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# YOJANA

JULY 2019 A DEVELOPMENT MONTHLY ₹ 22

# Citizen Centric e-Services

**Empowering Citizens Through e-Services**
Ravi Shankar Prasad

**Tracking Schemes Through GIS**
Vinay Thakur

**Less Cash India: Vision to Reality**
Narendra Yadav

**SPECIAL ARTICLE**
**Development of Metro Rails in India**
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**FOCUS**
**Digital Infrastructure: Core of Governance**
Neeta Verma

# PM Addresses Team NITI

> NITI Aayog has key role to play in fulfilling the mantra of SabkaSaath, SabkaVikas, SabkaVishwas:PM

> Goal to make India a 5 trillion dollar economy by 2024, is challenging, but achievable, with the concerted efforts of States:PM

> Export sector vital for boosting income and employment; States should focus on export promotion:PM

> Newly created Jal Shakti Ministry will help provide an integrated approach to water; States can also integrate various efforts towards water conservation and management:PM

> We are now moving towards a governance system characterized by Performance, Transparency and Delivery:PM

The fifth meeting of the Governing Council of NITI Aayog was held under the chairmanship of the Prime Minister at Rashtrapati Bhawan on June 15, 2019. It was attended by the Governor of Jammu & Kashmir, 26 Chief Ministers and the Lieutenant Governor of Andaman & Nicobar Islands, apart from Union Ministers, who are ex-officio members and special invitees. Vice Chairman, Members, CEO and senior officers of NITI Aayog also attended the meeting .

The Prime Minister emphasized that this is the meeting of Team India and said that States should recognise their core competence, and work towards raising GDP targets right from the district level.

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*Rig Veda*

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# Transformational Shift in Delivery of Services

Indian history is replete with instances of Governments who were extremely conscious of their duty to provide services to their citizens. Continuous efforts were made by them to set up systems of good governance through various schemes and laws. These systems were however largely based on records, files and transactions which were generally physical. It has been only in recent years that the concept of citizen centric e-Services has come to the fore.

Citizen centric e-Services aim to digitally empower the society and transform the economy. They aim to restyle how citizens avail of services and participate in the economy using less cash, opting instead for UPI, internet banking, direct benefit transfer, digital payment platform etc., using unique identification techniques, like Aadhaar, so as to drive financial inclusion with minimum lapses and delays. Government's push towards a Paper-less, Presence-less and Cashless model of e-governance and the launch of Aadhaar, UPI and BHIM have transformed the economy. Banking is fast moving from branch banking to a virtual world of banking called Digital Banking.

Various new citizen centric and transformational digital platforms that have been developed include BHIM-UPI, e-NAM, GSTN, DigiLocker, GeM, e-Hospital, MyGov, UMANG, SWAYAM, Jeevan Pramaan, NSP etc. These efforts are heavily dependent upon the efficient use of technology and as a result technology is increasingly being used to transform learning, economy and citizen services delivery mechanisms. The reach of mobile network, internet and electricity is expanding its reach to remote areas, thereby ensuring that the marginalised sections of the society are also brought into the mainstream. This digital transformation is facilitating the ease of access for citizens with disabilities as well and empowering them to access various products and services despite mobility constraints.

In the field of education too, technology is playing a greater role than ever before and is transforming classrooms from being isolated units of learning to more collaborative and communicative spaces with digital pedagogies, critical enquiry and demographic spaces that go beyond geographical constraints. Likewise, to minimise farmers' distress, digitalising of farming systems and creating a database is also a step towards achieving sustainable agricultural production. The delivery of services to citizens in an efficient, transparent and effective manner has been addressed by the Geographic Information System as a decision support system for developmental planning.

Citizen centric e-Services focus on accessibility, quality, efficiency, affordability, delivery, mobility and user experience. Products and services can no longer be viewed in isolation from the larger evolving scenarios around us and there should be a healthy mix of technology with progressive policies and practices. The Digital India programme and the tremendous focus of the Government on providing citizen centric e-Services are resulting in the Indian citizens witnessing not only a transformational shift in the delivery of services but also a better engagement of the Government with its citizens.

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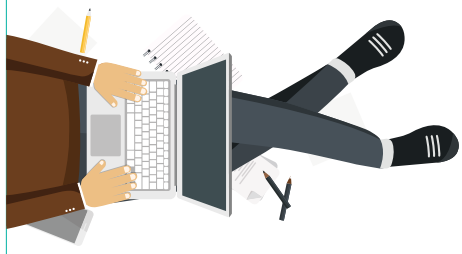

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# Empowering Citizens Through e-Services

*Ravi Shankar Prasad*

The Digital India programme, launched in 2015, takes forward the pioneering vision of Prime Minister Narendra Modi, for ensuring digital access, digital inclusion, bridging the digital divide and digital empowerment, leading to India's transformation into a knowledge based economy and digitally empowered society. The programme has ensured the digital inclusion of all through providing access of robust digital infrastructure created under it, facilitating connect with rest of the world. It has ensured citizen participation and empowerment with the technology that is **transformative, affordable and sustainable**. The Government is committed to provide governance and services to our citizens in an affordable and efficient manner within the shortest span of time. India sitting on the robust foundation of digital infrastructure and expanded digital access, is now poised for the next phase of growth — creation of tremendous economic value and empowerment of citizens as new digital applications permeate sector after sector.

India is among the top countries that have experienced the fastest digital adoption momentum. This has been achieved through a combination of government action, business innovation and investment, and new digital applications that are transforming and permeating a multitude of activities and types of work, the impact of which is being felt in all aspects of life for citizens. Digital technologies are vital for the inclusive growth of a country like India, which is at the peak of its demographic dividend. Our Government is committed to provide governance and services to our citizens in an affordable and efficient manner within the shortest span of time. The only way in which this can be accomplished is through the efficient use of innovation and technology.

Presently, digital transformation of India is on an exponential growth path and aiming towards a trillion dollar digital economy by 2025. Government is taking strategic steps to realize the Trillion Dollar Digital Economy potential. One of the aspects of the Digital India programme is to make technology central to enable change through deployment of emerging technologies.

Digital India in the last five years was implemented with a dedicated focus on making use of digital tools and techniques for the delivery of **Paperless**, **Presence-less** and **Cash-less governance** in the country. **Aadhaar** has provided a cradle to grave digital identity that is unique, lifelong, online and authenticable. Aadhaar enabled DigiLocker is enabling paperless governance by providing public documents to citizens digitally and facilitating consent-based data sharing for availing services. Aadhaar enabled eSign provides ease of authentication for digital transactions and thereby, eliminates the need for physical presence. Aadhaar Enabled Payment System (AEPS) facilitates banking services and digital payment. Aadhaar is the largest de-duplication mechanism for government schemes in the country. Its impact on **Direct Benefit Transfer (DBT)** scheme alone has led to the integration of 440 schemes and saving of INR 1,41,677 crore. The de-duplication and removal of ghost beneficiaries have been remarkable in all schemes integrated with DBT. The benefits of DBT in citizen centric services, such as LPG Distribution, Public Distribution System (PDS), Mahatma Gandhi National Rural Employment

**India's resonance towards digital technologies has now moved from the corridors of the empowered society and providing substantive benefits to the common masses, thus demonstrating the power of technology.**

The author is Union Cabinet Minister for Law and Justice, Communications, lectronics and Information Technology, Government of India.

Guarantee Scheme (MGNREGS), Fertilizer Subsidy and National Social Assistance Programme (NSAP) stood out in public savings.

The coverage of Aadhaar (123 crore), Jan Dhan Yojana (36 crore) and mobile connections (118 crore) has moulded the digital profile of India. Each of the individual component of the JAM Trinity stands out as an excellent enabler of the portfolio of citizen centric services collectively as well as in individual capacity. **Jan Dhan Yojana** has provided financial inclusion to unbanked people and thereby, it has enabled banking, pension (PMSBY and PMJJBY) and insurance (Atal Pension Yojana) services to common citizens. **Mobile** has also accelerated the accessibility of government services in rural hinterland and has helped tremendously in bridging the digital divide.

Digital delivery of services has been strengthened with the help of 3.47 lakh **Common Services Centres (CSCs),** spread across 2.3 lakh Gram Panchayats in the country that provides digital access to over 350 services especially in rural areas at an affordable cost. These centres have also led to empowerment of marginalized sections of the society by creating jobs for over 12 lakh people and by promoting rural entrepreneurs including women VLEs. CSCs have also undertaken Stree Swabhiman initiative to create awareness about menstrual health and have set up over 204 sanitary pad units.

Digital India has taken the definition of e-governance to higher trajectory, wherein, differentiated strategy was adopted technically and a remarkable shift from **project-based approach to platform-based approach** resulted in development of **public digital platform**-based ecosystem, delivering a plethora of common services for citizens. Various new citizen centric, transformational digital platforms have been developed, such as Bharat Interface for Money-Unified Payment Interface (**BHIM-UPI**), Government e-Marketplace (**GeM**), Goods and Services Tax Network (**GSTN**), Digital Locker (**DigiLocker**), Unified Mobile App for New-Age Governance (**UMANG**), Jeevan Pramaan, e-Hospital, MyGov, e-National Agriculture Market (**e-NAM**), Study Webs of Active–Learning for Young Aspiring Minds (**SWAYAM**) and National Scholarship Portal (**NSP**) etc.

Some of the important citizen centric initiatives of Digital India programme are explained in brief below:

**Direct Benefit Transfer**

- Enables transfer of government benefits directly to the bank account of beneficiaries
- Led to the integration of 440 schemes and the disbursal of INR 7,33,981 crore, resulting in savings of INR 1,41,677 crore
- The number of transactions for financial year 2019-20 alone, stands at 21 crore

**DigiLocker**

- Enables paperless governance by providing private space on public cloud to citizens for storing their public and private documents
- 352+crore documents are available at DigiLocker
- 200+ Types of documents are available
- 2.3 crore users are making use of DigiLocker
- 124 Issuers and 34 Requestor organizations are active

**UMANG**

- Provides one mobile app for availing government services through backend integration with several government applications and databases
- 362 Services are made available from 73 Departments and 18 States
- It has 1.1+ crore downloads and 4.5+ rating (max. 5)

**e-Hospital**

- Facilitates automation in hospitals through 20+ modules of Hospital Management Information System, namely patient registration, IPD, Pharmacy, Blood bank etc
- 322 hospitals are integrated with e-Hospital
- 9.8 crore patients have been registered

**e-NAM**

- Integrated 585 Agricultural Mandis across 16 States and 2 Union Territories
- 1.64 crore farmers and 1.2 lakh merchants are onboarded
- Digital payment service is also enabled and orders worth INR 70,000 crore have been transacted

**SWAYAM**

- A massive online open courses (MOOCs) platform, it offers more than 2000+programme categories
- Allows credits to students on the completion of course. The credit is recognised by Universities

**National Scholarship Portal**

- Provides facility of multiple scholarship schemes through a single online portal and includes application submission from students, verification by School Administration, approval by Authorities and disbursal through DBT
- 20 Scholarship schemes stand integrated
- 1.08 crore students have been benefited in 2018-19

### PMGDISHA

- Pradhan Mantri Gramin Digital Saksharta Abhiyan has been started with an aim to make at least one person per family digitally literate
- Target is to train 6 crore persons in rural areas
- 2.2 crore persons have been trained and 1.3 crore trained persons have taken certification

### India BPO Scheme

A unique initiative to incentivise BPO employment in smaller towns (Tier 2/3 towns) that covers 108 cities and approved 276 units

- 51,279 seats allocated and 26,331 seats became operational
- Created around 30,000 direct employment

### GeM

- An ecommerce platform for public procurement of common use goods and services
- 9.5 lakh products are placed for sale on the platform
- 2.3 lakh sellers and service providers are active on the platform
- For the first time, many sellers from small towns are participating in public procurement due to end-to-end automation

### Digital Payment

- Many innovative digital payment tools, namely BHIM-UPI, BHIM-Aadhaar, BHARAT QR Code, National Electronic Toll Collections etc., have been implemented
- Digital payments transactions on UPI including BHIM-UPI has grown 8,000 times from October 2016 to March 2019

### Jeevan Pramaan

- Facilitates pensioners to submit their life certificate digitally from anywhere, anytime basis
- 2.58 crore pensioners have submitted their life certificate using Jeevan Pramaan

### eCourts Mission Mode Project

- Promotes automation in Courts including Supreme Court, High Courts, District Courts and District Court Complexes
- Several services like case status, cause list, court order, caveat search etc
- National Judicial Data Grid is also implemented, which analyses the data gathered from all integrated courts and shows all India figures through dashboard

### MyGov

- Facilitates participatory governance in the country by providing a common digital platform, where citizens can share their views on government programmes and schemes
- 80 lakh active users are contributing through MyGov
- 39 lakh comments are received in 800 discussion threads

As per the data from Electronic Transaction Aggregation and Analysis Layer (eTAAL), the portfolio of electronic services has grown to 3,702 and an average number of electronic transactions on a daily basis (till April 2019) is around 9.5 crore, which can be attributed to both i.e. growing number of transactions as well as increase in consumption of e-Services. This also signifies that the benefits of Digital India have percolated down to a large section of the society.

