created and have showcased 515 prototypes.

A brief overview and status of each STPI CoE is given below:

- **Electropreneur Park** - ESDM is one of the fastest growing sectors of the Indian economy. In order to support the new entrepreneurs of this industry, STPI in association with University of Delhi and IESA has set up an Electropreneur Park in the Delhi University campus.

EP Delhi aims to support 50 startups in ESDM space and to create at least 5 global companies over a period of five years. EP Delhi focuses on local IP creation and indigenous product development resulting in increased domestic value addition and witnesses a unique integration of academia, industry, government and other incubation supportive elements. The initiative is first of its kind in the industry and it has set a role model which may Go a long way in the annals of incubation centres. EP Delhi was operationalized on 25th October 2015 and it was formally inaugurated on 27th August 2016.

EP has had 59 startups as its beneficiaries. There has been a significant achievement by the startups during this period where they were able to take their product to the next step by filing national patents. Overall, 177 prototypes have been created with 125 new product startups of EP Delhi. Also, 66 IPRs have been filed by the EP startups. Additionally, 43 startups have received external funding support to the tune of ₹21.79 Crore and the total revenue generated by the startups is 145 Crore. Since November 2022, EP Delhi is operating from Indraprastha Institute of Information Technology, Okhla, New Delhi.

IoT OpenLab - "IoTs" or IoT is a computing concept that encapsulates the idea of everyday physical objects being connected to the internet and being able to identify themselves to other devices as well as communicate with them. IoT is the next big thing in technology industry. The Indian IoT market is expected to reach US$9.28 billion by 2025 and Indian will have

2 billion IoT devices installed by 2022 itself. Bengaluru, the "Silicon Valley of India", alone has more than 500 IoT startups.

In the above background, IoT OpenLab has been established in Bengaluru in partnership with MeitY, M/s Arrow Electronics and others. The objective of IoT OpenLab is to create a technology platform for enabling innovative startups to develop IoT based applications, products & solutions which will address not just domestic needs but have a global perspective also. IoT OpenLab's offerings include 4,200 sq. ft. of ready-to-work plug & play space, an IoT Lab equipped with complete sample bank, test equipment & technical support, technical mentoring & support by in-house engineering team, access to financial resources, marketing support etc. It is targeted to support and nurture around 100 startups (physical & virtual) per year over a period of 5 years. IoT OpenLab was operationalized on 3rd December 2019.

IoT OpenLab has onboarded 57 startups, resulting in the development of 30 prototypes and 44 products by these start-ups.

FINBLUE - FinBlue CoE has been established in Chennai in partnership with MeitY, State government, IIT Madras, TiE Chennai and various industry partners such as Intellect Design, NPCI, Yes Bank, PayPal, Pontaq Ventures, RBS, Torus Innovations etc. to provide complete handholding & support to innovative startups & entrepreneurs working in Finblue.

Facilities & Services of FinBlue include 100 ready-to-work plug-n-play space, access to APIs, payment gateways and sandbox environment of Partner Bank and NPCI, CANVAS Technology of M/s Intellect, technical mentoring & support, access to financial resources (angel funding, seed fund, VC etc.), access & support towards networking & marketing activities.

FinBlue aims to support 58 startups over a period of 5 years with special focus on areas like Trading, Banking, Lending, Remittance, Insurance, Risk & compliance, Wealth advisory, Financial inclusions, Saving, Payment and alike.

FinBlue has onboarded 47 startups, resulting in the development of 112 prototypes and 161 products by these start-ups.

STPI has already established the first-of-its-kind ESDM Incubation Centre "Electropreneur Park" (EP) in New Delhi. The EP at New Delhi. This EP has been immensely successful with multiple startups getting funded as well as multiple patents being filed.

Hence, with support from MeitY, STPI has replicated this highly successful collaborative model across various parts of India, with next EP ESDM Incubation CoE at Bhubaneshwar, Odisha in partnership with State Government, Academic partners as IIIT-Bhubaneswar, IESA as lead industry partner. The EP at Bhubaneshwar aspires to contribute to the ESDM growth story of India through creation of a holistic ecosystem for encouraging R&D, innovation and entrepreneurship in the ESDM sector. This ecosystem is necessary to develop, promote, incubate, mentor and create break through innovations in the ESDM sector. It shall emphasize on development of product and IP creation in the ESDM sector.

Facilities & Services include 7,500 sq. ft. of built-up space, the state-of-the-art facility and fully furnished office space with high-speed

connectivity, fully equipped ESDM Lab for prototyping & testing in power electronics, LED, Communication, RF, embedded hardware & software, test & measurements etc.

It aims to leverage 40 startups over a period of 5 years with special focus on areas like Energy, Process Control & Industrial Automation, and Education. EP Bhubaneswar was operationalized on 23rd December 2019.

EP Bhubaneswar has onboarded 27 startups, resulting in the development of 71 prototypes and 26 products by these start-ups.

NEURON at STPI Mohali

The NEURON CoE at Mohali has vision to promote entrepreneurial spirit amongst youth, researchers, engineers and society at large by promoting cutting edge information technology startups especially in the field of AI/Big Data, AVG and IoT which will lead to economic and social development of the country. With this vision, a CoE in AI/Data analytics, IoT & AVG has been initiated in collaboration with MeitY, Govt. of Punjab, ISB-Mohali, Punjab Technical University PTU) and industry to provide complete handholding & support to innovative startups in the field of AI/Data Analytics, IoT and AVG

Facilities & Services include Incubation Facility with a dedicated 500 seats co-working space and dedicated labs for AI/Data Analytics, IoT and AVG. Apart from physical & sector-specific infrastructure, the hub will have the access to domain experts, technocrats, mentorship programs as well as funding. It is targeted to support 100 startups (revised) over a period of 5 years in focus areas like AI, ML, DA, IoT & Virtual Reality to solve real world problems in Education, Agriculture, Healthcare

etc. NEURON was operationalized on 30th September 2019.

NEURON has onboarded 57 startups and resulting in the development of 54 prototypes and 20 products by these start-ups.

MOTION at STPI Pune

The commercialization of autonomous vehicles will also contribute to the revenue growth of different industries such as IT, technology and electronics. According to Research and Markets, the global Autonomous Vehicles market accounted for US$27.09 billion in 2017 and is expected to reach US$615.02 billion by 2026.

With this background, a CoE in the Autonomous, Connected, Electric & Shared (ACES) branded as MOTION has been established in collaboration & partnership with Government of Maharashtra, M/s Tata Motors, M/s Kinetic, M/s Visteon, M/s MathWorks India, M/s Intel, College of Engineering Pune (CoEP) and associations like ARAI, SAE-India, TiE-Pune etc.

Facilities & Services include over 7000 sq. ft. of space (including lab & incubation) at STPI Pune. MOTION targets to benefit 50 domain-specific startups over a period of 5 years in Autonomous, Connected, Electric & Shared (ACES) Mobility. MOTION was operationalized on 10th December 2019.

MOTION has onboarded 52 startups, resulting in the development of 125 prototypes and 60 products by these start-ups.

VARCoE – With an intention to create an ecosystem for carrying out R&D in immersive visualization, give impetus to R&D, Incubation, IP Creation, Product Development, Skill

development and Entrepreneurship in AR, VR and allied fields, VARCoE has been established at IIT Bhubaneswar. According to a report published by Allied Market Research, the global AR & VR Market, which was $11.32 billion in 2017 is expected to touch $571.42 billion by 2025, with a CAGR of 63.3% from 2018 to 2025.

With this background, a CoE in the field of Augmented Reality and Virtual Reality has been established at IIT-Bhubaneshwar and was operationalized on 19th January 2018 to further research & development of tools and technologies along with nurturing startups in the said domain. This CoE targets 300 beneficiaries including startups, individual researchers and high R&D projects over 5 years in Health, Art and Architecture, Transport, Construction, Tourism, Entertainment, and Education. VARCoE has started operations with first set of projects working on various applications of VR/AR. Presently, 9 major projects on AR&VR applications in various domains involving 12-15 highly qualified faculty and researchers of IIT Bhubaneshwar are in progress. Additionally, 9 star-ups have been onboarded. Additionally, 14 star-ups have been onboarded, and resulting in the development of 2 prototypes and 4 products by these start-ups.

IMAGE at STPI Hyderabad - The Animation, VFX, and Computer Vision Industry is growing rapidly globally as well as domestically within India. The animation & VFX segment in India is expected reach ₹180 billion by 2024 (which is growth of more than 100% in three years). Globally, the Computer Vision (CV) market is expected to reach US$17.38 billion by 2023 (which is a rapid growth from US$12 billion in 2018).

With the above background and envisioning a promising future, a CoE in the field of Gaming, VFX, CV & AI has been established at Hyderabad in partnership with MeitY, Govt. of Telangana, academia, & industry partners like HYSEA (Hyderabad SW Enterprises Association) & TVAGA (Telangana VFX, Animation & Gaming Association). This CoE has provision of mentoring, technology support and funding for Gaming, Animation, VFX, Computer Vision and AI startups. IMAGE offers integrated programs, CVLAB and Game Lab, for startups to scale up through its incubation facility. The IMAGE program includes premium plug and play co-working space for startups and offers access to the ecosystem which comprises of IP owners, mentors, investors and a platform to support Go-to-Market strategy.

Facilities & Services include 10,000 sq. ft. incubation space and an IMAGE lab with cameras, display units & related equipment in an area of 3,500 sq. ft. The IMAGE Lab consists of Motion Capture (MoCap) facility and computing facility for Computer Vision & AI. The CV lab comprises of GPU Servers, Storage Servers, High & Mid Config Computers, Software along with 26 port PoE+ switch to connect & power multiple cameras together. The MoCap facility will have shooting space, providing high-end motion capture, facial animation to complement extensive animation and VFX work for the startups working on the Animation, VFX and Gaming domains. MoCap lab comprises of MoCap cameras & control box, Video Reference Camera along with clamps, heads, cables accessory kits & MoCap suits kits.

This CoE targets 140 startups in the domain of CV & AI and Gaming, Animation & VFX over a period of 5 years. IMAGE was operationalized on 17th February 2020.

IMAGE has onboarded 40 startups, resulting in the development of 30 prototypes and 58 products by these start-ups.

APIARY at STPI Gurugram - Blockchain Technology can enable ease of collaboration for enterprises and the ease of living for our citizens by bringing in transparency across government and private sector interfaces. Despite the fact that the technology is still in a nascent stage of its development and adoption where there is large opportunities in this domain.

According to a recent forecast by Gartner, the business value added by blockchain will grow to slightly more than US$176 billion by 2025, and then surge to exceed US$3.1 trillion by 2030.

With this background, a CoE in Blockchain Technology branded as APIARY has been established in collaboration with MeitY, STPI, STPINEXT, Govt. of Haryana, Padup Venture Private Limited, IBM, Intel, GBA and FITT.

This is an initiative, to identify and evaluate promising startups in the field of Blockchain Technology that will be hosted in STPI Gurugram. Facilities & Services include 7,000 sq. ft incubation space, IBM blockchain platform, mentoring, training, R&D, funding and networking. APIARY CoE was operationalized on 23rd March 2021. This CoE targets 100 innovative startups over a period of 5 years.

APIARY has onboarded 28 startups, resulting in the development of 33 prototypes and 10 products by these start-ups.

- **OCTANE CoEs under Phase-I:** As per the objective laid down in the vision document for Digital North-East 2022, STPI was entrusted with the responsibility to set up CoEs with

Start-up Innovation Zones (SIZs) in each of the states of North-East India. Accordingly, with support of MeitY, STPI has established eight CoEs in emerging technologies with SIZs along with e-commerce facilitation in the capital city of each NE state of India (NER) in a phase-wise manner. The network of 8 Nos of CoE+SIZ in NER is named as "OCTANE".

Under Phase-I, 3 CoEs having technology/sector focus, viz., IoT in Agriculture at STPI Guwahati, Animation at STPI Shillong, Emerging Technology AR/VR at Imphal have been established.

Presently, selection of start-ups is ongoing through open challenge programs. Till now, total 14 start-ups have been onboarded under Phase-I CoEs.