The **BPO movement** for smaller towns is facilitating balanced regional growth and creating job opportunities. It is changing the digital profile of the nation as the BPO industry which used to be metro centric earlier but has now dispersed and is permeating into

small towns such as Jammu, Srinagar, Sopore, Baddi, Raipur, Sagar, Mohali, Jaipur, Unnao, Siliguri, Kohima, Shillong, Auroville, Hosur, Madurai, Mayiladuthurai. As of now, 222 BPO units are functioning across 97 small cities and 27 States and UTs. It has the potential to create employment opportunities to around 1.5 lakh persons across the country.

Under the Digital India programme, India has witnessed a steep growth in **mobile manufacturing** units. From just 2 units of mobile phones manufacturing in 2014, 268 manufacturing units of mobile phones and accessories are now operational in India, resulting in employment for about 6.7 lakh persons (direct and indirect). The production of Mobile Handsets, LCD/ LED TVs and Light Emitting Diode (LED) Products in the country has gone up significantly. This has not only given impetus to manufacturing but also empowered citizens with enhanced employment opportunities.

To realise the credo of the Government in terms of digital inclusion of all, digital growth for all and digital trust among all, Digital India is getting restructured and revamped to raise its bar and in this direction, several new and innovative schemes, projects and services have been planned. Some of the major planned initiatives are India Enterprise Architecture (IndEA),

*Figure: Raising the bar of Digital India*

National Programme on Artificial Intelligence, open API platform, on-click consent driven address change in all public databases, Meity Startup Hub and GIS based decision support system for Districts, etc.

**IndEA** aims to offer One Government experience to citizens and businesses by establishing the best-in-class architectural governance, processes and practices with optimal utilisation of ICT infrastructure and applications. Digital Service Standard (DSS) has been notified, which lays down the desirable quality of digital services for an enhanced citizen experience that needs to be achieved by all government entities. A National Software Products Mission is planned to implement **National Policy on Software Products – 2019** that inter-alia includes nurturing 10,000 technology startups in software product industry and upskilling of 1,000,000 IT professionals. Artificial Intelligence along with other emerging technologies is envisaged to provide solutions for the benefit of citizens in all social sectors / domains. **National Programme on AI** has been designed with priority mission areas, namely Healthcare, Agriculture, Education, Smart Cities, Transportation, Cyber Security, Energy, Finance and Indian Languages. This programme will be implemented in a hub and spoke model, wherein the proposed National Centre on Artificial Intelligence will act as the hub and Centres of Excellence (CoEs) along with Startups will act as spokes. CoEs will facilitate startups / industry to work on the development and deployment of AI based solutions and will also aid Research and Academic Institutions in the applied research.

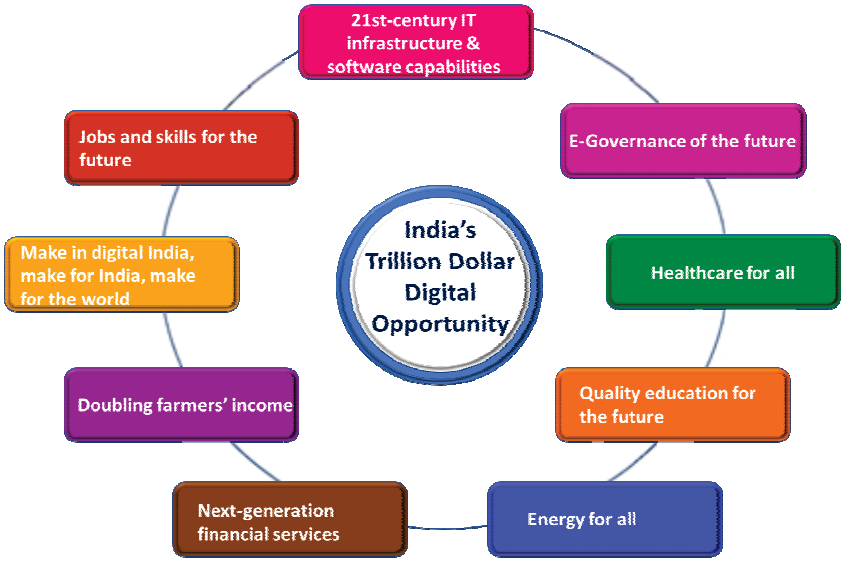


*Figure: Nine Key Areas Identified under India's Trillion Dollar Digital Opportunity*

**Meity Startup Hub (MSH)** has been set-up under the aegis of Ministry of Electronics and IT to promote technology innovation, startups and creation of Intellectual Properties. MSH will become a one-stop solution for all technology startups in the country. It will also facilitate Technology Incubation and Development of Entrepreneurs (*TIDE 2.0*) that includes coverage of 51 incubators and 2000 tech startups.

MeitY has recently released **"India's Trillion Dollar Digital Opportunity"** report to boost the scale, scope and digital innovation of citizen centric services, which can result in a quantum jump in digital contribution to the Indian economy upto USD 1 Trillion by 2025. Nine specific areas have been identified for government interventions.

The challenges of India are matched by the infinite opportunities that such technologies unleash to transform and disrupt the existing order, to provide a leveller to bridge the Divide and move towards a more equitable and inclusive society. The story of India's digital transformation is one of an ICT-led development by use of technology that is affordable, inclusive and empowering, thus, ensuring a sustainable development.

India's resonance towards digital technologies has now moved from the corridors of the empowered society and providing substantive benefits to the common masses, thus demonstrating the power of technology. Government is embracing changing landscape of technology and is committed to ensure the state-of-the-art technology enabled citizen centric services for the benefit of citizens, welfare of society and for the socio-economic development of the country. ❑

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# Tracking Schemes Through GIS

*Vinay Thakur*

Location-based information is a vital aspect of a digital economy not only to plan and monitor the developmental programmes but also to manage transparent, efficient and effective delivery of citizen-centric services. The use of Geographic Information System (GIS) as a decision support system for developmental planning is a critical component of e-Kranti pillar under the Digital India programme. To leverage GIS under Digital India, Ministry of Electronics and Information Technology (MeitY) had launched National Centre of Geo-Informatics (NCoG) in December 2015. A major e-governance sub-system, GIS is an important lever to accelerate growth and increase focus in numerous domains including government, education, environment, natural resources and business.

NCoG platform (https://ncog.gov.in) is aimed as a single source GIS platform for sharing, collaboration, location-based analytics and as a decision support system, catering to the Central and the State Government Departments across the country.

The key features of NCoG may be summarised through the following:

- 1:5000 Basemap.
- Open Source and in-house development – This results in cost saving as there is no use of any proprietary software.
- Integration of technologies (including web, mobile, GIS, GPS, image processing, mathematical models).
- Compatibility with multi-purpose geo-datasets.
- Dynamic Query– Logical & Boolean operations based query models. This facilitates in generation of customized reports and advanced analytical dashboards.
- Training – Two-way capacity building.
- Authentication–The representation of data on GIS platform is authenticated by the user/owner department/agency itself.
- Acceptability, affordability and adoptability by the user departments through integration of technology.
- A solution-based approach, keeping in view the user's requirements.

GIS has the potential for enabling good governance through effective and efficient monitoring of schemes; proactive identification of gaps in the implementation of schemes/programmes; and efficient allocation/management of resources. This has been reflected in various key projects including Government Land Information System, Mining Surveillance System, GIS platform for Aspirational Districts, Water resources, Industrial Information System and Social Benefits Management System.

Currently, more than 210 web applications and 30 mobile applications across 23 Central Ministries/Departments/Agencies and 18 States/UTs are at various stages of operationalisation under the NCoG platform.

### Key NCoG Projects

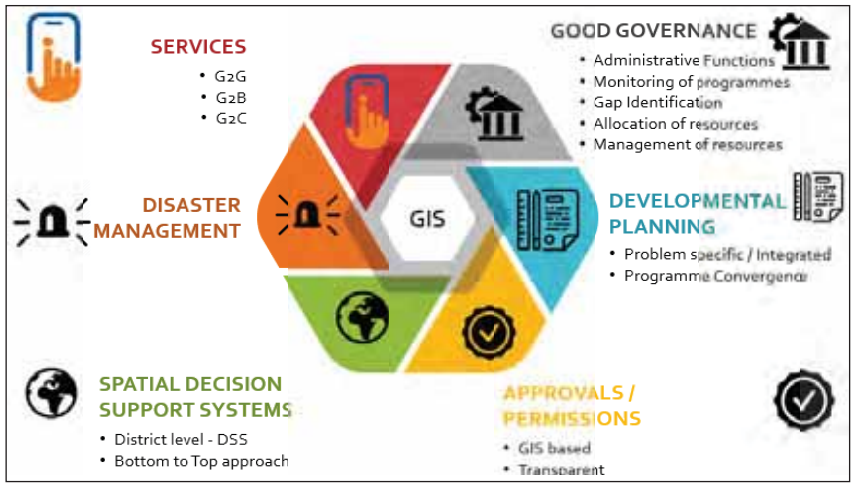
- Aspirational Districts
- The objective of this project is GIS based planning application for 117 aspirational Districts management, monitoring the progress of key socio-economic indicators and to reduce regional disparity.
- Some of the key sectoral information available in the portal includes Topography, Demography, Census based amenities, Education, Energy, Financial, Health & Nutrition, Forest data, Infrastructure, Water Resources and Animal Husbandry etc.
- Industrial Information System (IIS)
- GIS mapping of Industrial Parks, estates, clusters, areas, zones under the National Plan for Manufacturing Clusters for DPIIT, Ministry of Commerce and Industry smoothens policy making and aids investors to plan their investment decisions based on various parameters.
- Industrial estates' detailed databank are available across 31 States /UTs and 8 Central Ministries.
- Advanced analytics using query builder (logical/boolean) for various stakeholders including investors.
- Interactive Management Information System (MIS)

**A major e-governance sub-system, GIS is an important lever to accelerate growth and increase focus in numerous domains including Government, education, environment, natural resources and business.**

The author is Director, National e-Governance Division, Ministry of Electronics and Information Technology, Government of India.

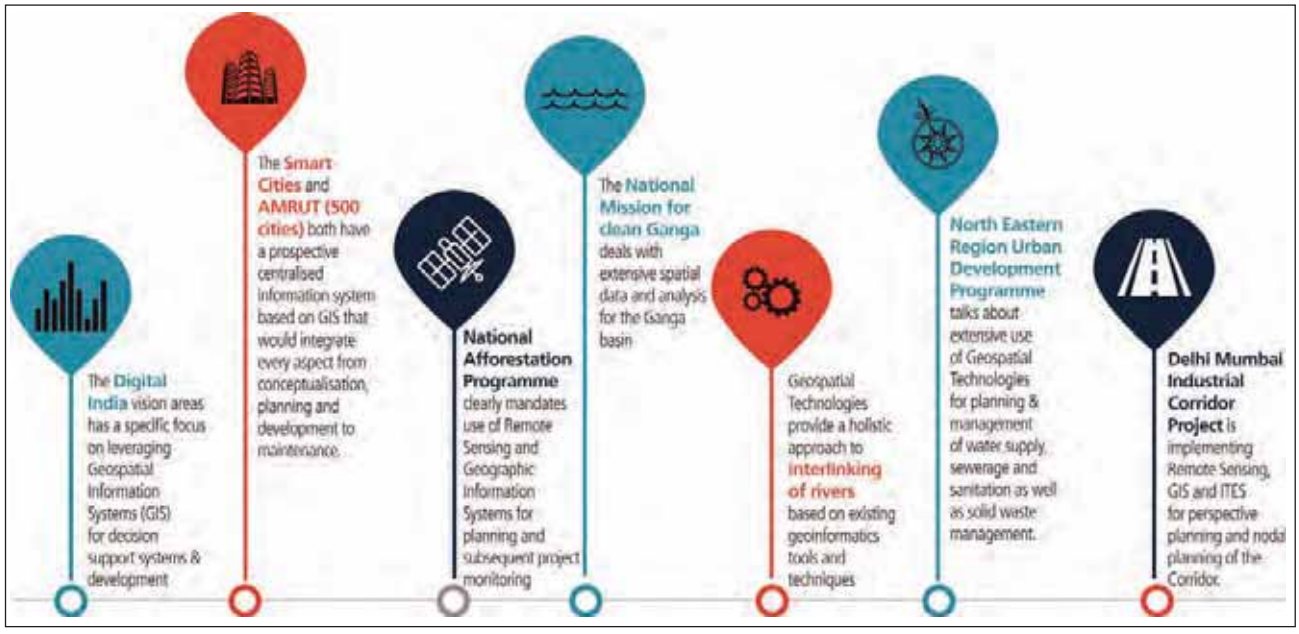
dashboard for insightful decision-making.