- **OCTANE CoEs under Phase-II:** Under Phase-II, 5 CoEs in five locations of NER having technology sector, viz., Data Analytics & AI at Agartala, Gaming & Entertainment at Aizawl, GIS application (including drone technology) at Itanagar, IT application in Graphic Design at Kohima and IT application in Healthcare & Agritech at Gangtok have been established.

Presently, selection of start-ups is ongoing through open challenge programs. Till now, total 18 start-ups have been onboarded under Phase-II CoEs.

Atal Incubation Centre (AIC) at STPI, Bengaluru:

With an aim to build vibrant pan-India ecosystem and with shared vision to support, promote and grow culture of innovation leading to startups & successful entrepreneurs with focus area in IoT, Health & Pharmaceuticals, e-Commerce, Big Data & AI, STPI has established the AIC at

Bengaluru in collaboration with Atal Innovation Mission, NITI Aayog.

Facilities & Services include 10,000 sq. ft. of space equipped with state-of-the-art physical infrastructure & lab, common office facilities along with a dedicated team for conducting hackathons, idea challenges, workshops, trainings, technical & business mentoring sessions, assisting startups in the matters of IPR filing, legal, accounting etc. The AIC was approved in May 2018 and it targets 65 innovative startups over a period of 5 years.

AIC has onboarded 30 startups, resulting in the development of 25 prototypes and 18 products by these start-ups.

Fostering Agritech Startups for Augmenting Livelihood (FASAL) at Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola

The IoT is a perfect match for smart farming due to its highly interoperable, scalable, pervasive, and open nature. Realizing this enormous potential of IoT technologies for smart farming, FASAL, an IoT in Agriculture CoE, is being set up at Akola to identify & evaluate promising startups in the field of AgriTech & Agri IoT and nurture them to build path-breaking products in the focused areas including Digital Farming, Crop Protection & Management, Predictive Analytics & Hydroponic VF System.

The CoE will help facilitate the development of smart techniques to enhance farmer income in the off-season using the Hydroponic VF System. The aim of FASAL CoE is to solve the challenges in farming, shipping, and storing food and to unlock new efficiencies in the agriculture sector.

The CoE FASAL is set up in collaboration with partners & leading stakeholders from Government, Academia, Industry & Industry Associations. The stakeholders are MeitY, STPI, Dr. Punjabrao Deshmukh Krishi Vidyapeeth (PKDV) Akola and other partners include ICAR-Indian Agricultural Research Institute (IARI), Agriculture Insurance Company of India Ltd. (AIC), Krishi Vigyan Kendra (KVK) Akola, College of Engineering & Technology Akola, SatSureAnalytis India Pvt. Ltd, Amazing Aerial Solutions Pvt. Ltd., ioCare, Indian Society of Agricultural Engineers (ISAE) and TiE Mumbai.

Facilities & Services include an area of 10,000 sq. ft with state-of-the-art incubation centre housed in the campus of Dr. PDKV, Akola. FASAL will have domain specific physical laboratories like Digital Framing Lab, Agri IoT Lab, Predictive Analytics Lab and Hi-Tech hydroponic vertical farming set up with required equipment, software in the domain to support the startups for PoC, prototyping, product development or testing their solutions. The CoE shall provide support like training, mentoring, marketing, networking, outreach, access to funding resources, IPR/ patenting assistance and other requisite support to the startups and entrepreneurs working in Agri-Tech domain.

The CoE has provision to provide funding support up to ₹10 Lakh per startup in addition to the access to other financial resources.

This CoE targets 25 innovative startups over a period of 3 years. FASAL was operationalized on 1st September 2021.

FASAL has onboarded 27 startups, resulting in the development of 38 prototypes and 47 products by these start-ups.

Efficiency Augmentation at Bengaluru

The CoE on Efficiency Augmentation is an open Cyber-Physical Systems (CPS) ecosystem designed to cultivate early-stage innovation and experimentation. This CoE aim to work with Govt, SME/MSME & tech startup leaders to transform business ideas into tech deliverables. The CoE shall pilot, adapt technology and processes to proactively predict industry needs and address real-world industry challenges.

The CoE is being set up by STPI in collaboration with Government of Karnataka, Hewlett Packard Enterprise, Vidyarthi Shikshana Seva Trust (VSS Trust), Yuvaka Sangha and IESAThe CoE shall be of international standard which seeks to bring together the international community, Industry to debate, deliberate, act and innovate in both the industry (infrastructure & business transformation) and people development, in order to address technology's impact on Industry.

Facilities & Services include an area of 16,000 sq. ft. with state-of-the-art incubation centre to accommodate 100+ workstations along with Board/ Conference rooms. There will be an Innovation & Development lab equipped with range of network, compute & storage elements, developmental tools/ software & platforms that are required by startups focusing on smart manufacturing, smart farming, smart energy, home & office automation, smart water, connected transportation, weather monitoring, smart hospital, smart security and intelligent asset monitoring.

As training programme is one of the important services offered by CoE, it includes a well-furnished training room. Additionally, there

shall be CoE zone where various equipment like PLC, PAC, wireless sensors, automation controllers, and IIOT platforms will be available connected to various actuators and sensors for trainees to have hands on learning experience.

This CoE targets 100 innovative startups over a period of 5 years. The CoE has been launched in the month of November 2023 along with open challenge program.

- **MedTech at SGPGI Lucknow:** Ineffective and ancient models of clinical decision making have accelerated the demand for medical electronics in the country along with the Government programs like National Rural Health Mission aiming to provide technology at the grassroots level.

India is among the top 20 medical devices markets globally and 4th largest medical devices market in Asia after Japan, China, and South Korea. The diagnostic imaging market is likely to expand at a CAGR of 13.5% between 2020-25. India has a 75-80% import dependency on medical devices. Export of medical devices from India stood at US$ 2.53 billion in FY21 which is expected to rise to US$ 10 billion by 2025.

With this background and foreseeing a promising result in the future, STPI has established a CoE in the domain of MediElectronics & Health Informatics at SGPGI at Lucknow in collaboration with SGPGI, Lucknow, Department of IT and Electronics, Govt. of UP, Association of Indian Medical Device Industry (AiMED), Indian Institute of Technology, Kanpur and Andhra Pradesh MedTech Zone (AMTZ) along with AiMed contribute to "Make-in-India".

Facilities & Services include 18,000 sq. ft. ready-to- work, plug & play incubation space and availability of MediElectronics & Health Informatics Lab (MedLab) and IoT Lab equipped with sample bank of instruments, analysers, clinical consumables, imaging & optical devices, test equipment & technical support. MedTech CoE was operationalized on 14th August 2020. The MedTech CoE targets to support 50 startups over a period of 5 years.

MedTech has onboarded 28 startups, resulting in the development of 18 prototypes and 16 products by these start-ups.

- **Centre of Entrepreneurship on Industry 4.0 at Rashtriya ISPAT Nigam Ltd. - Visakhapatnam Steel Plant (RINL-VSP)**

The demand of Industry 4.0 products and solutions is going to rise exponentially against the backdrop of growing Industrial Automation. Strengthening domestic capabilities of Industry 4.0 products & solutions will take the domestic industry up the value-chain significantly by way of increase in products, patents & IPR. In order to boost start-ups in these fields, a CoE in the field of Industry 4.0 at RINL Visakhapatnam has been established. It will nurture around 175 innovative startups over a period of five years.

Kalpataru CoE facility includes an area of 6,000 Sq.ft. with the state-of-the-art incubation facility housed on the campus of RINL-VSP. This CoE has domain-specific physical laboratories like IIoT, AI/ML & AR/VR and Industrial Automation, Robotics, Drone & 3D printing setup with the requisite equipment and software in the domain to support the startups.

This platform empowers aspiring entrepreneurs and innovators through strategic networking, seed funding, mentoring, providing support for training, marketing, patenting, access to CoE labs, tools, software and state-of-the-art incubation facility.

- **Status:**

Open Challenge Programs (OCPs) have been initiated to identify and support promising startups working towards digital transformation products/ solutions, enabling equitable & inclusive growth of PSUs with a focus on Industry 4.0.

From OCP 1.0, after evaluation, 05 Start-ups have been selected for the problem statements of RINL. Total project cost estimated for problem statements to be committed by RINL-VSP is ₹86 Lakh.

From OCP 2.0, after evaluation, 16 Start-ups have been selected. Out of which, 08 Startups were selected for the problem statements of RINL and the remaining 08 were selected for general problem statements for providing innovative solutions. Total project cost estimated for 08 problem statements to be committed by RINL-VSP is ₹470 Lakh.

This CoE has Signed MoUs with 09 Partners which includes State Government, Industry, Academic, and Industry Associations. Also, it added 15 Mentors to give technical support to the Start-ups. Nearly 22 promotional activities have been conducted to attract more start-ups.

Emerging Technology CoE (EmTeK) at Bhubaneswar & Satellite Centre at BPUT, Rourkela

A CoE on Emerging Technology at

Bhubaneswar & Satellite Centre at BPUT, Rourkela has been set up in collaboration with MeitY, Electronics & IT Department (Government of Odisha), STPI, STPINEXT, Biju Patnaik University of Technology, Odisha, Rourkela and IIIT Bhubaneswar. This CoE targets around 150 startups in technologies like Analytics, Machine Learning, Cyber Security AI over a period of 5 years. The CoE was launched in December 2022. EmTek CoE has selected 10 start-ups.

Next Generation Incubation Scheme (NGIS)

NGIS has a vision to drive the rise of India as a Software Product Nation so as to make it a global player in development, production and supply of Innovative, Efficient and Secure Software Products (including embedded software) thus facilitating the growth across the entire spectrum of ICT sector as envisioned in the National Policy on Software Products (NPSP)–2019. NGIS is focusing on 12 Tier-II locations of India viz. Agartala, Bhilai, Bhopal, Bhubaneswar, Dehradun, Guwahati, Jaipur, Lucknow, Prayagraj, Mohali, Patna & Vijayawada with an aim to support 300 start-ups/Entrepreneurs/SMEs in the field of IT/ITeS/ESDM over a period of 3 years.

NGIS's partners & stakeholders include MeitY, STPI etc. as well as a vast spectrum of industry, academia, investment & funding agencies to support the innovative product-focused start-ups in the most comprehensive manner. So far, STPI has selected 593 startups through 16 challenge programs (CHUNAUTI- Challenge Hunt Under NGIS for Advanced Uninhibited Technology Intervention). STPI has launched CHUNAUTI 7.0 to select women-led tech start-ups.

9.9.5 Modified Electronics Manufacturing Cluster (EMC 2.0) Scheme

The EMC 2.0 scheme was notified on 1st April 2020 with an implementation period of 8 years (i.e. up to March 2028) and launched by Hon'ble Union Minister for Electronics & IT, Communications, Law and Justice on 2nd June 2020. The objective of the scheme is to create a comprehensive supply chain/ecosystem for strengthening electronics manufacturing base and attract big Manufacturing units to set up production along with their supply chain. Total budgetary support for Scheme is ₹3,762 crores. STPI is the Project Management Agency (PMA) for implementation of the scheme. As on 31st March 2024, 31 applications have been received on EMC 2.0 portal.

Out of 31 applications received, approval for 06 has been accorded. The other applications are under process. Moreover, 03 Nos of Expression of Interest (EoI) have been received.

For more details para 3.3.3 may be referred

9.9.6 Promotion of Small and Medium Entrepreneurs by creating a conducive environment in the field of Information Technology

STPI has been promoting SMEs and their cause by offering incubation services, organizing events, sponsoring/co-sponsoring events, participation in events and export promotion efforts.

Some of the major events in which STPI participated/sponsored include:

- FinTech Festival India held during 16th-18th May 2023 at Mumbai

- 1st India ISP Conclave 2023 held during 12nd-13rd June 2023 at Pune

- CII SummitFX 2023 held during 8-9 August 2023

- Digital Acceleration & Transformation Expo (DATE) held during 23rd-24th November 2023 at New Delhi

- INFOCOM 2023 held during 30 November– 02 December 2023 at Kolkata

- Bengaluru Tech Summit held during 29th November – 01st December 2023 at Bengaluru

- GPAI held during 12th-14th December 2023.