- Plot-wise details (land availability, usage, employee count) enables Central/State officials to take decisions regarding optimum utilization of industrial land.
- Demand requirement at district level are captured under the project, thereby bridging the demand-supply gap.
- Identification of sector-based clusters for strategising cluster-based growth of industries.
- Details of transport, urban infrastructure, agriculture and horticulture aid decision-making in the establishment of new infrastructure and optimizing the use of existing infrastructure.
- Mining Surveillance System (MSS)
- The aim of the MSS web based portal and mobile applications (for both officials and citizens) is to curb illegal mining through automatic remote sensing detection.
- Khasra maps of the mining leases were geo-referenced and superimposed on the satellite imagery, which checks a region of 500 meters buffer around lease boundary for any unusual activity. Any discrepancy is flagged-off as a trigger using manual and automated satellite image analysis. A mobile app is available to facilitate the visit of field level officers for inspection of such areas, using which they can file the field report.




- Some key achievements of this project include mapping of 3,280 total mines including 1,689 working mines (100 per cent). A total of 478 triggers have been generated under the initiative, 416 field verifications have been undertaken and no contradiction has been reported for 59 unauthorised mining cases. In addition, 38 citizen complaints have resulted in citizen engagement, increased transparency and effective regulation.
- Industrial Development Scheme for North East including Sikkim (NEIDS) and for Himalayan States (IDS):
- The two web portals for implementation of North East Industrial Development Scheme (NEIDS) and Industrial Development Scheme (IDS), developed for Department for Promotion of Industry and Internal Trade, allows applicants from eight North Eastern States (including Sikkim), J&K, Himachal Pradesh and Uttarakhand to apply for incentives online, track their application and receive status related notifications. The applicant receives timely updates at every level of the process and once the application is approved by the competent authority, i.e. Central level (DPIIT), the applicant

**GIS has the potential for enabling good governance through effective and efficient monitoring of schemes; proactive identification of gaps in the implementation of schemes/programmes and efficient allocation/management of resources.**




receives a registration certificate digitally.

- Various claim forms (including Capital, Interest, Insurance, Transport) have been developed to ensure complete processing of claims online with minimal information to be filled.
- The future roadmap of this portal entails mobile-based ground truthing and monitoring of industries, which have received subsidies under these schemes.
- Social Benefits Management System (SBMS)
- An online platform (web based application) developed for Ministry of Social Justice and Empowerment, SBMS manages the disbursement of benefits to Schedule Castes/Backward Classes/ Safai Karamchari applicants.
- SBMS web portal was launched on 27 February, 2019 by Minister of Social Justice and Empowerment.
- It has been implemented to facilitate efficient management of both Bank Linked Schemes (where Ministry transfers funds to states for subsidy) and Non-Bank Linked Schemes (where all three apex corporations are involved i.e. NSFDC, NBCFDC and NSKFDC).
- One of the key features of this system is beneficiary engagement with facility of transparent and seamless electronic services. The beneficiary can apply online, track his application, get notified (on SMS as well as on his system), edit details, provide clarifications and get the interview scheduled through this online platform. District level officers, State level officers and Central users (Ministry and Apex Corporations) have their own dashboards and reports, enabling them to evaluate, monitor and respond to the applications efficiently.
- Geographic Indications of India (GIs)
- Mapping and promotion of GIs of India, mapping of all registered users of GIs to be tabbed under this project.
- First ever GIS mapping of 3,000 registered sellers of GIs of India was initiated under the project. 278 Registered GIs of India are already mapped. Information about all GIs process of manufacturing, origin, cultural significance is available digitally.
- Data related to GI- Name, Description, History, Uniqueness, Production Process, Geographic origin etc., is also available on the portal.
- Canal Mapping and Cropped Area Monitoring, Waterbody Monitoring
- Mapping of all live and ongoing canal projects of the Accelerated Irrigation Benefits Programme (AIBP), Surface Minor Projects and under Repair, Renovation and Restoration (RRR) projects is supported.
- 106 AIBP projects have been mapped ensuring transparency in impact analysis, efficient monitoring of project progress and cropped area analysis completed for the years 2014, 2015, 2016, 2017, 2018.
- Over 200 water bodies under RRR mapped to enable real-time and

**The Government is also working on leveraging and integrating emerging technologies such as Blockchain, Artificial Intelligence, Machine Learning, Internet of Things (IoT) and Big Data Analytics with GIS to give further boost to developmental planning, foster citizen-centric service delivery and good governance.**

effective action. This is facilitated through authentic status of water bodies and efficient monitoring of the project progress.

- Delhi Police
- Development of mobile apps for survey / data collection for dark spot analysis and development of a single mobile platform to host all 40+ Delhi Police services for citizens and Police personnel is covered under the project.
- Mobile App for Delhi Police and NDMC allows citizens to plot the dark spots in Delhi and enables Delhi Police to update the status of poles (not operational/ partially operational), seamless integration with NDMC-311 application, and creating tasks for Junior Engineers, Assistant Engineers for taking action against inoperative light poles and real-time navigation for police vehicles.
- Delhi Police One Touch Away App – Integration of 40 services on a single mobile app has been achieved with this mobile app. The mobile app also supports for SOS Call facility which shares user details along with their location with emergency contacts and Delhi Police for quick action. All 200+ police stations of Delhi Police have been already mapped and navigation to the nearest Jurisdictional Police Station feature is also incorporated in the application. This mobile app is planned to be launched soon.
- Coal Mine Surveillance and Management System (CMSMS)
- CMSMS web portal developed for Ministry of Coal aims to make use of automatic remote sensing to curb illegal mining of coal and facilitate real-time tracking and monitoring.
- Some key achievements of this project include 'Khanan Prahari' mobile app, which was launched for reporting of illegal coal mining by citizens. Through this application, 104 cases have been reported by citizens; of which 12 illegal mining cases were confirmed and FIR was filed in three cases. Also, 869 coal blocks (100 per cent) have been mapped under the project.

The NCoG platform has been working on other important projects including Government Land Information System, National Mission for Cultural Mapping, School Information System, Solid Waste Disposal and Management System, Internal Management System for Security Agencies and Rashtriya Bal Swasthya Karyakaram (RBSK) among many others.

In addition, the Government is also working on leveraging and integrating emerging technologies such as Blockchain, Artificial Intelligence, Machine Learning, Internet of Things (IoT), Big Data Analytics with GIS to give further boost to developmental planning, foster citizen-centric service delivery and good governance. ❑

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# Digital Infrastructure: Core of Governance

*Neeta Verma*

Government of India has been at the forefront of using technology in different aspects of governance, be it satellite based communication in 1980s or use of electronic messaging much before the advent of internet in the country or even the use of video conference for monitoring the implementation of Government programmes and schemes across the country. National Informatics Centre, an attached office of Ministry of Electronics & IT, has been closely working with Government in provisioning state-of-the-art infrastructure in the form of nationwide network (NICNET), Data Centres, and Video Conferencing facilities to name a few. Digital Infrastructure for Government was further strengthened through a number of initiatives taken under the National e-Governance Plan. Digital India, one of the flagship programmes of the Government, has given significant push to adoption of technology and has brought a paradigm shift in the delivery of services to citizens and also the way Government engages with citizens. Evolution of key components of digital infrastructure for Government is highlighted below.

## Pan India Network

**NICNET,** the Pan India communication network for exclusive use of Government has continuously evolved since 1980s in terms of its geographical expansion, state of the art technology, reliability as well as security architecture. Today it connects Government offices across the length and breadth of India using a combination of technologies viz. fiber optic, copper cable, VSAT, Radio Frequency based on availability and suitability of technology to terrain of the land. Today, NICNET is at the base of all Government communications right from Government to Government, Government to citizen as well as Government to business communication.

**National Knowledge Network (NKN)** is another important initiative which provides Multigigabit nationwide network connected through 10G backbone. It also extends high speed connectivity to leading Research and Academic Institutions of the country. NKN is steadily evolving as the National Education Research Network (NREN) of India and has made significant progress by connecting over 1699 institutes, 5 crore students, researchers and faculty in the network.

## Data Centres: A Host to e-Governance Applications

**Data Centres** are the ideal solutions for offering a robust, highly available infrastructure with adequate redundancy to enable the Government to effectively render a variety of services to the citizens. Realizing the importance of Data Centres, National Informatics Centre (NIC) has established large Data Centres at Delhi, Hyderabad, Bhubaneswar and Pune, which are offering robust, resilient and secure set-up for e-Governance applications, web portals and websites with high availability and accessibility. Mini-Data Centres are also operational in all NIC State centers to cater to the e-Governance requirements at the state level.

Hosting support is being provided from Data Centres and National Cloud for approximately 10,000 various critical e-Governance Projects, viz. e-Procurement, Public Financial Monitoring System (CPSMS), eLekha, e-Panchayat, Aadhaar Enabled Biometric Attendance System (AEBAS), Immigration Visa Foreigner Registration Tracking System, Public Distribution system, National Portal of India, Jeevan Pramaan, e-Courts, Digital Locker, e-Counselling, National Agriculture Market, mobile Fertilizer Management System, Cyber Swachhta Kendra, Digital India Portal, National Transport Project, Human Resource Management Systems and a number of Government websites.

To keep abreast with the demand of e-Governance services it was important to reduce the turnaround time to procure and provision a digital infrastructure for hosting of system for Government initiatives. Timely

**Digital India, one of the flagship programmes of the Government, has given significant push to adoption of technology and has brought a paradigm shift in the delivery of services to citizens and also the way Government engages with citizens.**

The author is Director General, National Informatics Centre (NIC).

adoption of virtualization technology carved out the path for creation of a cloud based environment. To accelerate the delivery of convenient e-Services to citizens from the Government there was a need to offer Cloud Computing Services from Data Centre. The National Cloud was launched in 2014 under the umbrella of Meghraj, a Government of India Initiative of MeitY. This has ensured standardization, interoperability integration, pooling of scarce resources, cost effective and agile services for rapid deployment of e-Governance initiatives of Government.

## Command and Control Centre

Over a period of time, with the spread of Digital India Initiatives applications have scaled manifold and there was a need to setup a specialized centre to provide nationwide view for ICT infrastructure for effective monitoring and management and also to ensure availability of all critical services. Command and Control Centre have been set up at NIC Headquarters which has increased the agility of NIC's ICT infrastructure.

## National Cloud (MeghRaj)

In order to utilize and harness the benefits of Cloud Computing, Government of India initiated a Government Cloud initiative titled "**MeghRaj**" in 2014. Earlier provisioning of a digital infrastructure was an extremely time consuming process for every individual project. However setting-up of a secured cloud infrastructure has reduced considerable amount of time in provisioning of digital infrastructure. On-demand services and scale-up of infrastructure during peak loads has also been made possible by cloud infrastructure.

The Government's cloud-based service delivery platform has also helped in meeting a number of other objectives, including optimum utilization of existing infrastructure, rapid deployment and reusability, manageability and maintainability, scalability, efficient service delivery and agility, security, cost reduction, ease of first time IT deployment and standardization.

Various Government initiatives and schemes, such as Swachh Bharat Mission, My-Gov, e-Hospital, National Scholarship, e-Transport etc. have been successfully launched due to a robust and agile cloud infrastructure.

## Geospatial Technology

**Geographical Information Systems (GIS)** have improved the accessibility of various e-Governance services by offering location based access, visual gap analysis and actual on-site representation of various activities. Initiative such as Digital India Programme has made extensive use of geo-spatial technology for effective service delivery.

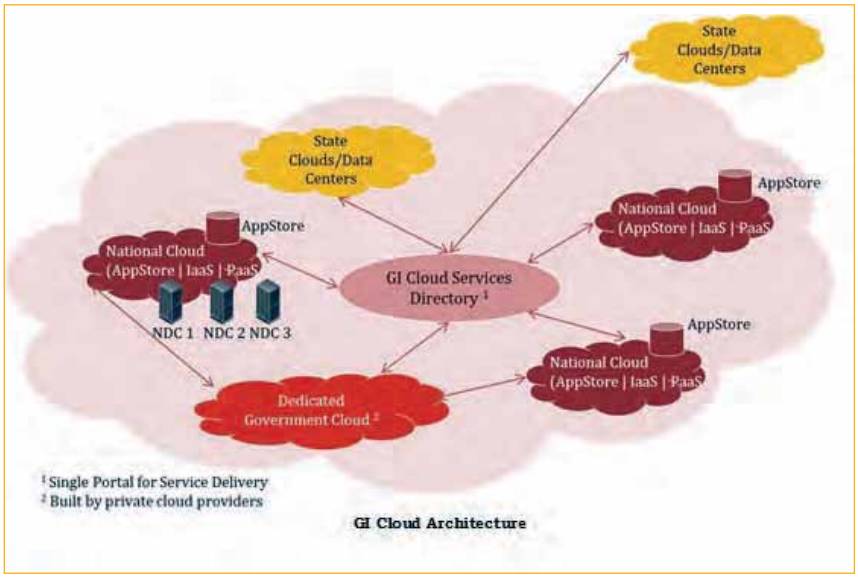
**Bharat Maps** is a multi-layered GIS platform / web service comprising of seamless country wide base maps, satellite images and hybrid maps aligned as per the global geo spatial standards. It is an essential component of Digital India Programme to support central/state government departments for delivering location driven citizen services.