Promotion of the India Software Product Industry

The Indian Software Product industry has made significant achievements in FY 2023-24, reaching $16 Billion in total revenue (As per NASSCOM estimate). Apart from the unicorn story, the software product segment witnessed a rise in demand for collaborative applications, application platforms, security software, system and service management software, and content workflow and management applications.

The following major programs are being implemented to strengthen the Indian Software industry:

Innovation Challenge for Development of Indian Video Conferencing Solution

MeitY announced "Innovation Challenge for Development of a Video Conferencing Solution" under the "DIP" in April 2020 for Indian Start-ups, to discover indigenous Video Conferencing software applications for use by the Government of India.

The "Techgentsia Software Technologies Pvt. Ltd. (Product name: Vconsol)" was declared the winner of the innovative challenge, and MeitY entrusted NIC with rolling out the Vconsol service for GOI.

The following three potential VC solutions start-ups were also selected for the VC solution development:

- M/s Instrive Soft labs Pvt Ltd (Product Name: HydraMeet)

- M/s Sarv Webs Pvt. Ltd. (Product Name: Sarv Wave)

- M/s People Link Unified Communications Pvt Ltd' (Product name: Insta VC)

NIC has created a secure infrastructure for "Vconsol" product at National Data Centre New Delhi on a pilot basis, with a capacity of around 1000 concurrent users, and started rolling out the services for Government of India uses in the brand name of "BharatVC". More than 3 lakh VC meetings have been held on BharatVC by March 31, 2024.

Grand Challenge for Development of "Smart Water Supply Measurement and Monitoring System" in partnership with National Jal Jeevan Mission (NJJM)

MeitY in partnership with NJJM, Department of Drinking Water and Sanitation, Ministry of Jal Shakti announced the development of a 'Smart Water Supply Measurement and Monitoring System' via an ICT Grand Challenge. Jal Jeevan Mission would be the user agency of the Grand Challenge.

Major Outcome:

This project was successfully completed under the initiative of the ICT Grand Challenge under the National Policy on Software Products (NPSP), MeitY. The aim of the grand challenge was to conceptualize an innovative, modular, and cost-effective solution to develop a "Smart water Supply Measurement and Monitoring System" to be deployed at the village/semi-rural/semi-urban levels. The system would collect and facilitate centralized monitoring of data.

As part of the ICT Grand Challenge, four startups/ MSMEs were shortlisted for deployment of their IoT pilots in 100 villages covering 9 states and a Union Territory, viz., Maharashtra, Haryana, Andhra Pradesh, Gujrat, Manipur, Rajasthan, Uttar Pradesh, Karnataka and Ladakh in total. This was done in coordination with State Nodal Officers of Public Health Engineering Department (PHED) and Rural Water Supply & Sanitation Departments (RWSSD).

ICT grand challenge helped Indian start-ups to come up with cost-effective solutions to monitor rural water supply. Technically feasible, modular, unique and innovative technological solutions are deployed by these four Participants covering technologies like GSM, M2M SIM, LoRaWAN, TLS 1.2 & 1.3, and Over the Air (OTA) firmware updates. Alternate power sources like solar panels were placed at monitoring stations with efficient battery backups, ensuring 24x7 power supply for the sensors.

Awardees of the Grand Challenge were felicitated by Hon'ble Minister Shri Gajendra Singh Shekhawat, Union Minister of Jal Shakti, Government of India

Startup Accelerator of MeitY for Product Innovation, Development, and Growth (SAMRIDH) Programme

The SAMRIDH scheme aims to support accelerators to select and accelerate potential IT-based startups to scale for solving India's problems and creating a positive social impact. The SAMRIDH scheme provides support to selected accelerators for extending acceleration services to startups (focused on Tier-II and III based) along with one-to-one matching funding support of up to ₹40 Lakh.

In the first round of cohort, 22 accelerators across the country have been selected through a multilateral screening process. The list comprises Government Supported Organizations, Academic Institutions, Corporate Accelerators, and Investment Firms. All the 22 selected accelerators have selected 175 startups who had gone through 6-9 months acceleration programmes.

Key Achievements:

- No. of Sessions conducted by Accelerators: 300+ (The sessions comprise one-on-one mentoring sessions, group sessions, boot camps, workshops, etc.)

- No. of Demo Days conducted by Accelerators: 35

- No. of Investors (VCs and Angels) engaged during the SAMRIDH Demo Days: 200+

- Total Number of Startups Funded (matching fund): 98

- No. of Employment generated by startups selected under SAMRIDH: 2,376+

iTamil Nadu Technology (iTNT) Hub in Chennai

The primary objective of Tamil Nadu Technology Hub is to nurture the deep/emerging tech innovation ecosystem in Tamil Nadu, that can guide, develop, implement and support startups, especially in the scaling up phase in Deep Tech. The objective will be achieved by:

- Establishing iTNT Hub at Chennai over a

5-year period, and subsequently in Madurai, Hosur, and other Tier-II/III cities that can support innovation-led startups in incubation, acceleration, and infrastructural and other support services, with a primary focus on acceleration in deep technology applications.

- Enabling corporate partnerships and support by providing a defined roadmap and responsibilities.

- Providing high technology equipment like Fab, 3D Printing, various types of IR 4.0 devices would be bought by TN Technology hub or obtained through stakeholders and given on a pay-per-use model to startups focusing on emerging and deep tech.

- Supporting startups in creating value in the IT and deep tech space.

- Creating a Digital Market Access Portal to provide services and facilitate interaction between different stakeholders.

- Facilitating startups to assist the Government as a customer by application of deep tech to solve problems of public, policy, and governance.

Current Status

- Startups Supported: 87

- Community Engagement Events: 41

- Deeptech and emerging tech investors: 35

- Entrepreneurs Benefitted: 1,103

- Startups Mentored: 81

- MoUs with Colleges for Industry-Academia Collaboration: 51

- Researchers Onboarded for Innovation Network: 3,530

- EOI's with international innovation ecosystem: 06

- Product Launches: 06

9.10 Digital India Corporation (DIC)

9.10.1 Introduction

DIC is a not-for-profit company set up & promoted by MeitY. The Company leads & guides in realising the vision, objectives and goals of the Digital India program. It provides strategic support to Ministries / Departments of Centre / States to carry forward the mission of Digital India by way of capacity building for e-Governance projects, promoting best practices, encouraging Public-Private-Partnerships (PPP), nurturing innovations and technologies in various domains.

The company encompasses 7 Independent Business Divisions (IBDs) viz. DIC Core or Technology Development & Deployment Division (TDDD), NeGD, MyGov, MeitY Startup Hub (MSH), India Semiconductor Mission (ISM), Digital India Bhashini Division (DIBD) and INDIAai.

9.10.2 DIC Core or Technology Development & Deployment Division (TDDD)

9.10.2.1 Poshan Tracker

'Poshan Tracker' is a mobile-based application for dynamic identification of stunting, wasting, and under-weight prevalence among children and last-mile tracking of nutrition service delivery. Continuing the journey of creating the finest ecosystem for the eradication of malnutrition in India, the program is being invested with data quality indicators, and compatible for scalability. It is a

- Job-aid to the Anganwadi worker for efficient delivery of services along with reflection of their efforts.

- Critical and beneficiary-centric service delivery Application under POSHAN Abhiyaan.

- Promote real time data with analytics.

Achievements:

- Real time monitoring by States, handling 1 Crore transactions daily in 2021; now averaging 30 Crore transactions daily in 2024

- Home Visit Scheduler tracks household visits by AWW

- Aadhaar based beneficiary migration from one Anganwadi center to another, both within and outside the State

- Jan Andolan portal for hosting Poshan Pakhwada and Poshan Maah every year.

- Supervisory module - Data entry of Anganwadi infrastructure by Supervisors;

- Monitoring and validation by CDPOs

- Heat maps of nutrition indicators (SAM/MAM, Underweight, and Stunting) till district level

- Dynamic Dashboards to provide comprehensive information - Mission Utkarsh, Saksham Anganwadi, Aspirational Blocks Programme, Tribal Villages Programme, Vibrant Village Programme, Growth Trends and Heat maps.

- Gestation module created for pregnant women for monitoring of weight gain

- Family Survey dashboard on application created.

- Poshan Helpline for beneficiaries, AWWs, State officials. Contact agents related to any issues faced in the application or in general. Poshan helpline is open for redressals from Monday to Saturday (9:00 am - 6:00pm).

This year another flavor of the program is in focus. A supervisory module has been made live for monitoring of the service delivered by the management layer till the State level.

This module focuses on quality of awareness and education imparted by Anganwadi workers to achieve a status of malnutrition-free India. As malnutrition-free India is not a status, it's the overall upliftment of society by educating them the importance of nutrition. Along with this beneficiary interface for self-registration and view of a passbook for the services under Poshan Tracker.

9.10.2.2 Kisan Sarathi: Implementation of 'Interactive Information Dissemination System (IIDS)' with Indian Council of Agricultural Research (ICAR)

The project has been taken up in partnership with ICAR to facilitate farmers location-specific 'Demand Based Tele Agriculture Advisories' in their local languages through Krishi Vigyan Kendras (KVKs).

Following is the progress of the project during the period:

- A Total of 738+ Krishi Vigyan Kendra (KVKs/ District Agricultural Advisory and Transfer of Technology Centers (DAATTCs) have been on-boarded.

- In this period 322 KVK experts enrolled, with a total of more than 3,000 Subject Matter Experts are also on-boarded for implementation of Kisan Sarathi from all states and UTs.

- 127.50+ Lakh new farmers have been registered in the period, with a total of 179.87 Lakh + farmers have been registered in the system.

- 1,10,286 calls received from the farmers, with this 1,87,836+ calls have been received from the farmers.

- During the period 24.96 Crore messages were sent (consumed) to the Farmers.

- IVRS has been enhanced to deliver domain-specific advisories 13 languages in according to the availability of domain experts available in-the-KVK.

- New module to manage multimedia query has been developed to address multimedia queries received from the farmer through UMANG.

- Module has been created to minimize manual entry of domain, subdomain, crop, problem, and problem types into the system.

9.10.2.3 Customization, Enhancement & Deployment of Digital Solutions for Empowerment of Citizens of North-East India

DIC has taken up the project with the objective to empower the citizens of North-East India by providing digital solutions to ease their job and enhance their productivity & livelihood with a special focus on Farmers, Artisans, Weavers and Teachers (special schools). The project is focused on deploying DIC technologies / applications in the area of ICT in Agriculture, Embroidery & Weaving and Differently Abled which have lots of potential for large-scale deployment in all the North-Eastern States for the benefit of farmers, women, embroidery artisans, weavers and teachers of special schools. To achieve the proposed objective, three technology components have been identified for necessary customization and following deployment based on its usability and potential in North-East Region.

Component 1: Interactive Information Dissemination System (IIDS): Empowering Agri Institutions & Farmers

Manipur: Loumisingi Paojel

The sub-component has been taken up in collaboration with the College of Agriculture, Central Agricultural University Imphal to empower the farmers by providing the right information at the right time through mobile-based agro-advisory system.

Awareness and Sensitization Program for Millet Cultivation & Practices at Yurembam Makha Leikai

Awareness and Sensitization Program for Loumisingi Paojel at Chakpikarong, Chandel District

Component 2: CAD Tools (DigiBunai™ & DigiKadhai): Empowering Weavers, Designers & Artisans

CAD Tools (DigiBunai™ & DigiKadhai) are utilized

to develop or enhance the skills of Handloom Artisans of NER. It supports the Handloom Weavers/Designers in the direction of Manual to digital transformation of skills, time reduction in preparation of region-specific woven products, a bridge between technology & user's understanding (local dialects), possibilities to create intricate design, possibilities for product diversification & increase the possibilities of self-employment, etc.

Digital India Corporation established CAD labs in six states (Assam, Manipur, Meghalaya, Tripura, Arunachal Pradesh & Sikkim) to provide a collaborative space for handloom designers, master weavers, trainers, and faculty to refine their skills and knowledge in computer-aided textile design (CATD). In this phase, various training programs have been conducted to train the handloom artisans on the above CAD Tools. A remarkable 1956 individuals (including designers, weavers, trainers, students and faculty members) have actively participated in the program, contributing to its success. Here, established CAD labs are providing continuous support to artisans who cannot afford the costly IT equipment to get the benefits of the CAD Tools.

To further propel awareness and knowledge sharing, a series of 65 workshops on DigiBunai™ CATD (Computer-Aided Textile Design) reach out to a wide audience. The program's impact extends beyond learning. Trainees have actively embraced the new skills & created more than 1300 digital designs during their training sessions. These designs are a testament to their creativity and successful adaptation to digital design techniques.

Component 3: Punarjjani™: Empowering Teachers of Special Schools & Children with Intellectual Disabilities. It is a web-based tool that assists Special Teachers in the assessment of children (6 -18 years of age group) with Intellectual

Disabilities (IDs)

The project includes implementation of the tool in 18 Special / Inclusive Schools in the North East region of the country through training of Special Educators, requisite hardware support for Special / Inclusive Schools, incentives for Special Educators and follow-ups.

9.10.2.4 LokOS: Digitizing Self-Help Groups in India

The Deendayal Antyodaya Yojana- National Rural Livelihoods Mission (DAY-NRLM), a program by the Ministry of Rural Development, Government of India, is dedicated to eliminating rural poverty by empowering the poor through institutions and strengthening their livelihoods. With a substantial human resource pool of over 9 Crore Self Help Group (SHG) members across 8+ Lakh SHGs, DAY-NRLM employs various systems with diverse objectives, ranging from transaction capture to state and national-level Management Information Systems (MIS). Some programs even feature state-level, program-specific portals. SHGs, Community-based Organizations (CBOs), and their members contribute data to these systems.

The NRLM has introduced the LokOS platform, designed to enhance and digitally empower SHG communities through the mentioned system. LokOS aims to digitize, collect, collate, and report community-based transactions of CBOs, utilizing a microservices-based, granular, federated, and community-centric data architecture, alongside data standards and protocols. The primary goal is to improve the quality of data captured at the source, consequently enhancing the central NRLM's MIS. Ultimately, the LokOS platform strives to maximize benefits for SHGs, their members, and the Cadres and office-bearers of CBOs.

Statistics (as on 03-01-2024)

Total SHG Members mobilized	9.96 Crore
SHGs Promoted	90.20 Lakh
Village Organizations promoted	4.49 Lakh
Number of SHGs provided Community Investment Fund (CIF)	29.76 Lakh
Community Resource Persons developed	4.09 Lakh

9.10.2.5 MY Bharat: Empowering India's Youth

Mission and Objectives: MY Bharat aims to empower and propel the youth towards positive change in India. By creating a physical ecosystem, the platform facilitates comprehensive resources, mentorship, and industry connections. It operates under the Department of Youth Affairs, dedicating itself to youth-led development, fostering community transformation through technology.

Inception & Launch

The YUVA portal, initiated in April 2023, evolved into MY Bharat as PM Shri Narendra Modi officially launched the platform on October 31, 2023, envisioning it as a pivotal, technology-driven facilitator for youth development. MY Bharat seeks to provide equitable opportunities for youth to realize their aspirations and contribute to a developed India.

MY Bharat's proactive approach to youth development and community engagement, coupled with strategic collaborations, showcases a promising trajectory towards empowering India's youth and contributing to the nation's progress.

9.10.2.6 Visvesvaraya PhD Scheme for Electronics & IT

MeitY, with the approval of the Cabinet Committee on Economic Affairs (CCEA) had initiated 'Visvesvaraya PhD Scheme' with the objective to enhance the number of PhDs in ESDM and IT/IT Enabled Services (IT/ITES) sectors in the country in 2014.

Phase-I of Visvesvaraya PhD Scheme with a budget of ₹466 Crore, initially approved for 9 years from 2014, is extended till March 2025.

Financial Components under "Visvesvaraya PhD Scheme Phase-I
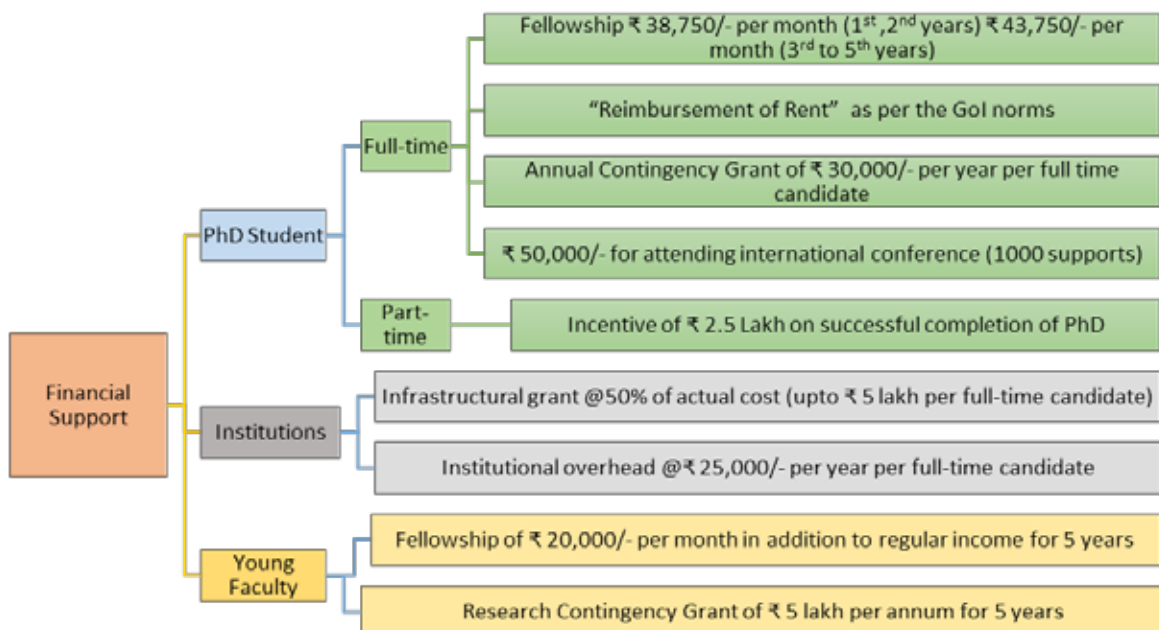
Status as on date is as under:

a) 723 Full-time and 141 Part-time PhD candidates have completed their PhD

b) 78 Full-time and 9 Part-time PhD candidates have submitted Thesis

c) 92 Full-time and 123 Part-time PhD candidates are currently pursuing PhD

d) 158 Young Faculty Research Fellowships were awarded under the Scheme

e) 85 Patents have been filed by PhD candidates & YFRF awardees

f) 5,750 Research Papers have been published by PhD Candidates & YFRF awardees

g) 08 Workshops were held for assessment of quality of research

Achievements under Phase-I of the scheme

Some of the Products developed:

- UWB Wearable Antenna for Wireless Applications by Ms. Mugdha Kango, Bharati Vidyapeeth

- PTreadX: A Physiology-sensitive Treadmill-based exergaming platform by Dhaval Solanki, IIT Gandhinagar.

- An Automated Multi-user Story-creation and Story-telling platform by Pradeep Raj, IIT Gandhinagar.

- Active Glove ideal for assessment and training of fine hand movements by Chandan Kumar Jha, IIT Gandhinagar.

- FPGA based adaptive digital Bean forming Meta-material antenna by Thogaru Abhishek Reddy, Osmania University

Some of the Technologies Developed:

- Photonic assisted techniques by SRM Institute for generation of

  ➤ Millimeter wave and terahertz signals suitable for 5G/ beyond 5G applications.

  ➤ Arbitrary Microwave waveforms suitable for radar and defence applications. Optoelectronic method of assessing cardiovascular pulse wave called Photoplethysmography (PPG) Cardiac Abnormality Detection.

- New image processing framework to find the cell and nuclei variation in low power (40x) magnified microscopic biopsy tissue samples by SRM Institute.

- Tool Chain for Static Analysis of Smart Contracts (Ethereum Platform) Url: https://youtu.be/fRrp7mvepMs by Fajge Akshay Madhukarrao, IIT Patna.

- Point-to-Multi-Point Tracking: NIT Rourkela, https://www.youtube.com/watch?v=aIrLiid2RRo&t=2s

- Hybrid FSO/RF: NIT Rourkela, https://youtu.be/kEcgsjs-7DY

- Fog Channel: NIT Rourkela, https://youtu.be/EuET-BLi-B8

- FSO Transceiver: NIT Rourkela, https://youtu.be/5Szod8M3r6Y

Some of the granted Patents:

- Method of Reducing DoS Attacks Using Voice Response in IoT Systems

- System for providing energy management in smart grid environment

- System For Detecting Type of Sleep Disorders and Method of Operating Thereof

- Electrochemical Measurement of Creatinine in Serum

- A Device for Assessment of Seed Pre-Treatments

- Spoof Recognition in an Ear Biometric System

- Image Compression for Transmission

- A Novel Microfluidic Approach for Bio-Mems Applications

- A completely miniaturized on-chip electron paramagnetic resonance sensor

Some of the Startups:

- **Galanto Innovations** by Chandan Kumar Jha, IIT Gandhinagar: won numerous awards such as BUILD by Boeing, SITARE-Gandhian Young Technological Innovation etc. Link to the company website: https://www.galantoindia.com

- **Frazen Technologies Pvt. Ltd.** by Thogaru Abhishek Reddy, Osmania University, presently having a staff of 40 employees.

- **GIGA Innovations Technologies Private Limited** in OUTBI by Thogaru Abhishek Reddy, Osmania University with target field of products in Defence, 5G Telecom, AI, ML and Computer Vision. A major achievement is the development of a robust beam-forming algorithm with less complexity.

- **Evxplorer. Pvt. Ltd:** Intelligent Operation Strategies For Smart Microgrid & Electric Vehicle On Demand System by Pranay Kumar Saha, IIT Patna.

- **EWARN System, NIT Rourkela:** It provides multipurpose devices with extendable and integrated functionalities that are broadly related to sensor systems, the IoTs and data analytics.

Visvesvaraya PhD Scheme Phase-II: Based on assessment of Phase-I, demand from the institutions and role of such scheme in strengthening research eco-system, Phase-II of Visvesvaraya PhD Scheme, has been initiated with an outlay of ₹481.93 Crore for 9 years w.e.f. Academic Year 2022-23.

Salient features:

a) 1000 Full Time PhD seats in the areas of ESDM & IT/ITES.

b) Current monthly rates under the scheme: ₹38,750/- (1st & 2nd Year), then ₹43,750/-.

c) 225 Post-Doctoral Fellowships.

d) One time support for 250 Candidates (50 candidates/year) for 6 months Visit to Labs Abroad.

e) Support for International Conference up to ₹1.5 Lakh.

f) Contingency Research Grant @ ₹1.20 Lakh/year per Full Time PhD.

g) 150 Part Time PhD seats & 50 "Young Faculty Research Fellowships" to be awarded.

h) One time award of ₹3.0 Lakh for Part Time PhD Candidates after completion of PhD.

i) YFRF Fellowship & Contingency Grant @ ₹20,000/- per month & ₹5 Lakh/year respectively upto 5 years.