One such successful implementation of geographic information system has been in the rural development scheme **MGNREGA**. GIS is helping MGNREGA workers to get information about availability of work in the near locations, work site location information, real time transparent attendance and payment information. At the same time, it is benefitting the citizens by enabling geo portal for MGNREGA assets, which will enhance the concurrent social audit by citizens and facilitate feedback information on current status of work, quality validation, etc.

## Direct Benefit Transfer (DBT)

**Public Finance Management System (PFMS)** electronically interfaces with all banks and gives a holistic view of the overall flow of funds in the Government, thereby eliminating delay and increasing transparency.

Earlier, there was an inherent delay in the transfer of funds due to multiple layers of governance. With the advent of technology and **Direct Benefit Transfer (DBT)** coming up, a paradigm shift has been experienced in the way benefits are transferred to the citizens. DBT has enabled aadhaar and non-aadhaar based payments. Introduction of advancements in online payments technology has been of extreme importance in terms of not just making business easy, but also managing transparency at all possible levels of transactions. Today, Total Direct Benefit Transfer



GI Cloud Architecture

(cumulative) amounts to ₹ 7,38,762 Crore. This has also showcased a direct impact on implementation of various Government schemes which are being implemented pan India. **Swachh Bharat Mission** platform extensively used **Direct Benefit Transfer technology** for transfer of funds to beneficiaries.

Under the **Swachh Bharat Mission**, beneficiaries had to declare the progress of the amenity construction. All it took for the beneficiary was to upload the pictures of the construction in phases and post validation and approval of the picture updation and geographical location, money was directly credited to beneficiary's account.

## Email Services

**X400** email services were launched for Government of India officials in late 1980s for providing an open source based secure and unified messaging platform to Government officials at all levels. The email services have evolved over a period of time in terms of scalability, security, responsiveness and feature sets. As part of the mandate under the Digital India Programme, the Government provided a secure email service to all for official communication. The email services today offer security features such as Geo-fencing, device mapping and adaptive authentication. As on date, more than 25 lakhs User IDs and 2000 applications use the email services. Further, to improve citizen engagement, SMS Service was launched ensuring real time updates to users. Approximately 15 lakhs SMS are sent to the users per day and around 2200 applications are integrated with SMS services.

## Video-Conferencing

NIC has been offering **Video Conferencing** services since 1995 for connecting and bringing administration close to each other. As on today, over +1852 Video Conferencing sites have been established, thus becoming an integral component of Government functioning and processes. Video Conferencing is now extensively used at all levels of governance i.e. Centre to State, State to District and Sub-districts, and government to public providing state-of-the-art, high definition, multi-party, anytime, anywhere video conferencing services. This has resulted in substantial saving of time and cost.

## Cyber Security

**Cyber Security** is one of the key concerns of any digital infrastructure today and it becomes all the more pertinent when it comes to Government infrastructure. Therefore a dedicated team has been instituted to enhance security posture of the government. Cyber Security has evolved from just being about to network security to application security also. Centres of Excellence for application security have been established across India to protect the Government applications from cyber threats.

To address ever increasing threat of cyber-attacks in terms of their magnitude as well as their sophistication, **Computer Emergency Response Team (NIC-CERT)** group has been constituted with an objective of analyzing, monitoring and responding to cyber threats on critical government cyber infrastructure, like websites, emails and various services. NIC-CERT coordinates with other stakeholders to mitigate the cyber threats by monitoring network for security incidents and issuing advisory for vulnerabilities. NIC-CERT works in close guidance of **CERT-In,** which is the national nodal agency for

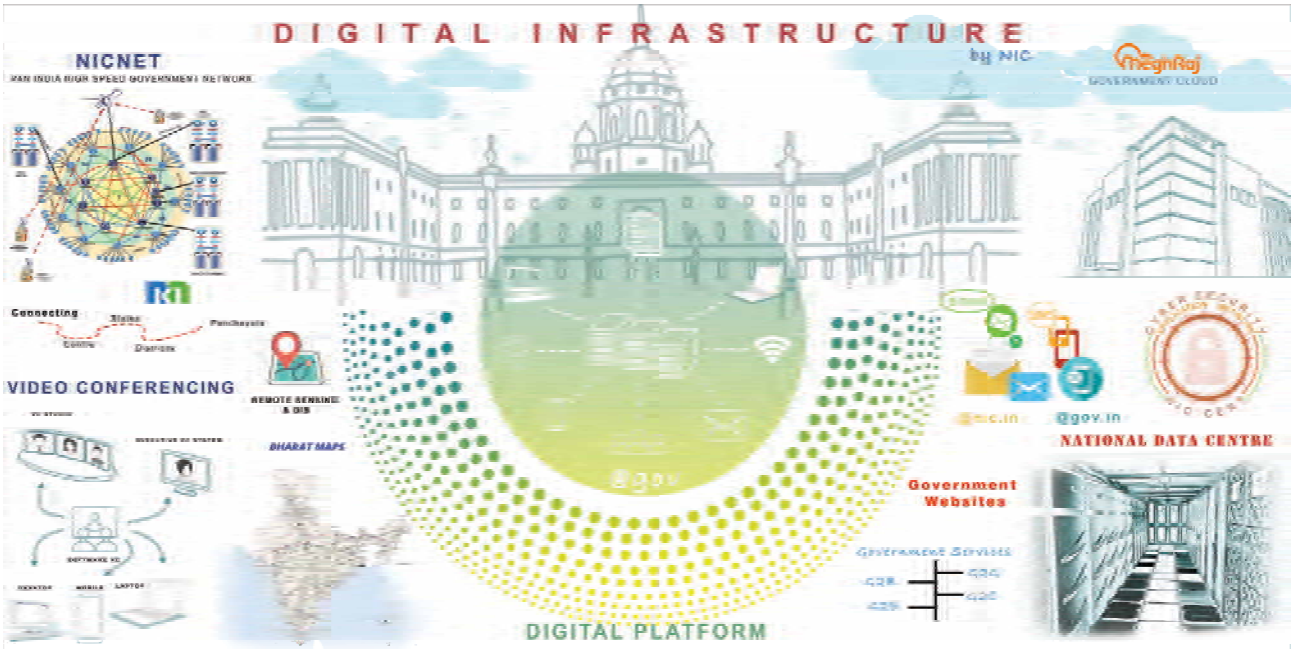



*Fig 2. Digital Infrastructure*

responding to computer security incidents as and when they occur.

## Digital Platforms

Availability of cloud infrastructure in Government has given rise to launch of number of digital platforms at National level **(One Nation One Platform)**. These platforms have addressed the issues of inter-operability, seamless integration and consolidation by creation of National Registers for vehicles, houses, toilets, ration cards, etc.

With a stable, reliable and best-in-class digital infrastructure, the government of India along with NIC and other key stakeholders have successfully set-up various services such as e-Office, e-Transport, e-Hospital to name a few. A well-established IT infrastructure has ensured end-to-end provisioning of various services right **from planning to a seamless execution**. One such success story is of **e-Transport**, where NIC was associated for the design, development, roll out and maintenance of the project across all the states and UTs. The initiative saw an extensive array of **G2G, G2B and G2C services** benefitting citizens, transporters, vehicle dealers, manufacturers, police and security agencies, banks, insurance companies, various Government Departments at the State and Central level. Today, for some services such as tax payment, getting specific certificates, etc. no RTO visit is required.

New citizen focused initiatives like mobile-based traffic enforcement solution through **e-challan**, mobile extension for services in the form of Parivahan app, with 4 million downloads and Comprehensive Analytics Portal are innovations emerging from such platforms.

**e-Way Bill** system has been a key lever in the success of Goods and Services Tax (GST) implementation. Within a year, the number of e-Way bills generated were more than 5577 lakhs and almost around 172 lakhs are verified. This brings the consigner, consignee and the tax payer on a single platform.

For rural development, the government has harnessed technology for implementing various ICT applications in over 10 programs including Pradhan Mantri Aawaas Yojana - Gramin (PMAY-G), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), National Social Assistance Program (NSAP), Deen Dayal Upadhyay Grameen Kaushalya Yojana (DDUGKY), Deendayal Antyodaya Yojana-National Rural Livelihood Mission (DAY-NRLM), a project to profile all GPS and villages on various social, economic and infra parameters (Mission Antyodaya), etc.

## Way Forward

NIC continuously strives to explore and evaluate new technologies to enhance government digital infrastructure. In-line with the approach of embracing new technologies, areas such as Artificial Intelligence, IOT, 5G, Edge computing, etc. have been identified.

NIC is in a unique position to cater to the ICT needs at all levels of governance, i.e. central, state, districts and sub-districts as well as at executive, judiciary and legislative layer of the Government. All these citizen services provided by various government organizations are leveraging a common underlined digital infrastructure.

Initiatives have been undertaken to establish Centers of Excellence for Data Analytics, Block Chain, Artificial Intelligence, etc. to ensure that the Government infrastructure is future ready in terms of technology adoption and its applicability in various initiatives. ❑

*(E-mail:dg@nic.in)*

### E-Governance Initiatives for ST Welfare Schemes

Several e-Governance initiatives for ST Welfare schemes were launched recently by the Ministry of Tribal Affairs.

Ministry of Tribal Affairs has developed online portals namely DBT Tribal (https://dbttribal.gov.in/) and NGO Grants Online Application & Tracking System (https://ngograntsmota.gov.in/) for bringing in greater e-Governance in implementation of welfare schemes for STs. In DBT Tribal portal, there are 3 main modules for Pre-Matric and Post-Matric Scholarship. Data Sharing module is mainly meant for sharing beneficiary-data by States. In Communication module, the States have facility to upload documents, raise query and DBT data uploaded by States is used for faster release of funds. Monitoring module has facility of MIS reports and Dashboards.

The Ministry has further developed module for verification of students by Universities and Colleges under Fellowship scheme and Grievance Module for all stake holders including beneficiary students in 03 Central Sector schemes and Institutions.

The NGO portal, developed for implementing scheme of Aid to Voluntary Organizations working for the welfare of STs, has been fully revamped and redesigned with simplified Application form, Inspection Report and Fund Processing module.

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**...Digital India Programme has harnessed digital technologies to bring about a positive change towards good governance that is easy, economical, transparent and efficient governance.**

# Digital Empowerment through 'Maximum Governance, Minimum Government'

***Simmi Chaudhary***

India today is at the cusp of a digital revolution. According to the Report of the Ministry of Electronics & IT, Government of India, 'India's Trillion Dollar Digital Opportunity', India has witnessed the second fastest growth rate of digital adoption out of 17 countries of the world over the period of 2014-17. The story of India's digital transformation is one of an ICT - led development by use of technology that is affordable, inclusive and transformative. By ensuring digital access, digital inclusion and digital empowerment, the Digital India Programme has harnessed digital technologies to bring about a positive change towards good governance that is easy, economical, transparent and efficient governance. In fact, it would be correct to say that digital delivery of services to citizens forms the driving force to the next generation growth trajectory towards a robust and knowledge-based economy. India is now poised for the next phase of growth – creation of tremendous economic value and empowerment of citizens as new digital applications permeate sector after sector.

Digital Empowerment through 'Maximum Governance, Minimum Government' is not a mere slogan. Instead, it is a conscious strategy towards ushering reforms in governance and transforming India by making governance simple, fast, flexible and effective by application of innovations and technology. This also leads to participative governance, a key element of a responsible democracy. The aim is not just to reduce the human interface in delivering services to the people but also to enhance the experience of the citizens, while also providing them with enormous opportunities.

To achieve this, the Digital India Programme of the Government is playing an important role in empowering citizens. Through the application of digital technologies, the Government is undertaking specific initiatives to improve the delivery systems to ensure that the benefits of the welfare schemes of the government reach directly to the targeted beneficiaries, including the poorest of the poor in a convenient manner without any pilferage. The combination of Jandhan bank accounts,

The author is Economic Adviser to the Ministry of Electronics and Information Technology, Government of India.

mobile phones and digital identity through Aadhaar i.e. **JAM trinity** is helping the poor to get benefits directly into their bank account. A total of Rs. 7.34 lakh crore have been disbursed through Aadhaar based Direct Benefit Transfer(DBT) to beneficiaries of 439 Government schemes which, have led to saving of over Rs. 1.41 lakh crore cumulatively by March 2019, by removing fictitious claimants. DBT brings in efficiency, effectiveness, transparency and accountability in the Government system.

**Common Services Centres (CSCs),** as Digital kiosks, are providing more than 350 types of services to citizens in rural areas. CSCs are a unique PPP model where micro-entrepreneurs are creating sustainable livelihoods and bringing about a digital revolution in the villages of India. A vast network of over 3.45 lakh CSCs, providing online government and non-government services, have created entrepreneurial opportunities for nearly one million village-level entrepreneurs, including over 60,000 women entrepreneurs.

The world's largest digital literacy programme, **Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA),** is bridging the digital divide and helping people to access benefits of the digital world. So far, 2.2 crore persons have been imparted digital literacy under the programme.

**MyGov** is an example of the Government's commitment towards participative governance, bringing citizens and Government closer to one another by democratizing the decision-making. Today, MyGov has over 80 lakh users and over 2 lakh submissions have been made in 815 tasks.

The **BPO** movement for smaller towns with 219 BPO units functioning across 97 small cities and 27 States and UTs is facilitating a balanced regional growth, and creating job opportunities in small towns.

In Digital India, aspirations meet opportunities to create an equitable and sustainable growth model as the country is poised today to transit from a service economy to an innovative economy. One of the ways to meet the aspirations and needs of more than 1.3 billion citizens in a transparent, efficient and cost effective manner is through the use of innovation and technology. Digital India Programme has resulted in rolling out of **public digital platforms** and use of public data for open innovation models to create new opportunities for businesses and a fresh approach to problem-solving. India is leveraging public digital platforms to serve the needs of citizens and businesses to derive more economic value and usher in greater transparency in governance, creating a large demand for skilled jobs for the youth and foster economic and social inclusion.

Even though a late entrant, India is set to leapfrog in Digital Payments bypassing the era of Cards and NetBanking. The experience of **UPI** has transformed the digital payment ecosystem in a span of two years, various private players are on-board on unique payment platform that is not only eliminating friction of cash from economy but also creating a new ecosystem for new business models, such as flow-based lending, credit scoring, insurance writing etc., providing sustainable solutions to serve the needs of the citizens. Transactions on the BHIM/UPI platform have increased in volume from 70 lakh to 7996 lakh per month over last two years.

Another prominent Digital Platform is Government e-Marketplace. **(GeM)** is attempting to increase the efficiency in public procurement by increasing transparency through an online platform for sourcing. This platform is acting as a single localised national market under one roof, where all buyers and sellers can interact and carry out their business across the country regardless of their geography, making GeM a truly digital tool of empowerment and entrepreneurship. This is boosting the growth of MSMEs, small manufacturers and other sellers. As Digital India aims to bring in maximum transparency by minimising Government's human transactional interface, GeM has streamlined the public procurement system. At present, GeM has 36,068 Buyer Organisations, 238,183 Sellers and Service Providers, 993,908 Products, and 10,749 Services.

India has moved ahead from the era of dongles/keys required for digital signatures with the advent of Aadhaar based eSign, that is an easy, efficient and secure way to sign and authenticate documents digitally. This eKYC based authentication enhances service delivery experience of citizens and can be used anywhere, anytime. Another platform that provides a paperless, secure eco system for storing original certificates/documents online is Digilocker. The cloud based platform provides secure access to billions of documents/certificates online issued by various authorities, thereby eliminating the need for physical documents. To facilitate ease of access to government services and fast track mobile governance in the country, a

unified platform has been developed, Unified Mobile Application for New-age Governance (UMANG) that offers over 360 services of 73 Departments and 18 States to the citizens through their mobile phones.

The digital transformation resulting from digitisation is all-encompassing, with the consequence that sector-specific strategies developed within silos are not applicable anymore. Therefore, the Government needs to build public digital platforms to foster collaboration amongst sectors and to devise and jointly implement policies/ programmes. Emerging Technologies, such as **Artificial Intelligence (AI), Internet of things (IoTs)** and big data analytics are expected to bring in mass disruption. The Government has to prepare to leverage the opportunities so unleashed. Business as usual will not suffice with new emerging technologies having a phenomenal sweep in all sectors with 'winner takes all' characteristics. Digital India is embracing change and fostering innovation. To accelerate the disruption, the Government is working closely in all sectors to leverage the opportunities of transformative technology. To leverage Artificial Intelligence and related emerging technologies in the interest of citizens and businesses, a **National Programme on 'Artificial Intelligence'** has been envisaged, to be catalysed by the establishment of **National Centre on Artificial Intelligence** as a hub along with **Centres of Excellence.**

In addition, the Government has to increasingly move beyond conventional aspects while formulating public policies, expanding beyond traditional domains to include new areas, such as, privacy protection, disrupting software product development, IP creation and fostering quick adoption of digital technologies, leading to trust and enhanced customer experience. Under Digital India programme, the Government is working on privacy protection through enabling Personal Data Protection Framework. The advent of technologies and its fast adoption has generated huge and

personalised data that can be used to alleviate societal problems relating to areas, such as, health, food security, transport and urban planning. In order to ensure growth of the digital economy while keeping personal data of citizens secure and protected, the Government is working towards formulation of **Personal Data Protection Framework**. The **National Policy on Software Products** has also been formulated that envisages creation of a robust Indian Software Product development ecosystem, thereby enabling IP driven holistic growth of the IT industry. The policy aims to develop India as the global software product hub, driven by innovation, improved commercialisation, sustainable Intellectual Property (IP), promoting technology start-ups and specialized skill sets. It also aims at alignment with other Government initiatives, such as, Start-up India, Make in India and Digital India, Skill India etc so as to create Indian Software products Industry of USD ~70-80 billion with direct and indirect employment of ~3.5 million by 2025.

While India is leveraging its strength in IT Services and aiming to become a software product nation, the momentum in electronics manufacturing has been maintained. 268 manufacturing units of mobile phones and accessories creating almost 6.7 lakh direct and indirect jobs. The **National Policy on Electronics, 2019** aims to further promote domestic manufacturing and export to achieve a turnover of approx Rs. 26 lakh crore by 2025.

The outreach of digital services has ushered in greater connect, inclusion, convenience, choice and savings to the citizens from all walks of life. In the next phase of growth based on digitisation, public, societal platforms will play a critical role in triggering and enabling solutions to the problems of the common citizens from start-ups and digital innovators. These platforms will not only act as a tool of enhanced empowerment for the citizens but will also act as catalysts to accelerate capturing the value of the digital economy. Towards this end Central and State Governments, private sector and social sector organizations can come together to build strategic public-private-social partnerships. Digital transformation can, thus, be government–led and business-enabled in some domains and government-enabled and business-led in others.

Digital India, utilising the power of digital platforms, has, thus, demonstrated a successful case study, where developing economies, through embracing technologies, will be able to leapfrog towards sustainable and inclusive growth. Having built a strong foundation of digital infrastructure and vastly expanded digital access and outreach, India is now poised for a robust growth of digital technologies in all sectors of the economy that will lead to creation of up to $1 trillion of economic value from the digital economy in 2025. ❑

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YE-1169/2018

# Less Cash India: Vision to Reality

*Narendra Yadav*

India has traditionally been a cash-based society. This dominance of cash has been primarily due to three reasons –

1. Lack of payment acceptance infrastructure
2. Bank accounts perceived as accounts for savings rather than accounts for payments by a majority of the population
3. Cash-based payments seem to be zero-cost and hassle-free as cost of cash is distributed and invisible.

Until a few years ago, card-based payments were the only mode of digital payment available to our merchants and customers. Till November 2016, only 15 lakh merchants had been enabled with PoS by over 40 banks. This meant that only 2.5 per cent of India's 6 crore merchants had an option of receiving payments through cards. The remaining merchants had no option but to rely on cash based payments. This changed dramatically with the advent of QR code based payments. Today, there are over 1.2 crore merchants having QR code who give an option to their customers to pay through their wallet or bank account. The QR code based payments have been attractive to merchants as it does not have traditional costs associated with PoS terminals – cost of PoS terminal, cost of maintaining internet, maintenance of PoS terminal, high MDR etc. With steady progress in mobile and internet technology, the number of people with smartphones has been incroreeasing and merchants need not have a costly device connected with internet to accept payments as customer's smartphone can be leveraged for payments.

**The 4 key elements of financial inclusion are payments, credit, investment and insurance; and technology can truly enable these elements for driving financial inclusion in the country. The JAM trinity (Jan Dhan, Aadhaar, Mobile) has ushered a digital revolution ensuring that marginalized sections of the society are also brought into financial mainstream.**

India has over 100 crore bank accounts with over 90 crore debit cards. While most households have atleast one bank account, especially after Jan Dhan Mission, the number of customers using bank accounts for digital payments is less than 5

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crore. Many people find payment through bank accounts cumbersome and/or risky. Prepaid Instruments (wallets) became a huge hit among these customers as customers could set up wallets easily by authenticating their mobile number. The perceived risk is capped to the amount kept in the wallet, which is separate from their bank account. The number of wallet users has been incroreeasing consistently despite new regulations mandating the need of KYC in a given time frame. The advent of UPI has simplified use of bank accounts for payments for people who are comfortable to pay directly from their bank accounts. Overall, wallets and UPI have been leading the growth of digital payments in addition to traditional modes like net banking, debit card and croreedit card.

Cash has an inherent benefit of being universally accepted and instantly usable. However, there is a cost of cash in the form of expensive cash management infrastructure. Cash management infrastructure includes cost of printing cash, bill collection centres for utilities, network of ATMs and cash deposit machines, cash in/cash out counters in banks etc. Transitioning to digital payments will lead to significant reduction in costs due to inefficiencies associated with cash. Further, cash is anonymous and once you have parted with it, there is no trace visible in the system. Contrast this with digital payments, which leaves a footprint acroreoss the ecosystem and is traceable.

In P2M (person to merchant) digital payments, there is a central neutral party which facilitates arbitration and provides a channel for dispute resolution with merchants. For instance, customers using digital payments have an option of initiating chargeback against a merchant for fraud transactions / wrong product etc. On the other hand, cash is a bilateral transaction between a customer and a merchant. Once a payment has been made, as there is no trail of the transaction, the customer is at the mercy of the merchant. In addition, while on-boarding merchants on digital payments platform, due diligence is undertaken as per the requirements of the Indian Government. This greatly removes fraud / spurious merchants as due diligence is an extensive exercise on the part of the acquiring banks / financial institutions since fly-by-night merchants can cause greater damage to acquirers than customers in a cumulative way. Hence, the quality of the merchant accepting digital payments is expected to be better than merchants accepting payments only in cash.

Government of India envisions financial inclusion of all sections of the society. Financial inclusion does not simply entail having a bank account for all citizens. It goes much deeper and involves croreeating an ecosystem wherein people use different financial instruments in their day to day life. The 4 key elements of financial inclusion are payments, croreedit, investment and insurance; and technology can truly enable these elements for driving financial inclusion in the country. The JAM trinity (Jan Dhan, Aadhaar, Mobile) has ushered a digital revolution ensuring that marginalized sections of the society are also brought into financial mainstream. The Jan Dhan programme focussed on opening bank account for at least one member of every Indian family. The benefit of Government schemes and subsidy now flow directly into the bank account of beneficiary, thereby eliminating middlemen. The poor of the country can now do digital transactions and by doing so croreeate an account history which can enable banks and other financial institutions to determine croreedit worthiness and offer loans, thereby preventing the poor from unregulated moneylenders and high interest rates on loans that have been extended. This strong digital payments infrastructure has a multiplier effect on the economy as users get access to croreedit, based on their transaction history.

For a citizen, digital payments offer several uses, from payment of utility bills to booking train/movie tickets and payment of school/college fee etc. There is no need to line up in queues to pay bills and no need to look for change while making a payment. Also, it is convenient to reconcile croreedits and debits since all transaction details are available at the click of a button.

In order to promote security of online transactions, Indian Government has mandated use of 2 factor authentication for all payment methods. The 2 factor

authentication essentially involves a customer to "know something" like his username and password, as well as "have something" like OTP received on mobile phone. It provides additional security, since, if a hacker needs access to a person's account, he/she would need to know the password as well as have person's phone where OTP is sent. India is one of the few countries in the world, wherein this 2 factor authentication to provide additional security to digital transactions has been implemented. For lower value transactions which carry lower risk, Indian Government has relaxed the additional factor authentication requirement for transactions up to Rs. 2000. These risk based solutions work best since they balance safety as well as user experience.

With regard to security of digital transactions, there are 2 aspects – one is the technology aspect and the other is financial literacy of users. With emerging technologies such as Artificial Intelligence and Machine Learning it has become safer to do digital payments. At the same time, technology is evolving so that any patterns for hacking / cyber-crime are quickly understood and preventive measures taken in order to prevent spreading of such crimes. With regard to financial literacy, the Indian Government has undertaken several campaigns in this regard. Users are being made aware about maintaining the security of their bank accounts, keeping strong passwords which are difficult to guess, not sharing one time passwords (OTP) etc.

While discussing digital payments, user privacy is of paramount importance. The banking and financial services industry is eagerly awaiting the passage of Personal Data Protection Bill in Parliament. This Bill sets out how the personal data of individuals is processed by the Government and private entities incorporated in India and abroad. We believe that Payments Data and / or any data pertaining to digital payments is croreitical personal data that must be stored and processed in the servers / systems located only in India. The Supreme Court of India while delivering its judgement on the constitutional validity of Aadhaar on 26th September 2018, also asked the Government of India to bring in a robust law for data protection at the earliest. The law for data protection can be robust and enforceable only when the sensitive and croreitical data is stored only in India.