Financial Components under "Visvesvaraya PhD Scheme Phase-II
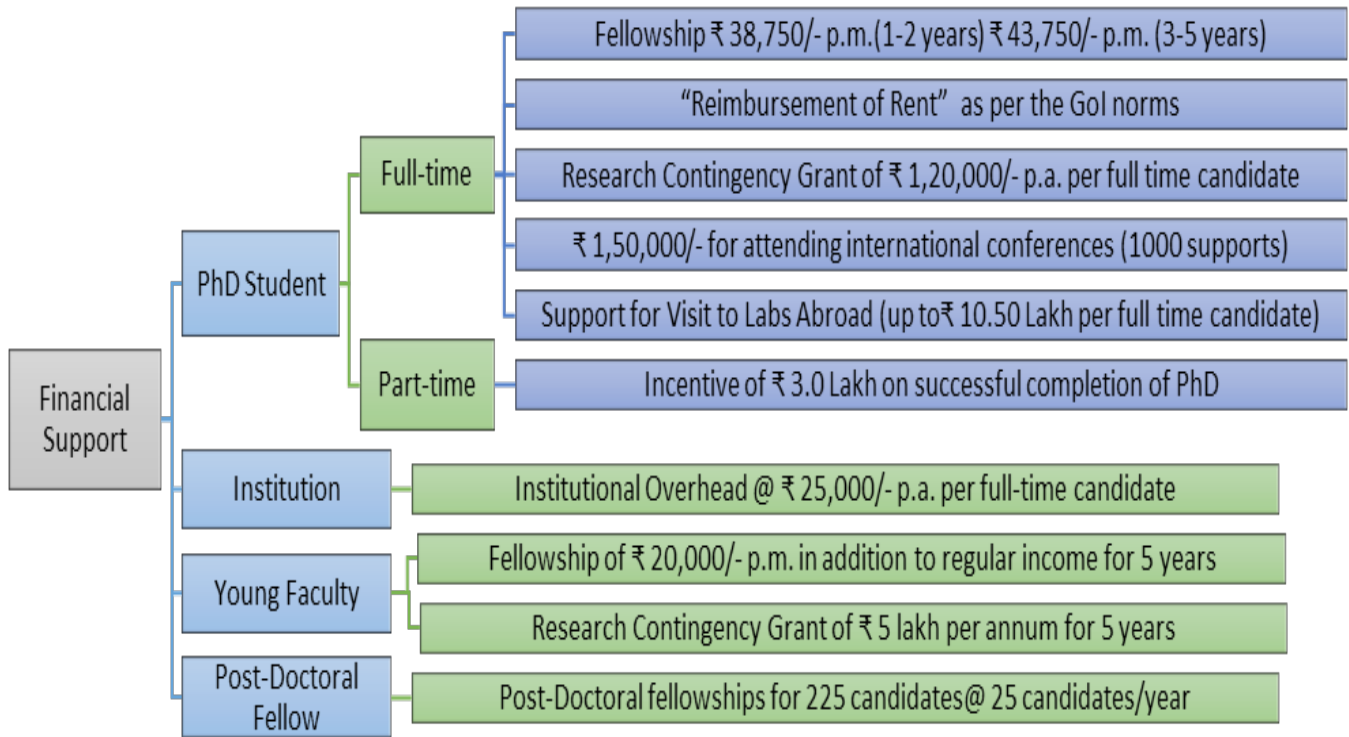
Status:

a) 253 Full-time PhD candidates are currently pursuing PhD at 67 institutions.

b) Phase-I of Visvesvaraya PhD Scheme with a budget of ₹466 Crore, initially approved for 9 years from 2014, is extended till Mar 2025.

c) Proposals have been invited for YFRF & PDF

9.10.2.7 24x7 Women Helpline

In order to facilitate the women victims and provide them psychological support, the National Commission of Women (NCW) has taken the initiative to start a helpline. DIC has been providing technical support to NCW for developing and hosting the helpline platform which is based on the IIDS platform of DIC. A dedicated helpline number 7827170170 has been provided for the purpose.

Any woman or girl (above 18 years) in distress within the public or private sphere of life (aggrieved woman) seeking redressal /help can call the helpline. This helpline is being operated from NCW premises which is located in New Delhi. During the period, 1,45,394 calls have been received or made through the NCW Helpline Platform, with this total call number have been reached to 3,03,106. During the period 1,640 counselling is provided through the system and 2,660 grievances has been registered into the System.

Following new modules have been developed during the period - Grievance Registration Module (to register the complaints and connect to service providers), Counselling Module (for scheduling and providing sessions on call), Follow-up and Feedback module, Dashboard and Report Module to generate various reports.

9.10.2.8 NCW- Her Legal Guide App

"NCW- Her Legal Guide" – A Mobile application focuses on various rights and statutes pertaining to women in India has been developed by DIC for NCW. This Mobile App will act as a new friend of women in difficult situations and will aware them of their rights. It also contains details about the helplines pertaining to women. The App is available in the Android PlayStore and iOS app store. Also, the App is available under UMANG. This app was officially launched on 9th November 2023.

9.10.2.9 Women Safety Audit Platform

NCW intends to conduct Women's safety audit in Indian cities to assess the level of safety experienced by women in public spaces and workspaces in the city based on a sample survey & focused group discussion (FGDs). DIC has developed a Mobile application for data collection and a Web Panel to manage the agencies and the survey with a dynamic dashboard and City Safety Scorecard for the audited city. The Mobile App for survey data collection contains a secure login for authenticated surveyors. The app works in both offline and online modes. Web Application contains different admin-level logins which control the mobile app. Survey module, Questionnaire module, Agency Module, Task Management module, Location management, Notification, Profile, Report and Dynamic dashboard and City Safety Scorecard for the audited city.

9.10.2.10 India Handmade

Indiahandmade:
(www.indiahandmade.com)

DIC designed, developed and implemented an exclusive e-commerce portal dedicated to Indian handmade handloom & handicrafts. The portal was launched on 22nd April, 2023 by the Ministry of Textiles, Govt. of India. In these past 12 months, the DIC team has worked relentlessly to structure and establish this beautiful e-commerce portal dedicated to authentic handmade items. The team also handles complete operations ensuring seamless & timely delivery of the ordered items.

Indiahandmade.com is a unique online shopping marketplace by Ministry of Textiles, Govt. of India dedicated to local weavers and artisans of India. Only with a mission to empower the artisan to transform into an independent businessman digitally. This platform facilitates you to get authentic handloom and handicrafts directly from the artisans and weavers present across India.

During the year, following activities were undertaken:

• Development, maintenance and Tech Support.

  ➢ Developed ecommerce portal and mobile app (for sellers, buyers).

• Operational activities:
  ➢ 1,185 sellers have been on-boarded on the portal.

  ➢ More than 11,865 products have been uploaded and 8,638 are available for buyers.

  ➢ Total 59 training sessions were held on various subjects like seller registration, Product upload, GST & HSN help, Order Processing, Packaging, Image Guidelines and many more.

➤ Received orders for 544 products (through 327 orders) worth ₹6.76 Lakh

➤ 28,787 IVRS calls (Inbound calls - 2,286 & Outbound calls -26,101) received/made for registration, enquiry and grievances.

➤ Indiahandmade offline connect with sellers for awareness and onboarding

- Handloom Haat, Janpath
- Dilli Haat
- Noida Expo Centre

9.10.2.11   e- SARAS (https://www.esaras.in/)

DIC has taken an initiative for the development of an efficient and effective online platform has been developed for the enhancement of the livelihood of the rural people under NRLM, Ministry of Rural Development (MoRD), Government of India. This online platform showcases the products manufactured by self-managed self-help groups (SHGs) and associational organisations. Its objective is to curate authentic artisanal products from across the country. Through this online portal, customers get access to 100% authentic, beautiful, amazing and uniquely handcrafted products that come straight from the heart of India.

The Foundation for Development of Rural Value Chain (FDRVC) takes care of the operations part of the portal and sourcing of the products from the different SHGs. e-commerce portal and mobile applications (developed by DIC) are being used by the buyers and sellers as follows:

- Developed e-Commerce portal (for sellers, buyers and admin)

- Developed mobile app for buyer and seller (android)

- More than 1,771 products have been uploaded.

- More than 713 orders have been received on the portal.

- Various training sessions are being conducted for the orientation, setting up the user account, uploading products with different attributes, ordering process and reporting module, etc.

- The portal is being promoted through social media, print media and Saras Mela.

- More than 965 IVRS calls (Inbound &

Outbound) received/made for registration, inquiry and grievances.

• Showcasing different crafts on the portal.

9.10.2.12 AAINA – Dashboard for cities for Ministry of Housing and Urban Affairs

During the 'National Conference of Chief Secretaries' held on 15th-17th June 2022, Hon'ble PM emphasized the creation of a 'Dashboard for Cities' so as to compare themselves against other cities in their State as well as across the country.

Accordingly, **AAINA** is envisaged, which would serve as a tool for comparing similarly placed Urban Local Bodies (ULBs) and promoting peer learning amongst ULBs. The project was awarded by the Ministry of Housing and Urban Affairs to DIC in November 2022 for a period of 5 years.

The ULBs through the portal will periodically report their progress status against different performance indicators under different thematic areas e.g.

• Political and Administrative (Water Supply Responsibility; Sewerage Management; Schools & Hospitals; Public Transport Management; Posts and Vacancies)

• Finance (Revenue; Property Tax; Grants; Expenditure)

• Planning (Town Planning Scheme; Land Pooling; Urban Planner Posts)

• Citizen Centric Services (Accounting; Latest Budget; Citizen Charter; Digital Complaint)

• Delivery of Basic Services (Percentage of houses with Septic tanks, connected Sewer network, Piped water supply; Percentage of Non-revenue water; Swachh Survekshan Ranking; Waste Generated vs Waste Processed Percentage; Total Slums Rehabilitated through relocation; Total In-situ Slum Rehabilitation Total Affordable Housing) etc.

Current Status:

AAINA website has been developed (available at - https://aaina.gov.in) and released to ULBs on November 14, 2023 for filling of the Indicators data by the ULBs.

9.10.2.13 Digital Infrastructure for Knowledge Sharing (DIKSHA)

DIKSHA is a national platform for school education. It has been adopted by 35 States/UTs, and central autonomous bodies/ boards including CBSE. DIKSHA can be accessed by learners and teachers across the country and currently supports 36 Indian languages. Under the PM eVidya initiative which has been declared as part of the AtmaNirbharBharat. DIKSHA has been declared

as 'One Nation, One Digital Platform'. It provides equitable access to education to learners from all socio-economic backgrounds.

- DIKSHA provides equitable access to quality content for learners to access anytime, anywhere on any device. One Nation One Digital Platform for Education (Student, Teacher, Learners). Used by Teachers to upload content and teaching materials. DIKSHA offers free-of-cost access and has e-content sufficiency. 6,577 Energized Textbooks (ETBs) hosted.

- To ensure continuity of training & capacity building, several programs were rolled out at centre as well as states/UTs focusing on digital training. DIKSHA contains more than 20,000 capacity-building courses.

- A capacity building programme 'NISHTHA' which is part of DIKSHA for improving the quality of school education through Integrated Teacher Training.

- DIKSHA is developed on open-source technology and deployed in the cloud platform. DIC provides technical administration and manages the Cloud of Diksha platform. Diksha is integrated with DigiLocker and learners can now get their authentic certificates in their DigiLocker.

9.10.2.14 Ayush Global Portal

A project to design, develop and maintain a global portal and mobile application for the Ministry of Ayush (MoA) with respect to the missions' website to propagate Ayush systems all over the globe and to provide Ayush-related information to citizens of various countries is being implemented. This portal / application will be hosted on infrastructure provided by MoA. The work is to understand, design, develop, test and implement / rollout the

system i.e. web and mobile apps (iOS & Android) and to have country-specific microsites. The work also includes linking the Ayush Global Portal with the websites of the respective Ayush country missions. The portal & app are built to support multiple languages.
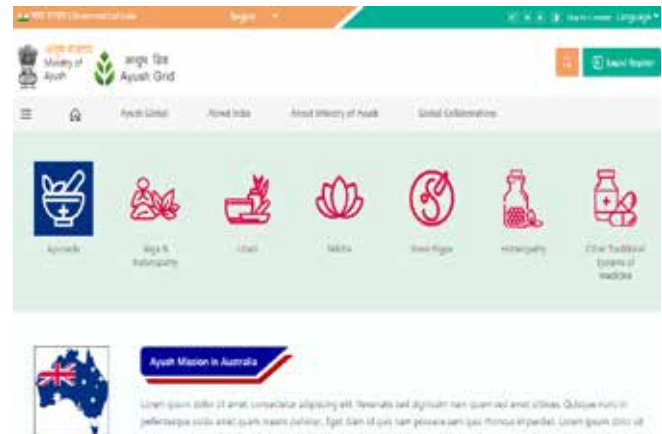
9.10.2.15 Meri Maati Mera Desh

"Meri Maati Mera Desh" stands as a solemn initiative, designed to pay homage to our valiant heroes, encourage community participation, and commemorate their supreme sacrifices. Its primary emphasis lies in the promotion of national unity and the remembrance of those who gave their all for our nation. Conceived as the crowning event of the Azadi Ka Amrit Mahotsav Commemoration, key activities encompass the construction of memorials, the solemn undertaking of the 'Panch Pran' pledge, the planting of saplings for the creation of the 'Amrit Vatika,' and the honourable felicitation of freedom fighters. With an outreach extending to over 4 Crore citizens and participation from 2.39 Lakh Gram Panchayats/Urban Local Bodies, this initiative garnered significant attention. It was successfully concluded under the patronage of our Hon'ble PM, with active engagement from the Union Minister for Youth Affairs and Sports and other distinguished dignitaries. Furthermore, the

dissemination of the initiative was amplified through various media channels. Notably, this initiative received funding support from the Department of Youth Affairs and featured a multilingual web portal, equipped with advanced features like AI-based content moderation and geo-tagging.

9.10.2.16 Hamara Sankalp Viksit Bharat

Hamara Sankalp Viksit Bharat, a nationwide campaign, is being executed to raise awareness and ensure the saturation of Government schemes across all Gram Panchayats, Nagar Panchayats, and Urban Local Bodies. The initiative, supported by the Digital India Corporation, MeitY, aimed at reaching the unreached, disseminating crucial information, and enrolling potential beneficiaries. Remarkable achievements include engagement with over 8.9 Crore citizens, coverage in 1.61+ Lakh Gram Panchayats, and expansion to 5.9K+ urban locations. The campaign has adopted a whole-of-government approach, involving various Ministries/ Departments, State Governments, and Central Government Organizations to ensure comprehensive success.

9.10.2.17 MANAS-National Narcotics Helpline

Narcotics Control Bureau(NCB) awarded the project to DIC to create a multi-channel platform that can serve as a dedicated helpdesk for citizens to conveniently report drug-related complaints around the clock. A bilingual platform is being developed featuring OTP-verified tip submission for drug trafficking / illicit cultivation. Further, the platform provides citizens with access to authorized counseling and rehabilitation help through the Ministry of Social Justice and Empowerment (MoSJE). The platform includes a CRM with ticket management for queries via portal, IVRS, and email with role-based access for ticket creation, forwarding, escalation, priority management, ticket threads, dashboards, team management, etc. The platform is being developed as per the requirement of NCB.

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Chapter 10

Other Matters

10.1 Use of Official Language Hindi in official work

In order to promote the use of Hindi in official work in the Ministry, an annual incentive scheme for noting and drafting in Hindi is being run in the Ministry. Officers who write at least 5,000 words in Hindi and employees who write 20,000 words in Hindi during the year can participate in this incentive scheme.

Hindi Pakhwada was organized in this Ministry during September, 2023 and winners were awarded. In order to promote the progressive use of Hindi in day-to-day official works, various other competitions are also being organised from time to time.

To ensure the implementation of official language policy in the offices under the administrative control of this Ministry, official language inspection was done by the Committee of Parliament on Official Language at STPI, Mysore; NIC, Gandhinagar; ETDC, Bengaluru; NIC, Lucknow; NIELIT, Lucknow; STPI, Lucknow; NIC, Dehradun; STPI, Dehradun; NIC, Hyderabad; ETDC, Hyderabad; STPI, Visakhapatnam; NIC, Patna; NIELIT, Patna; SCL, Mohali; STPI, Shimla; NIELIT, Shimla; ETDC, Solan; NIC, Himachal Pradesh; NIC, Vijayawada and NIELIT, Gorakhpur. Besides, Official Language inspection of C-DAC, Pune; STPI, Vijayawada; C-DAC, Bengaluru; STPI, Bengaluru; NIELIT, Lucknow; STPI, Lucknow and STPI, Dehradun was done at the Ministry level also.

During the period under report, various important documents like Annual Report, Outcome Budget, various Cabinet Notes and various Notes for

Parliamentary Standing Committee, replies of Parliament Questions and Questionnaire based on Demands-for-Grants, Power-Point Presentation for Standing Committee, Follow-up Action Reports, Monthly Reports for the Cabinet and other miscellaneous documents were translated from English to Hindi.

10.2 RTI Matters

There is an RTI Cell in the Ministry, which is the central receiving point for RTI applications/appeals and responsible for overall coordination in respect of RTI matters of MeitY and its organisations. MeitY and its Attached/ Subordinate Offices/ Societies are separate Public Authorities in terms of Section 2 (h) of RTI Act, 2005. Each of these Public Authorities has its own Central Public Information Officers (CPIOs)/Appellate Authorities (AAs). For any information relating to these organisations, applications need to be submitted to the concerned Public Authorities as per provisions of RTI Act, 2005. All Public Authorities have also hosted relevant inputs/ documents on their respective websites, as required under Section 4 of the RTI Act. The relevant contents are reviewed and updated periodically by the concerned Public Authorities.

During the period from 01.01.2023 to 31.03.2024, 5,337 RTI applications (5,100 online and 237 physical) were received in the Ministry. 256 numbers of appeals (241 online and 15 physical) were also received during the period from 01.01.2023 to 31.03.2024. The applications received were related to MeitY and its organisations under it. Cyber Law, Social Media, e-Governance services, online gaming and internet websites were the main subjects on which large number of RTI applications were received during the period 01.01.2023 to 31.03.2024.

10.3 Public Grievances

Public Grievances Cell in MeitY is headed by Nodal Grievance Officer.

The grievances received in PG Cell through CPGRAM portal and also offline mode were mainly related to the following:

a) CSC
b) Digital India/e-Services
c) Social Media
d) Cyber Security
e) NIC
f) My Gov

During the period from 01.01.2023 to 31.03.2024, 11,048 grievances were received and out of these, 10,762 were disposed of. Detailed information for the period is shown below:

Grievance Source	Brought Forwarded	Receipt During Period	Total Receipt	Case Disposed During Period	Closing Balance
DARPG	02	218	220	218	02
Local/Internet	217	7,821	8,038	7,856	182
President Secretariat	04	131	135	125	10
Pension	01	37	38	35	03
PMO	53	2,564	2,617	2,528	89
Total	**277**	**10,771**	**11,048**	**10,762**	**286**

Pie Chart showing the details of grievances received during the period 01.01.2023 to 31.03.2024.
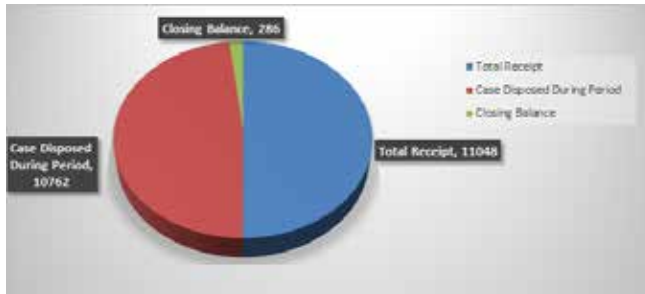
During the period 01.01.2023 to 31.03.2024, 1958 Grievance Appeals were also received and out of these, 1916 were disposed of.

10.4 Citizens' Charter

The basic objectives of Citizens' Charter are to empower the citizen in relation to public service delivery. It represents the commitment of the organization towards the standard, quality and time frame of service delivery, grievance redress mechanism, transparency and accountability. The Citizens' Charter is written, voluntary declaration by service providers about service standards, choice, accessibility, non-discrimination, transparency and accountability. It should be in accordance with the expectations of citizens. Therefore, it is useful way of defining for the customers the nature of service provision and explicit standards of service delivery. Details on Citizens' Charter are available on MeitY's website, url: https://www.meity.gov.in/clients-citizens-charter

10.5 Information and Documentation Centre (I&DC) (Library)

MeitY has a spacious well-planned Library viz I&DC, with an inventory of books and journals. It uses RFID based Library Management System to manage issue & return of Books/Journals. I&DC also provides various other services like inter-Library loan facility to the officials of the Ministry through DELNET (Developing Library Network) and also arranges books from libraries of various other Organizations. Services are also provided to the retired officials of the Ministry and trainees who undertake projects in the Ministry.

The I&DC possesses approximately 20,758 number of books on various subjects including Electronics, Computer, IT, Computer Languages, Fiction, AI & Cyber Security. It has books on Hindi and English literature also. I&DC procures on an average 50 books and approximately 56 Journals per annum and, e-books service (Books 24x7) is also made available to the authorized users.

The Ministry is spearheading an Intra-Ministerial initiative viz the Library Consortium. Consortium of the Ministry (MCIT Consortium) comprises the users from the NIC, C-DAC, NIELIT, SAMEER, C-MET, STQC Directorate, STPI, ERNET India, C-DOT. The Ministry provides on-line access to various e-resources i.e. IEEE Journals/Transactions/Proceedings, IEE Journals/ Proceedings, ACM digital library and ISO Standards to its users through MCIT Library Consortium.

I&DC provides Gartner Research and Advisory Services which is useful e-resources consists of reliable global trends & best practices and latest reports on digital technologies.

I&DC also provides Web Portal Services "Manupatra". The Manupatra contains most exhaustive collection of judgments & orders, statutes (Acts, notifications, circulars, legislative, regulatory and procedural content covering India and International jurisdictions.

10.6 Parliament Matters

10.6.1 Till March, 2024, 242 number of Parliament Questions in Lok Sabha (16 Starred & 226 Unstarred) and 214 number of Parliament

Questions in Rajya Sabha (14 Starred & 200 Unstarred) were admitted and handled by the Parliament Section. These were mainly related to Data Breach of sensitive Personal Data, Cyber Security, Digital Payments, National e-Governance Plan, Amendment to Information Technology Rules, PLI Scheme, Regulation of AI system, Semiconductor Ecosystem, Aadhaar, DIP, Misuse of Social Media, IoTs, Data Protection and Privacy, Cyber Security, National Policy on Electronics, Electronics Manufacturing, Hacking incidents of Government Websites, National Policy on Information Technology, Production of Semiconductor chips, Common Service Centre, Increase in cyber attacks, Cowin Data Breach, Addiction to Online Gaming, Accountability of Social Media, Digital personal Data Protection Bill, Child Pornography, SAMRIDH Scheme, Promotion of Digital Transaction, Bhashini projects, Boost to Digital Economy, Leakage in Aadhar database, Digital India Scheme, New National Cyber Security Policy, IT Hubs, Design and Manufacturing of Electronic System, Ban on Chinese apps, Electronics clusters under EMC 2.0 scheme, Digital Transaction, Misuse of social media and online news platform, Online Gambling and illegal Betting, Hacking and Data Breaches of Government websites, Employment to Youth, Cloud Technology, Investment in IT Sector, e-Literacy, Development of e-Skills, Super Computers, Internet Related Polices, E-Governance at Grass root Level, National Digital Literacy Mission (NDLM) Programme, PMGDISHA, Online Child Sexual Abuse, Wafer Fabrication Facility, Performance of Schemes launched by Government, Semiconductor Money Spent by UIDAI, Circulation of Fake Clips, Vulnerabilities in App used in smartphones, Status of IBPS, MSIPS, UMANG App, Strengthening of internet security, Prevention of Cyber Crime, and Artificial Intelligence (AI), MoU between India and EU, TIDE 2.0 Schemes, Regulating AI and deepfakes and Visvesvaraya Ph.D. Scheme.