The Indian Government should encourage innovation in digital payments. There should be a push for incroreeasing digital payments acceptance infrastructure – and not for any particular mode of doing the same. The entities in the digital payments space should be given freedom to enable merchants to accept digital payments in whatever way they deem fit–be it wallet, UPI or any other new innovation which can scale up the number of merchants accepting digital payments even further.

The key to propagating digital payments is to ensure trust in the system – both from the customer as well as the merchant. Trust can be built by ensuring transparency of cost and charges for digital payments along with timely grievance redressal, along with customer / merchant education and awareness. The banking and financial services industry under the guidance of the Indian Government has taken several measures to build trust and a lot more needs to be done. Certainly, with constant innovation in technology and incroreeased awareness about digital payments, time is not far when this trust factor truly enables the realization of the vision of less cash India. ❑

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## NORTH EAST DIARY

### Japan to Invest Rs 13,000 crore in Northeast

The Government of Japan has decided to invest an amount of 205.784 billion Yen, equivalent to approximately Rs.13,000 crore, in several ongoing as well as new projects in different states of India's North- Eastern region.

Some of the important projects in which Japan will collaborate include Guwahati Water Supply Project and Guwahati Sewage Project in Assam, Northeast Road Network Connectivity Improvement Project spread over Assam and Meghalaya, Northeast Network Connectivity Improvement Project in Meghalaya, Bio-diversity Conservation and Forest Management Project in Sikkim, Sustainable Forest Management Project in Tripura, Technical Cooperation Project for Sustainable Agriculture and Irrigation in Mizoram, Forest Management Project in Nagaland, etc.

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YE-1162/2018

# Fostering the Right Ecosystem – A Software Products-Led Approach

*Debjani Ghosh*

With a new government at the centre and with a penchant for tech-enabled growth and a big-bang approach, the effort should be to continue to work towards realizing the dream of a 10 trillion dollar economy (GDP) by 2030. It's a long-haul and in process, at all times, we must not lose sight of the big picture. Certainly, we should celebrate small wins but that magical figure of TEN must be our guiding force. Our GDP right now is about 2.4 trillion USD so the task ahead is pretty much cut out.

## Preamble

The 181 billion dollar IT BPM industry has been services-led and exports driven. It has reaped remarkable results and in turn, our industry has become a global powerhouse in the IT Services sector. NASSCOM Strategic Review estimates that the software products segment stands at 7.1 billion dollars, FY 2018. Of which, the domestic market is at 4.8 billion USD. There can be two distinct approaches, not that they have to be mutually exclusive. As an industry, both can be adopted, depending on the availability of core competence. One can be about focusing on global markets and catering to the Fortune 500 club. Purely from a products standpoint, that may not yield very high growth right away; simply because, Indian software products are not there yet in the Top 100 list. The other option is to solve the structural challenges of every industry through a products-based approach and put the nation in an altogether different orbit.

"Digital" is a force multiplier. It enables exponential growth in all other sectors like telecom, e-commerce, domestic electronic manufacturing, digital payments, and direct subsidy transfers. The economic value added through digital technologies is currently about 200 billion dollars annually, and it is estimated that this burgeoning economy (digital) in India alone will fetch a trillion dollars by 2025. What if we extend this premise to enable an ecosystem which will unlock productivity, efficiency and savings across diverse sectors like agriculture, education, energy, financial services, e-governance, healthcare, logistics, manufacturing, trade and transportation? Our mobile data consumption grew 54 times in the last two years because the conditions were favourable and consumers simply grabbed the opportunity like ducks take to water. If we are able to establish a conducive ecosystem for digital propagation across industries, is it really a stretch to re-imagine a four-fold growth of the Indian economy in the next 10–12 years?

There are about 4,000 software product companies in India, companies of large, small and mid-size, and even MNCs. Much has also been written about the startup ecosystem which is right up there in global rankings and second to none really, in terms of capabilities. Things don't happen in a vacuum. We need to foster the right ecosystem and include all the stakeholders as we go along – industry, academia and the government.

**We cannot be looking at products and services in isolation. If anything, there's a healthy mix of both in progressive companies which are supremely concerned about providing a superior experience for its customers. In that sense, it is fairly agnostic and really adopts the combinatorial power of deep technologies.**

The National Policy on Software Products (NPSP 2019) has been tabled. At its core is a vision to expand Indian software products market by ten-fold in the next 5 – 6 years. Ambitious as it may be, this kind of growth may well be sustainable.

## The Policy Decoded

Patient Capital needs a greater push. Towards this, a dedicated Software Product Development Fund (SPDF) is proposed which will provide risk capital to scale up market ready software products. A corpus of Rs 5000 crore will bridge the gap between capital requirements of software product startups and the funding available from banks. On the lines of venture funds, it will provide risk capital to enable the creation of at least a 100 Indian software product companies having a valuation of Rs. 500 crore or employing 200 people.

There is a gap between what the industry requires and what the academia

The author is President, NASSCOM.

delivers. An attempt is being made to bridge this gap. A budgetary outlay of Rs 500 crores will support research and innovation in software products in institutes of higher learning. The focus is on creating IP and addressing societal challenges through technology in areas like education, healthcare, sanitation, agriculture, persons with special needs (Divyangjan) etc. in a participative manner to include all stakeholders.

Incubation is critical and towards this, the policy plays a more decisive role by extending various forms of support - technical and infrastructural assistance, mentoring, seed funding, testing facilities and marketing. It will also nurture 10,000 software product startups which in turn will create a million jobs – both direct and indirect. And, here's the most encouraging part - at least a thousand of these startups will have to be in Tier II & III locations. To start with, MeitY will be initiating two incubation schemes: Technology Incubation and Development of Entrepreneurs (TIDE) 2.0 with a budgetary outlay of Rs. 264 crore for software product development, aimed at the societal sectors, and Next Generation Incubation Scheme (NGIS) with a kitty of Rs 95 crore , for Tier II & III software product companies based out of STPI.

The role of STPI in the growth of Indian IT can never be over-emphasized. Something similar - 20 domain specific Indian software product clusters will be initiated, for instance, in automobile, textile, financial services, electronic manufacturing, and energy among others. These clusters will have integrated ICT infrastructure, marketing, incubation, R&D/test beds and mentoring support for at least 500 technology start-ups.

Finally, it is all about people – upskilled/reskilled talent and MeitY has undertaken this massive agenda. Through its Future Skills PRIME initiative, it will aim to upskill/reskill another 3 – 3.5 million people. This talent pool will develop capabilities which will enable a ten-fold growth in software products as envisioned in the policy document. In addition, a Talent Accelerator program will be addressed towards engineering and other STEM talent in this country. Lest we forget, the nation produces 2.6 million STEM graduates annually, of which, a million are engineers. That's a massive talent pool which will have to be tapped into.

## Caveats & Commentary

- Software products often take upto 2 years for release. In addition, there will be periodic upgrades and releases.
- The On-premise model is seen to be making way for Cloud. Worldwide, as much as 90 percent of Fortune 500 companies are using cloud. Given that we are handling very large quantities of data – that's the obvious choice. In India, the growth is quite remarkable - at a CAGR of 30 percent and in the next 3 – 4 years, is what NASSCOM studies have estimated.
- Towards Ease of Doing Business, a single repository of all laws and regulations applicable to the software product industry should be created.
- Funding for innovation can be appropriated through an exclusive Innovation Fund, within the purview of MeitY, and it should be used to promote the domestic product companies (not just restricted to startups). To be fair, the proposed Software Products policy does address it, albeit in a limited manner.
- Testing is a very important aspect of software product development. That's why we need a Private-Public Partnership towards creating testing labs and centres of excellence. There has to be definitive incentives for investors to set up this kind of expansive infrastructure where the returns on such investments are likely to be long drawn. It will also have to be about incentivizing R&D investments.
- Talent, particularly in acing deep tech, will have to be accelerated. This will require a complete overhaul of how we view skilling. One-time premier qualifications will soon have limited returns and will have to be replaced by a culture of life-long learning where participants would be required to do a 360 degree turnaround, once in ten years (at the very least), in a career spanning forty-odd years. By this I really mean a complete overhaul – unlearning the old and relearning a skill or set of skills which will be completely new and unprecedented. The old skillsets and competence will then cease to exist. These waves will come and go at least once in a decade. Those who are not able to keep pace will be relegated to history and in the list of also-rans.
- The measuring metrics today are centred on volume, an age-old practice. We have to move towards quality. It is not only about size that should overwhelm but superior quality of output as well. Even if a product is *not* niche and aimed at bettering a million lives, quality cannot be compromised. We simply cannot afford to take consumers for granted even if they are at the bottom of the pyramid. This new pyramid structure facilitates upward mobility very quickly, as is evidenced by the rise of the neo-middle class.

## Experience Economy Marches On

We cannot be looking at products and services in isolation. If anything, there is a healthy mix of both in progressive companies which are supremely concerned about providing a superior experience for its customers. In that sense, it is fairly agnostic and really adopts the combinatorial power of deep technologies. We must always bear in mind that it is that much harder to retain an existing customer than to acquire a new one. Be it products or services, the "Stickiness Factor" cannot be compromised. ❑

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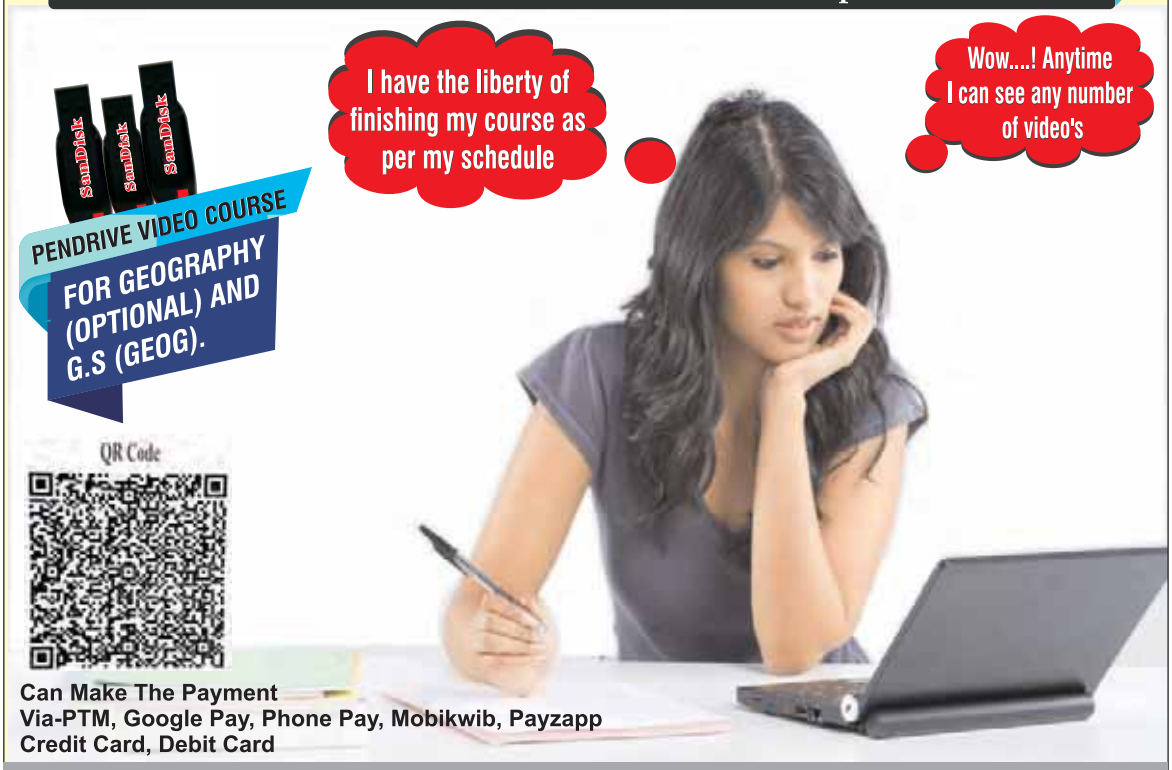


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YE-1168/2018

# Reimagining Citizen Services with Open Fintech Platforms

*Abhinav Guptha, Mayur Singhal*

India is home to more than 1.16 billion (Urban – 0.65 billion and Rural – 0.51 billion) wireless subscribers and 0.56 billion internet users[1]. The number of mobile users in India has crossed 1 billion mark and most of them have experienced internet for the first time on their smartphones. This revolutionary trend is due to 4G infrastructure, affordable mobile devices and customer friendly offering from telecom companies. This paradigm shift in connectivity has opened up avenues to create innovative business models to offer various services to citizens with varied demographics. In fact, it has the greatest market potential in the entire world, as determined by the Harvard Business Review in its latest edition of Digital Evolution Index 2017.