10.6.2 Department related Parliamentary Standing Committee on Communications and Information Technology (PSC, CIT) have discussed and laid Reports on the Table of Lok Sabha and Rajya Sabha on the following subject:-

i   Evidence of the representatives of MeitY on Demands-for-Grants (2023-24)

ii. Evidence of the representatives of the MeitY on the subject 'Citizens' data security and privacy';

iii. Briefing by the representatives of the MeitY, Ministry of Finance, Indian Cybercrime Coordination Centre (Ministry of Home Affairs), CERT-In, Reserve Bank of India, National Payments Corporation of India and Public Sector Banks (State Bank of India, Punjab National Bank and Bank of Baroda) on the subject 'Digital Payment and Online Security Measures for data protection.'

iv. Briefing by the Representatives of MeitY, Department of Telecommunications (Ministry of Communications), Ministry of Panchayati Raj, and Department of Posts (Ministry of Communications) and CSC e-Governance Services India Ltd. on the subject "Review of functioning of Common Service Centre – Special Purpose Vehicle (CSC-SPV)".

10.6.3 Meetings of the Parliamentary Committee on ICT Management (ICTM), Rajya Sabha on the subject pertaining to Neva and Electronics and IT facilities extended by MeitY in New Parliament Building.

10.6.4 The Parliamentary Standing Committee on Communications and Information Technology has selected the following subjects for discussion during the year 2023-24:

(i) Digital Payment and Online Security measures for data protection

(ii) Review of functioning of UIDAI

(iii) Safeguarding citizens' rights and prevention of misuse of social/online news media platforms including special emphasis on women security in the digital space

(iv) Promotion of Electronics/IT Hardware/ telecom equipment manufacturing sector under Make in India and measures for reduction of imports

(v) Review of cyber security scenario in India

(vi) Review of functioning of Common Service Centre – Special Purpose Vehicle (CSC-SPV)

(vii) Issues related to social media domain

(viii) Emergence of AI and related issues

(ix) Issues related to monopolistic practices by social and digital platforms, their regulation and services provided by them

(x) Safeguarding rights of independent content creators on social and digital media

10.6.5 Legislative Matters: -

'The Digital Personal Data Protection Bill' was taken up and passed by Lok Sabha and Rajya Sabha during Monsoon Session, 2023 of the Parliament and Hon'ble President assented to the said Bill on 11th August, 2023. Now, the Bill has become 'The Digital Personal Data Protection Act, 2023'.

10.6.6 The following Annual Reports of Societies and Notifications of the MeitY have been laid on the Table of the House (Lok Sabha and Rajya Sabha) in the year 2023:-

Sl No.	MeitY and Organisations/ Attached Offices	F.Y.	Laid in Lok Sabha	Laid in Rajya Sabha
i.	MeitY(Demands for Grants (DDG) & Output-Outcome Monitoring Framework (OOMF)	2023-24	08/02/2023	NA
ii.	BISAG-N (Annual Reports)	2020-21	08/02/2023	17/03/2023
		2021-22	08/02/2023	17/03/2023
iii.	ERNET India (Annual Reports)	2021-22	08/02/2023	10/02/2023
iv.	SAMEER (Annual Reports)	2021-22	08/02/2023	10/02/2023
v.	STPI (Annual Reports)	2021-22	08/02/2023	10/02/2023
vi.	SCL (Annual Reports)	2021-22	08/02/2023	10/02/2023
vii.	C-MET (Annual Reports)	2021-22	08/02/2023	10/02/2023
viii.	C-DAC (Annual Reports)	2021-22	08/02/2023	10/02/2023
ix.	NIELET (Annual Reports)	2021-22	08/02/2023	10/02/2023
x.	UIDAI - Notifications	2022	08/02/2023	23/12/2022
	UIDAI - Annual Report	2021-22	08/02/2023	17/03/2023
xi.	NICSI (Annual Reports)	2021-22	08/02/2023	17/03/2023
xii.	Notification of Aadhaar	-	22/03/2023	24/03/2023
xiii.	Notification of IT Act	-	22/03/2023	-
xiv.	Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Amendment Rules, 2023 under the Information Technology Act, 2000	-	02/08/2023	04/08/2023

Sl. No.	MeitY and Organisations/Attached Offices	F.Y.	Laid in Lok Sabha	Laid in Rajya Sabha
i.	**DIC** (Annual Report)	2022-23	13/12/2023	15/12/2023
ii.	**SCL** (Annual Report)	2022-23	13/12/2023	15/12/2023
iii.	**NIELIT** (Annual Report)	2022-23	13/12/2023	15/12/2023
iv.	**BISAG-N** (Annual Report)	2022-23	13/12/2023	15/12/2023
v.	**C-MET** (Annual Report)	2022-23	20/12/2023	09/02/2024
vi.	**C-DAC** (Annual Report)	2022-23	20/12/2023	09/02/2024
vii.	**STPI** (Annual Report)	2022-23	20/12/2023	09/02/2024
viii.	**ERNET India** (Annual Report)	2022-23	20/12/2023	09/02/2024
ix.	**SAMEER** (Annual Report)	2022-23	20/12/2023	09/02/2024
x.	**UIDAI** (Annual Report)	2022-23	07/02/2024	09/02/2024
xi.	**Statement-** 45th Report of the Standing Committee on C&IT on Demand for Grants (2023-24) of MeitY	-	20/12/2023	02/02/2024
xii.	**UIDAI Notification:-** a. Unique Identification Authority of India (Appointment of Officers and Employees) Amendment Regulations, 2023 b. The Aadhaar (Enrolment and Update) Amendment Regulations, 2023 c. The Aadhaar (Payment of Fees for Performance of Authentication) Regulations, 2023 d. The Aadhaar (Authentication and Offline Verification) Amendment Regulations, 2023	-	20/12/2023	09/02/2024

10.7 Details related to the Vigilance cases (As on 31st March, 2024)

Vigilance Unit, MeitY is the nodal Unit for handling all vigilance matters of MeitY and Organisations under the administrative control of Ministry. This Unit is presently, headed by a Joint Secretary, who has been appointed as the Chief Vigilance Officer (CVO) of MeitY by Central Vigilance Commission (CVC). The CVO with the assistance and support of a team of officials looks into the vigilance matters of MeitY and its organisations and is the Nodal Officer of MeitY for interaction with CVC and CBI. Each of the Autonomous Societies are provided with an independent CVO appointed by Secretary MeitY based on CVO's recommendation and in consultation with CVC. The organisations under MeitY have their own vigilance set up in their respective organizations, who work in close coordination with the Vigilance Unit of this Ministry.

During the year 2023, about 70 complaints were received in Vigilance Unit, MeitY which included complaints from CVC and complaints from different platforms, including PM's Office, Public Grievance Portal etc. The complaints received were related

to allegations of favoritism/ nepotism, corruption in recruitment, violation of CVC guidelines/ GFR and GeM's Terms and Conditions in tender process, misuse of official position, insubordination, harassment, unfair transfer/posting etc. Out of 70 complaints, appropriate action in respect of 57 complaints has been taken in terms of CVC's guidelines and accordingly disposed of. Action in respect of remaining complaints is under process.

Other than the above during year 2023, 10 major cases were processed in Vigilance Unit and after due examination, necessary advice was provided to the concerned authorities for bringing in Systematic Improvement in their functioning. Wherever necessary advisories were issued to the concerned authorities and in one case disciplinary action was initiated against the erring official. In the disposal of disciplinary case, wherever necessary, advice of UPSC was obtained before imposing the penalty as per CCS(CCA) Rules, 1965.

In order to mitigate potential risk of corruption, Vigilance Unit, MeitY scrutinizes Annual Property Returns (APRs) of the officials of MeitY at regular intervals with a view to check possession of assets disproportionate to known sources of income, non-intimation of transaction of property etc. During the financial year 2023 about 165 APRs have been scrutinised.

In terms of the advice of the CVC, MeitY took up a three-months campaign from 16th August, 2023 to 15th November, 2023 on various Preventive Vigilance activities.

As a precursor to Vigilance Awareness Week (VAW) 2023, campaign was carried out on awareness building about Public Interest Disclosure and protection of Informers (PIDPI) Resolution, conducted training Programmes on various topics viz procurement, IO/PO and systems and procedures of organisations. The Training programmes were well attended by the officials of MeitY. Surprise inspections were carried out with a view to bring in efficiency and accountability. Random inspections of records were carried out by officers of Vigilance Unit and necessary Systematic Improvement Measures were communicated wherever shortfalls were observed to bring efficiency in the administration.

As per the directions of CVC, Vigilance Unit, MeitY observed the Vigilance Awareness Week, 2023 from 30th October, 2023 to 05th November, 2023. The week commenced with administering of integrity pledge within the premises of Electronics Niketan, MeitY by Additional Secretary, MeitY on 30th October, 2023.

Periodical reports and returns were timely sent to the concerned authorities and preventive measures were communicated to the organisations under MeitY to enable them to bring in robust mechanism to curb corruption and unethical practices in public administration and to bring about transparency, fair-play, objectivity, accountability and responsiveness to the aspirations of the citizens.

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Approval of Union Cabinet for extension of the Digital India Programme for the duration of 15th Finance Commission

The Government had launched the DIP in July 2015 with three key vision areas, namely digital infrastructure as a core utility to every citizen, governance and services on demand, and digital empowerment of citizens. The overall goal is to ensure that digital technologies improve the life of every citizen, expand India's digital economy, and create investment and employment opportunities. It has also helped in the delivery of services directly to beneficiaries in a transparent manner. In the process, India has emerged as one of the pre-eminent nations of the world to use technology to transform the lives of its citizens.

The Government, in August 2023, approved the extension of the DIP with a total outlay of ₹14,903.25 Crore for the period of 15th Finance Commission i.e., 2021-22 to 2025-26.

The extension of the programme will have the following major benefits:

o 6.25 Lakh IT professionals will be re-skilled and up-skilled under the FutureSkills PRIME Programme.

o 2.65 Lakh persons will be trained in information security under the Information Security & Education Awareness Phase (ISEA) Programme. In addition, more than 12 Crore beneficiaries are envisaged to be covered under the Cyber Aware Digital Naagrik component through various activities.

o 540 additional services will be available under the UMANG app/ platform. At present over 1,700 services are already available on UMANG.

o 9 more supercomputers will be added under the National Super Computer Mission. This is in addition to 18 supercomputers already deployed.

o Bhashini, the AI-enabled multi-language translation tool (currently available in 10 languages) will be rolled out in all 22 scheduled 8 languages.

o Modernisation of the NKN which connects 1,787 educational institutions.

o Digital document verification facility under DigiLocker will now be available to MSMEs and other Corporates.

o 1,200 startups will be supported in Tier 2/3 cities.

o New initiatives in the area of cyber security including the development of tools and integration of more than 200 sites with the National Cyber Coordination Centre.

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Global Indices [e-Government Development (EGDI)]

The E-Government Development Index (EGDI) presents the state of E-Government Development of the United Nations Member States. MeitY is the nodal ministry for the EGDI. It is a composite measure of three important dimensions of e-government, namely: Online Service Index, Telecommunication Infrastructure Index and the Human Capital Index.

The Online Service Index (OSI) measures a government's capability and willingness to provide services and communicate with its citizens electronically.

Ex: Transactional services: income taxes via national websites – MeitY.

The Telecommunication Infrastructure Index (TII) measures the existing infrastructure that is required for citizens to participate in e-government- Department of Telecommunications (DoT).

The Human Capital Index (HCI) is used to measure citizens' ability to use e-government services – Department of School Education and Literacy (DoSEL) & Department of Higher Education.

An e-Government Index Monitoring Committee (eGIMC) periodic meetings were held to review the status of sub-indices the of EGDI.

Regular updation of data on GIRG dashboard for EGDI and its parameters i.e., OSI, TII, HCI and other indices where MeitY is the line ministry. Analysis of EGDI, TII and HCI data shared by Line Ministries/ Departments was done. And accordingly, Reform Areas and Reform Actions have been identified with timelines.

GovTech Maturity Index (GTMI):

GovTech Initiative was launched in 2019 by the World Bank Group (WBG) to support the latest generation of digital government reforms. GovTech Maturity Index (GTMI) was introduced in 2021 to measure the key aspects of four GovTech focus areas in 198 economies. The GTMI is a composite index based on 48 key indicators defined to collect data from 198 economies in four categories: The Core Government Systems Index (CGSI) based on 17 indicators; the Public Service Delivery Index (PSDI) based on 9 composite indicators; the Digital Citizen Engagement Index (DCEI) based on 6 indicators; and the GovTech Enablers Index (GTEI) based on 16 indicators.