Data usage in smart phones was primarily used for entertainment earlier, however there is a considerable shift being observed towards utility services, financial services etc. Government of India's push to enable digital touch points and infrastructure has laid down rail roads for efficient citizen service apps like Digilocker, MyGov, Umang etc. and initiatives like e-Gov app store have prompted all the public institutions in India to digitize and create efficiencies like never before. Catalyzing usage of digital channels have undoubtedly enhanced comfort levels of citizens and created unparalleled efficiencies. One of the most prominent examples is saving of Rs.1,41,677 crore by aligning the Direct Benefit Transfer (DBT) beneficiaries with Aadhaar, which has enhanced efficiency of government departments and extended convenience for citizens with utmost transparency[2].

Aadhaar has been the key to efficient delivery of various services to citizens across India. Government's focused strategy to promote JAM (Jan Dhan, Aadhaar, Mobile) trinity has enabled emergence of a legion of promising fintech startups that are working to bring innovation and disruption to the otherwise conservative Indian banking sector. Forecasted to cross $2.4 billion by 2020, as per a report by KPMG India and NASSCOM, India is currently home to more than 500 fintech startups, whose collective aim is to attain financial inclusion. Since early 2015, the fintech sector has undergone massive changes, chief among them being the move towards a cashless economy.

**Banking has moved towards mobile and web from branch banking and this has created a virtual world of banking called Digital Banking.**

The government's enthusiastic promotion of cashless technologies – digital wallets, Internet banking, the mobile-driven point of sale (POS) and others – as well as the launch of IndiaStack including Aadhaar, eKYC, UPI and BHIM have also managed to restructure the financial sector, disrupting the long-held monopoly of traditional institutions like banks. Reserve Bank of India's new announcements on setting up

Abhinav Guptha leads fintech vertical at T-Hub and advises start-ups on scaling-up. Mayur Singhal is a Management Consultant with a leading global management consulting firm with experience in Digital Payments and Banking industry.

regulatory sandbox for experimentation and validation of new age products is a major step in promoting open platforms. Latest vision document published by RBI has focused on rethinking financial services both at institution level and citizen level.

## Thinking Beyond

"Digital technology provides a low-cost way for people in developing countries to send money to each other, buy and sell goods, borrow and save as long as the financial-regulation environment is supportive." – Microsoft co-founder and former CEO Bill Gates.[3] Till recently Aadhaar has been the backbone of customer onboarding and e-verification process of various industries like banking, telecom etc. However, the monumental amendment by apex court has indicated our dependency on the Aadhaar platform and on the other hand compelled us to rethink models to serve existing processes with similar efficiencies.

To seek solution for this challenge, one needs to look outward and think if there is any alternate framework in the economic areas where a common identity platform like Aadhaar is absent. Revised Payment Services Directive or PSD2 might perhaps be a potential way forward for this challenge. PSD2 are set of guidelines which financial institutions in SEPA (Single Euro Payments Area) need to abide for enabling their financial products. PSD2 is creating strides in the domain of open banking and has opened up numerous opportunities for new age financial institutions. New PSD2 directive allows third-party providers to access customer bank account data, based on the customer's approval, to provide value-added services in the payments arena. This open financial framework and data sharing ecosystem will eradicate monopoly of few institutions on customer data.

PSD2 introduces two new classes of payment service providers: Payment Initiation Service Provider (PISP) and Account Information Service Provider (AISP), which are expected to provide new services under PSD2. For example, AISPs could provide aggregated bank account information and analysis services. PISPs, which "initiate a payment from the user account to the merchant account by creating a software bridge," could start to offer services such as bill payment and peer-to-peer transfers.

API based banking products have empowered us to create open frameworks for the first time in history. This open banking framework would enable various businesses to extend various banking and allied services without regulatory banking license to citizens.

Several banks in India have understood the power of open banking and its impact in increasing business. An open framework similar to AISP model can be a way forward for the challenges posed in recent times. Adoption of this model would enable third party institutions like fintech startups to collect KYC data of customer from his bank and complete onboarding digitally. This process requires customer's consent and is similar to Aadhaar based e-KYC.

Open banking frameworks will empower fintech institutions and startups to a large extent by collaborative data sharing. This framework will even allow various banks to share their risk score related to a customer and help FI's to decide on a business transaction. This will enhance current risk scoring methodology and even provide an alternate risk scoring mechanism to CIBIL. PISP framework can even allow a customer to source his loan from the bank of his choice and save that in a different bank of his choice.

## Unified Payments Interface (UPI): A Glimpse of Open Banking

Since inception, UPI has been a major force in shaping payments industry of India. This unique service enables an individual to use third party application to link their existing bank account and carry out various banking transactions with minimum hassle.[4] Success of this open framework can be measured by the increase in adoption rates and volume of transactions. In April 2019, UPI transactions clocked 800 million, which was a milestone moment for the fintech domain in India.[5] Additionally, rise in 3rd party payment applications like Google Pay, PhonePe, Paytm etc. provide enough evidence on positive traction of open frameworks in the banking domain.

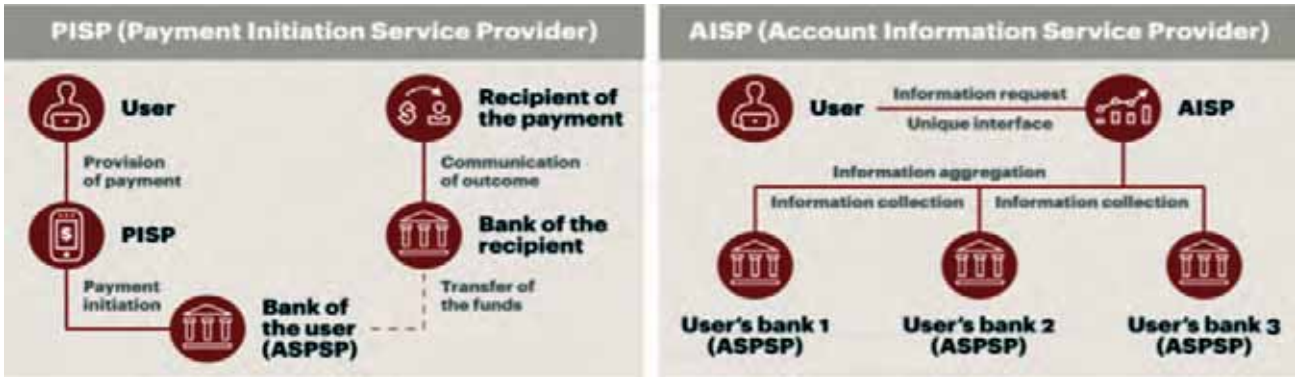


*Figure 1: Payment Initiation Service Provider (PISP) and Account Information Service Provider (AISP) flow diagram (Source: A T Kearney analysis)*

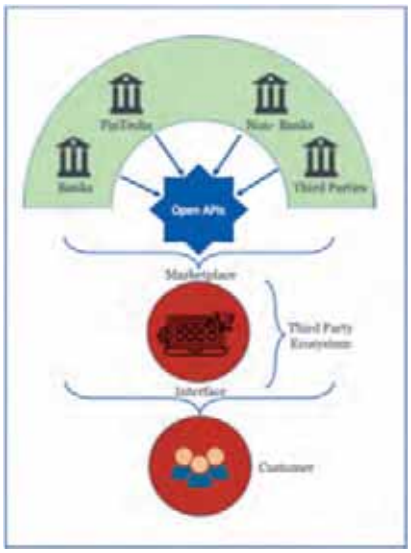


*Figure 2: Open Banking Framework*

## Technology-Based Customer Centric Approach

Today the financial industry is competitive and the key to success is to provide world class services to its customers. Banking has moved towards mobile and web from branch banking and this has created a virtual world of banking called as Digital Banking. However, most often rural customers are left behind from getting the similar service support on time from banks which urban or digitally literate customers are getting. Digitally literate or urban customers can leverage this channel for getting best services from their banks but there are many customers who are living in rural areas with limited infrastructure and facilities to connect with their bank. Open banking might show them a way forward.

Open banking not only provides similar level of service support to rural customers but also enhances their banking experience. It will revolutionize the banking industry in ways which is yet to be imagined by giving customers' information access to third parties, upon consent, via APIs that could unlock the power of solutions to benefit the customers who are left behind.

Open banking will create a marketplace wherein Banks, FinTechs, Non-Banking entities etc. are connected to a marketplace through secured open APIs and give direct access to the service provider about customers' information. These marketplaces can innovate their own service model to provide better services to customers on behalf of the banks. Open banking will let a third party integrate with various banks through open APIs and become a direct service agent of any bank anywhere in the country.

Just imagine a service point in a village with computer and internet connection, integrated with all banks, raising and resolving customer grievances with single interface. This service point owner could be an agent of any third party, a trusted non-banking entity, using banks' open APIs and directly behaving as a customer support agent for customers. Open banking platforms with service level APIs can unlock the true potential of BC (Business Correspondent) network to deliver additional citizen services like utility tax collections, complaint registrations, offer other financial products like insurance, mutual funds, pension schemes etc.

## Create a Trusted Third Party Ecosystem

But since all this is happening over network and linked to customers' information, it involves risks as well. As a trusted party in the marketplace, banks could vet third-parties, protect customers against fraudulent providers, and educate them about the implications and potential risks associated with enabling access to sensitive personal data. Once the third party is vetted by any bank and becomes the trusted party in the marketplace, any other bank can simply start exposing their APIs in order to connect with their banks customers through the marketplace. Additionally, the upcoming directive on data handling practices will create a trusted environment for the customer.[6]

## Conclusion

Needless to say, this vision needs a high level of change in the regulatory landscape that can drive the open banking in the country. Recently in an event held in Mumbai, Governor, RBI, said "The Reserve Bank will continue to pay focused attention to appropriate enabling regulation, strong infrastructure, apposite supervision and customer centricity, due attention must be paid by operators towards cyber security, effective customer grievance redress arrangements and reasonableness of customer charges. Operators should ensure that no corner is cut regarding cyber security – after all, in a network environment we are only as strong as the weakest link." Indian regulator's open mindset with innovation centric regulations will pave the way for a new era in the Indian banking industry which will make our nation a fully financially inclusive nation. Government's other initiatives like open health stack when combined with these open banking platforms will allow startups and other institutions to offer services which were never imagined.

Open banking and fintech platforms hold a potential to transform lives of citizen in this digital era. However, perceptions and needs of financial inclusion customer segment are heterogeneous and different from their urban counterparts. Hence it is an imperative to understand the need and requirements of all demographics of citizens and to make them aware about how innovative solutions can actually make a difference in their daily lives.

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YE-1161/2018

# Leveraging Technology for Transforming Education

*P Krishnakumar*

India is a country on the move, taking giant strides towards becoming a global leader and building an inclusive growth trajectory for her 1.3 billion minds. An integral pillar of this growth is leveraging technology to leapfrog development by focusing on three pillars: improved connectivity and access, focused skilling and capacity building, and sustainable innovation. With the country strategically investing in digital transformation, building a strong demographic dividend that reaches the remotest corners of our vast country is an important pivot.

With more than 50 percent of India's population under the age of 25, sustained investments in education and equipping students with 21st century skills are crucial to ensure relevance and productivity as a part of the global, and Indian, workforce. Unity in diversity is our biggest strength, however, it is also an equally worthy challenge in creation of a uniform education system. With sixteen official languages, 720 recognizable dialects, and more than thirteen scripts, it is a mammoth task to implement education homogeneity. The difference of access in urban and rural geographies further complicates the equation.

Irrespective of these challenges, India has made strides in universalizing primary education - ensuring improvement in both enrolment and completion rates of primary and elementary school. Along with budgetary commitments to education, pathbreaking initiatives such as NITI Aayog's Atal Innovation Mission have, in a brief time, made a dent on the learning culture. Tinkering labs have not only put inquisitiveness at the heart of the learning process but have also democratized access to technology for the larger good. Industry has also contributed significantly to the progress of education by committing time, resources, and innovative solutions to the cause. From directing CSR funds to supporting diverse initiatives focused on developing future ready workforce, education is perhaps the sector with maximum multi-modal investment.

A lot has been done – but there still are many miles to traverse. This is where Technology can help.

## 1. Providing Access and Bridging the Divide

In-roads of portable devices and internet has augmented the scale of connectivity in India. Well-meaning revolutions in form of content, videos, MOOCs have proliferated the education segment regardless of social construct. However, while providing content on your fingertips is the first step – it alone cannot be an effective and sustainable solution.

To become a knowledge economy, we must embrace creation of knowledge and content, and not just consume it passively. It is important for both students and teachers to play an active role in creating ingenious content. Need of end-point devices is of course a necessity to accomplish this, but so is advent of emerging technologies. Because of the linguistic diversity, technology can help create

**ICT is also helping classrooms to evolve from being isolated blocks by expanding the scope for collaboration and communication between students, teachers and administrators from different geographies. From sharing learnings to fostering collaboration, the walls of the classrooms are no longer a barrier.**

The author is Senior Vice President & General Manager, CSB – Asia Pacific and Japan, Dell.

and translate content to suit a diverse set of customized needs.