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Ministry of Electronics and Information Technology Annual Budget 2024-25

Sl. No.	Scheme/Non - Schemes	Budgetary Support (₹ in Crore)
Non - Schemes		
1	**MeitY Secretariat**	**150.00**
2	**National Informatics Centre**	**1,748.64**
3	**Regulatory Authorities**	**454.00**
3.1	Standardisation Testing and Quality Certification (STQC)	200.00
3.2	Cyber Security (CERT - In)	240.00
3.3	Controller of Certifying Authorities (CCA)	14.00
4	**Assistance to Autonomous & Other Bodies**	**1,713.00**
4.1	Centre for Development of Advanced Computing (C-DAC)	270.00
4.2	Society for Applied Microwave Electronics Engineering and Research (SAMEER)	160.00
4.3	Centre for Materials for Electronics Technology (C-MET)	110.00
4.4	Bhaskaracharya National Institute for Space Applications and Geo - Information [BISAG(N)]	20.00
4.5	Semi Conductor Laboratory (SCL)	540.00
4.6	Digital India Corporation (DIC)	13.00
4.7	Unique Identification Authority of India (UIDAI)	600.00
	Sub-Total (Non-Scheme)	4,065.64
Schemes		
5	**Digital India Programme (Umbrella Programme)**	**4,216.51**
5.1	Capacity Building & Skill Development Scheme	537.50
5.2	Electronic Governance (incl. EAP)	650.00
5.3	National Knowledge Network	240.26
5.4	Promotion of Electronics & IT Hardware Mfg (MSIPS, EDF & Manufacturing Clusters)	750.00

Sl. No.	Scheme/Non - Schemes	Budgetary Support (₹ in Crore)
5.5	Promotion of IT/ITeS Industries	130.00
5.6	R&D in IT/Electronics/ CCBT	1,148.25
5.7	Cyber Security Projects (incl.CL&DG)	759.00
5.8	Promotion of Digital Transactions (excluding Digital Payments)	1.50
6	**Other Schemes**	**13,103.00**
6.1	Production Linked Incentive Scheme	6,200.00
6.1.1	Production Linked Incentive for Large Scale Electronics Manufacturing	6,125.00
6.1.2	Production Linked Incentive for IT Hardware	75.00
6.2	Modified Programme for Development of Semiconductor and Display Ecosystem in India	6,903.00
6.2.1	Modified Scheme for setting up of Compound Semiconductors/ Silicon Photonics/Sensors Fab/Discrete Semiconductors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP)/ Outsourced Semiconductor Assembly and Test (OSAT) facilities in India	4,203.00
6.2.2	Modified Scheme for Setting up of Semiconductor Fabs in India	1,500.00
6.2.3	Modified Scheme for setting up of Display Fabs in India	100.00
6.2.4	Modernisation of Semi - Conductor Laboratory, Mohali	900.00
6.2.5	Design Linked Incentive Scheme	200.00
	Sub - Total (Scheme)	**17,319.51**
	TOTAL (SCHEME & NON - SCHEME)	**21,385.15**

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Ministry of Electronics and Information Technology Employees structure as on 01.01.2024

Group	Permanent/ Temporary	Total No. of Employees	SC	% of SC total employees	ST	% of ST total emp - loyees	Persons with disabilities	% of PWDs
Group 'A'	**Permanent** (i) Other than lowest rung of Group A	159	29	18.24	13	08.17	05	03.14
	(ii) Lowest rung of Group A	02	00	00.00	01	50.00	01	50.00
		35	00	00.00	00	00.00	00	00.00
	Temporary (i) Other than lowest rung of Group A	13	00	00.00	00	00.00	00	00.00
	(ii) Lowest rung of Group A							
Group 'B' (Gazetted)	Permanent	56	13	23.21	03	05.36	03	05.36
	Temporary	00	00	00.00	00	00.00	00	00.00
Group 'B' (Non - Gazetted)	Permanent	69	15	21.74	05	07.25	02	02.90
	Temporary	20	02	10.00	01	05.00	01	05.00
Group 'C'	Permanent	148	28	18.91	08	05.40	03	02.02
	Temporary	45	04	08.88	03	06.66	05	11.11
Total		**547**	**91**	**16.64**	**34**	**06.21**	**20**	**03.66**

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List of Abbreviations

AEBAS	-	Aadhaar Enabled Biometric Attendance System
AEPS	-	Aadhaar Enabled Payment System
AI	-	Artificial Intelligence
AKAM	-	Azadi Ka Amrit Mahotsav
API	-	Application Programming Interface
ASIC	-	Application Specific Integrated Circuit
ASP	-	Application Service Provider
ASR	-	Automatic Speech Recognition
BHIM	-	Bharat Interface for Money
BISAG-N	-	Bhaskaracharya National Institute for Space Applications and Geo - informatics
BOSS	-	Bharat Operating System Solutions
BRAP	-	Business Reform Action Plans
BSNL	-	Bharat Sanchar Nigam Limited
CCTNS	-	Crime and Criminal Tracking Network & Systems
C-DAC	-	Centre for Development of Advanced Computing
CEDA	-	Centre of Excellence for Data Analytics
CERT-In	-	Indian Computer Emergency Response Team
CFC	-	Common Facility Centre
CGIT	-	Central Government Industrial Tribunal
CIPET	-	Central Institute of Plastics Engineering & Technology
C-MET	-	Centre for Materials for Electronics Technology
CMTI	-	Central Manufacturing Technology Institute
COSEM	-	Companion Specification for Energy Metering
CPGRAMS	-	Centralized Public Grievance Redress and Monitoring System
CSC	-	Common Services Centre
CSSS	-	Champion Service Sector Scheme
CTDP	-	Comprehensive Telecom Development Plan
C2SD	-	Chip to System Design
DAPSC	-	Development Action Plan for Scheduled Castes
DBT	-	Direct Benefit Transfer

DEPwD	-	Department of Empowerment of Persons with Disabilities
DGHR	-	Directorate General of Human Resource Development
DIC	-	Digital India Corporation
DIHAR	-	Defence Institute of High-Altitude Research
DIP	-	Digital India Program
DILRMP	-	Digital India Land Records Modernization Programme
DLC	-	Digital Life Certificate
DLMS	-	Device Language Message Specification
DPIIT	-	Department for Promotion of Industry and Internal Trade
DSC	-	Digital Signature Certificate
EGDI	-	eGovernment Development Index
EMC	-	Electronics Manufacturing Clusters
EoDB	-	Ease of Doing Business
EoL	-	Ease of Living
ERNET	-	Education and Research Network
ESP	-	eSign Service Provider (ESP)
eTaal	-	Electronic Transaction Aggregation and Analysis Layer
FINTECH	-	Financial Technologies
FOSS	-	Free and Open Source Software
FSOC	-	Free Space Optical Connectivity
GeM	-	Government e-Marketplace
GSTN	-	Goods and Services Tax Network
HRD	-	Human Resource Development
IBM	-	Indian Bureau of Mines
iCAS	-	Indian Conditional Access System
ICJS	-	Interoperable Criminal Justice System
ICT	-	Information and Communication Technology
I&DC	-	Information and Documentation Centre (i.e. Library)
IIFPT	-	Indian Institute of Food Processing Technology
IIDS	-	Implementation of Interactive Information Dissemination System
IIT	-	Indian Institute of Technology
INCEP	-	Integrated Citizen Engagement Platform
IndEA	-	India Enterprise Architecture

InDEA	-	India Digital Ecosystem Architecture
IoT	-	Internet of Things
ISEA	-	Information Security & Education Awareness
IVFRT	-	Immigration, Visa, and Foreigners Registration & Tracking
JAM	-	JanDhan, Aadhaar and Mobile
KMS	-	Knowledge Management System, Key Management System
LMS	-	Learning Management System
MAQAN	-	Metro Area Quantum Access Network
MDoNER	-	Ministry of Development for North-Eastern Region
MeitY	-	Ministry of Electronics and Information Technology
MMIC	-	Monolithic Microwave Integrated Circuit
MNRE	-	Ministry of New and Renewable Energy
MSME	-	Ministry of Micro, Small and Medium Enterprises
MTS	-	Mining Tenement System
MSDE	-	Ministry of Skill Development and Entrepreneurship
M-SIPS	-	Modified Special Incentive Package Scheme
NaMPET	-	National Mission on Power Electronics Technology
NAPS	-	National Portal for Rooftop Solar
NCMEC	-	National Centre for Missing and Exploited Children
NCRP	-	National Cybercrime Reporting Portal
NDUW	-	National Database of Unorganized Workers
NEBPS	-	North-East BPO Promotion Scheme
NCoG	-	National Centre of Geo-informatics
NCCC	-	National Cyber Coordination Centre
NCPP	-	National Cyberpolice Portal
NCSC	-	National Career Service Centres
NeGD	-	National e-Governance Division
NDC	-	NER -National Data Centre in North -East Region
NDEAR	-	National Digital Education Architecture
NER	-	North- Eastern Region
NERS	-	Nationwide Emergency Response System
NeVA	-	National eVidhan Application
NavIC	-	Navigation with Indian Constellation

NFVI	-	Network Function Virtualization Infrastructure
NGDRS	-	National Generic Document Registration System
NIC	-	National Informatics Centre
NICSI	-	National Informatics Centre Services Inc.
NIDHI	-	National Integrated Database of Hospitality Industry
NIELIT	-	National Institute of Electronics & Information Technology
NJGD	-	National Judicial Data Grid
NLCPR	-	Non-Lapsable Central Pool of Resources
NSSO	-	National Single Sign-On
NKN	-	National Knowledge Network
NMM	-	National Mission on Manuscripts
NPP	-	National Power Portal
NREN	-	National Research and Education Network
ONDC	-	Open Network for Digital Commerce
ORS	-	Online Registration System
PENCiL	-	Platform for Effective Enforcement for No Child Labour
PFMS	-	Public Financial Management System
PMAY	-	Pradhan Mantri Awas Yojana
PMGDISHA	-	Pradhan Mantri Gramin Digital Saksharta Abhiyan
PMSYSM	-	Pradhan Mantri Shram Yogi Maandhan Yojana
PRAGATI	-	Proactive Governance and Timely Implementation
PRIME	-	Project Review & Information Management Electronics System
SAMEER	-	Society for Applied Microwave Electronics Engineering and Research
SANKALP	-	Skill Acquisition and Knowledge Awareness for Livelihood Promotion
SCAN	-	Subsidy Claims Application for NFSA
SCOSTA	-	Smart Card Operating System Specification for Transport Applications)
SDWAN	-	Software-Defined Wide Area Network
SEZ	-	Special Economic Zone
SFIO	-	Serious Fraud Investigation Office
SID	-	Skill India Digital
SMDP	-	Special Manpower Development Programmes

SMITHA	-	Smart Meter Integrated Testing and Higher Analysis
SNMS	-	Summons and Notices Management System
SPECS	-	Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors
SSDG	-	State Service Delivery Gateway
STPI	-	Software Technology Parks of India
SWASTHA	-	Smart Wearable Advanced nanoSensing Technologies in Healthcare ASICs
TCPS	-	Tactile Cyber-Physical System
TDIL	-	Technology Development for Indian Languages
UIDAI	-	Unique Identification Authority of India
UMANG	-	Unified Mobile App for New -Age Governance
ULPIN	-	Unique Land Parcel Identifier Number
UPI	-	Unified Payment Interface
USOF	-	Universal Services Obligation Fund
USSD	-	Unstructured Supplementary Service Data
USSP	-	Unified Shram Suvidha Platform
UTTRA	-	Universal Transparent Tracking of Applications
UX4G	-	User experience for Government Websites & Apps
VVPAT	-	Voter Verifiable Paper Audit Trail
YUVAi	-	Youth for Unnati and Vikas with Artificial Intelligence

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