ICT is also helping classrooms to evolve from being isolated blocks by expanding the scope for collaboration and communication between students, teachers and administrators from different geographies. From sharing learnings to fostering collaboration, the walls of the classrooms are no longer a barrier. Digital pedagogies are also injecting values necessary for developing emotional and intellectual intelligence by building skills and competencies such as attention control, emotional regulation, perspective taking, empathy, compassion, critical inquiry and systems thinking among others, thereby laying the foundation for a peaceful and sustainable society.

## 2. Capacity Building of Teachers:

In the last few years, there has been heightened focus on teachers, and rightly so. They are the most important change-makers, who are the catalysts for students and parents alike. We also need to complement the existing efforts with a two-pronged approach: Be an ally to the teacher in her/his journey to imbibe this change and create a monitoring and evaluation mechanism to assist in the learning journey.

There is a unanimous sentiment that the goal of education is to enable a happy, productive, and inquisitive child. There has been a lot of focus on breaking down a child's learning process to see what works and what doesn't. We need to build the same level of focus on how a teacher learns and answer questions such as:

- How can a teacher evolve into being a facilitator and help the child think critically?

***MAIT EduVIsion Maturity Model***:

| Level1 | Level2 | Level3 | Level4 | Level5 |
|---|---|---|---|---|
| Computer lab[1] | Wireless Microphones for Teachers | Smart Board/Interactive LED Panels | 3 D Printers | Augmented Reality Labs[2] |
| Printer | Education Software | Cloud Based Storage & Communication Systems[3] | Laptops Installed in Classrooms for Each Teacher & students | Artificial Intelligence Tools[4] |
| Scanner[5] | Audio Visual Room | Uninterrupted Power Supply | Bio-Metrics | Robotic Kits |
| Broadband Connection (at least 2 MBPS[6]) | Broadband Connection (at least 5 MBPS) | Wireless Internet Connection (at least 10 MBPS) | Wireless Internet Connection (at least 24 MBPS) | |
| Operating Software | Interactive Science Kits | Online Student Response and Feedback | Digital Podium[7] | |
| Electricity (Alternate energy backup) | Technical Assistant, To Manage The computer Lab | Network and Data Firewall | e-Readers in Libraries | |
| Computer Aided Learning | | In-School Networking | | |

*Revised guidelines for ICT in Schools

[1]One dedicated Computer Lab for the entire school

[2]Allows students to explore the world without having to hold up a device which could distract them from the experience

[3]storage of reference articles and e-Books, submission of assignments, access to video recordings and audio notes from lectures

[4]Tools that allows educators to visually see and understand how students think while discussing ideas or coming up with solutions,

[5]For archiving and uploading files

[6]The speed has been recommended by MHRD in the set of ICT guidelines for schools released in 2011

[7]Lecture stand that comes equipped with various media components/devices and allows for lecture recording

*Source: MAIT Edu Vision 2018 Report*

**Fostering innovation and the spirit to unlearn and relearn is at the heart of the digital transformation that should be aimed for. For this, the entire ecosystem of education will have to be considered: Students, teachers, administrations, and policy makers are all important parts of this equation.**

- How can a teacher be handheld into making the transition into an ICT enabled facility, without letting techno phobia setting in?
- How can a teacher's skills be assessed to ensure that s/he is adept at leveraging technology and to invest in continued improvement?

For this to happen, it is important to not just equip teachers with ICT device and knowledge, but also to handhold her/ him through the journey of being productive in an ICT enabled classroom. Initiatives like upskilling of teachers through Common Service Centers are strategically well aligned with this vision.

Increasingly, parents and teachers are cognizant of different mental makeup and learning styles of different children. Creative capability is formed during a child's development years – Here, too, technology can play a pivotal role by providing personalized learning models which adjust to diverse skill sets and mental faculties. Teachers, with the help of technology are discovering more efficient and innovative ways of creating an immersive learning experience for students and are empowered with tailored assessment tool for enhanced monitoring and evaluation.It is often feared that expanding the role of technology in classrooms will lead to a scenario where technology replaces teachers. However, this fear is unfounded as socio emotional learning and skills such as empathy, unlearning and relearning will continue to increase in relevance.

### 3. Need to Adapt to Varying Needs

The size of the school, existing infrastructure, and rural urban divide create a perceptible difference in a school's maturity and ICT readiness. On one end of the spectrum we have schools focused on ahead of the curve pedagogical tools and access, on the other we have schools which are shadowing another school to access an ICT lab. These realities cannot be dissociated from one another, but we need to be cognizant of varying needs of these types of schools and many more in the middle of this spectrum.

MAIT, an apex industry body, proposed an EduVision Maturity Model to suit needs of schools across five levels, where level 1 schools need the most basic tech-enabled infrastructure and level 5 schools that are already ICT matured but need to invest on applications and use of emerging technologies.

This model particularly becomes helpful because it staggers the expenditure as per the current readiness of schools and provides a good benchmark for aspiring to go to the next level. As per this report, the cost of setting up a basic ICT lab in a Level 2 K-12 school, that caters to 4 sections of 40 students each comes to approximately INR 10 Lakhs. This also gives a direction to various CSR efforts that are investing in K-12 schools.

Fostering innovation and the spirit to unlearn and relearn is at the heart of the digital transformation that should be aimed for. For this, the entire ecosystem of education will have to be considered: Students, teachers, administrations, and policy makers are all important parts of this equation. For all these stakeholders, it has been an earnest attempt to explore ways of how technology can transform education, by supporting and focusing on various elements that create a larger learning and development ecosystem. There has been significant progress made already – the pace of this innovation and change will only go higher from this point on. To embrace this change, investing in building critical thinking ability and capacity will be most important. ❑

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**Ready Employability Skilling Program for ITI Students**

Nearly 15,00,000 students across all the ITIs in India can access the digital learning module via the Bharat Skills portal. Directorate General of Training (DGT), under the aegis of the Ministry of Skill Development and Entrepreneurship, has joined hands with two big private sector companies-Cisco and Accenture, to skill youth for the digital economy, through its Industrial Training Institutes (ITIs). Along with the implementation partner Quest Alliance, this program will equip students enrolled in ITIs across India with skills for the digital economy over the next two years.

The program includes tailor-made curriculum with modules for digital literacy, career readiness, employability skills and advanced technology skills such as data analytics, and a blended learning model enabled by a combination of online self-learning via the Bharat Skills portal and in-classroom modules.

The initial phase of the in-classroom training programme is being rolled out across 227 ITIs in Tamil Nadu, Gujarat, Bihar and Assam, targeting more than 1,00,000 youth. The in-classroom program will deliver more than 240 hours of training to impart critical 21st century skills including digital literacy and digital fluency skills; workplace readiness skills including creative problem solving and use of data in decision making; and career management skills including the cultivation of a growth mindset and the ability to identify and plan careers.

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YE-1172/2018

# e-Services for the Differently Abled

***Mohammed Asif Iqbal***

As India embarks on digitization journey, several digital revolutions and fundamental changes are happening in the way citizens avail various services from both government and private organizations. Both government organizations and corporates are transforming their operating models to optimally use digital solutions to reach out to customers/citizens. As a nation, we need to ensure that every citizen is a beneficiary of this change posed by the digital revolution. Digital transformation has facilitated ease of accessing products and services for all citizens whereas citizens with disability are empowered to access various products/services with ease. World is home to billion people with disability and more than 100 million citizens with disability reside in India.

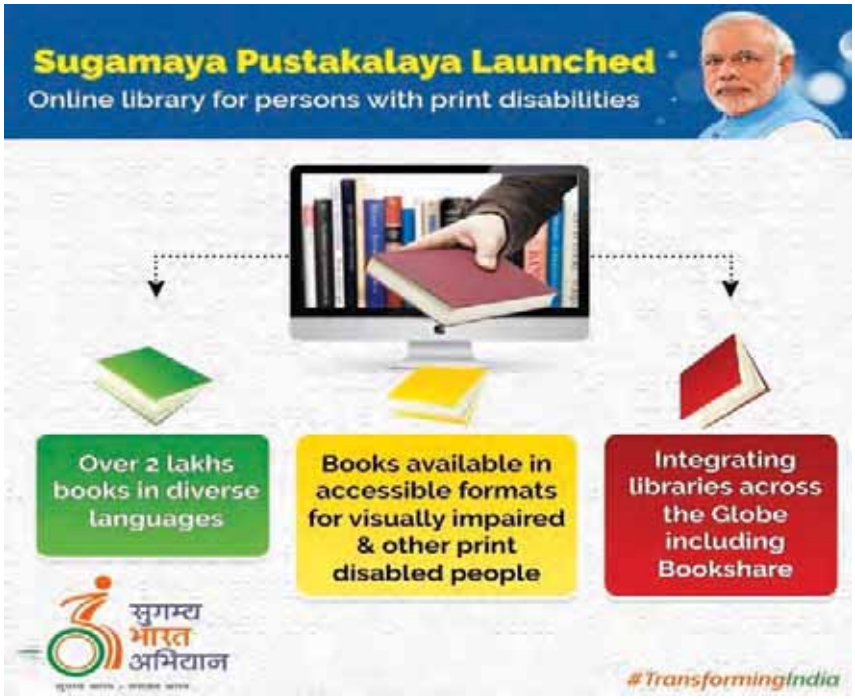
## Assistive Technology

Citizens with disability use assistive technology to access various mode of ICT channels such as web portal, mobile application, kiosk, etc. Blind or visually impaired citizen would use screen reader which would provide audio output of operating system and it's application such as Windows OS, Microsoft office, Google Chrome, etc. Various computer programmers of India have contributed significant amount of effort to enhance features of open source windows screen reader software which provide audio output of computer softwares. Non-visual display access (NVDA), an open source screen reading software, is now available in 7 Indian languages comprising of Hindi, Bengali, Tamil, Marathi, Kannad and Indian English. In the era of mobile app; hear to read is a text to speech (TTS) app which is developed for Indian language for Android such as, for Gujarati, Marathi, Kannada, Punjabi, Tamil and Telugu.

Avaz, another invention from India, is an alternative and augmentative communication device. It works by generating speech from limited muscle movements like that from the head or by the hand, and is used by people with speech disorders such as cerebral palsy, autism, intellectual disability, and aphasia.

Avaz was widely used in India as a communication device, and was subsequently converted into an app for the iPad and for Android tablets. This device is 90 per cent cheaper than the devices which are available in developed countries and cater to Indian languages.

The author is Associate Director with PricewaterhouseCoopers (PwC) India.




Kabi, is an app for speech impaired children which assists them for quick communication with the external world by selecting pictograph image on their hand held Android devices.

Blee watch is a smart watch especially designed for the needs of hearing impaired citizens. The watch enables recording emergency sounds like doorbell, fire alarm, baby's cry into the connected app. Whenever that sound is played next, Blee Watch notifies the user with unique vibration patterns, colours and icons. It also indicates the feel of music even if it is not being heard, Blee Watch converts sound into vibration patterns. The user can then express through dance on the basis of these vibration patterns.

## e-Services Leads to Inclusion

There are apps designed to find friend, life-partner/ companion for persons with disability and this is being widely used by community of persons with disability.

I still recall those days when I use to curse my blindness specially at the time of hailing a taxi to go to a particular destination. I had to literally climb down three stairs and request the building security guard to accompany me for getting a taxi. Today I can independently book Uber or Ola through iPhone/Android using their voice over /talkback feature which provide audio output of mobile app. Home delivery food ordering based apps can also be used by persons with disability with ease as they comply to digital accessibility international standard. Convenience of enjoying online shopping from home or anywhere through Amazon can also be availed by community of citizens with disability empowering them to overcome their mobility constraint.

e-Services has also led to financial inclusion of citizens with disability. Earlier blind and visually impaired had to suffer consequences of cheque being dishonoured on account of variation in individual signature but today digital channel has solved this problem to a large extent by online transactions through web portal or mobile app instead of cheque based instruments. Today, citizens with disability have full control of their finances including banking transactions, as they embrace digital channel.

Reading a newspaper on the go through mobile is no longer a dream but widely used by citizens with disability. Citizens with disability are also contributing to conversation with Government and private enterprises in terms of improving their service delivery mechanism. This digital channel of service delivery mechanism has empowered citizens with disability to raise a grievance with ease at the comfort of being in their own residence. Citizens with disability truly enjoy accessing entertainment based content on their mobile apps because these apps integrate universal design and can be accessed with ease through use of assistive technology.

## Government Initiatives

Government of India (GoI) has undertaken several initiatives to ensure that the digital channel of service delivery mechanism offers equal access to all, including citizens with disability. Income tax e-filing, IRCTC, Ministry of IT & Electronics, Ministry of Social Welfare, Women & Child Development are some of the finest examples of undertaking the accessibility journey and its features are largely accessible to citizens with disability. Government of India has launched an accessible India campaign with an objective of achieving complete accessible physical infrastructure, transport system and ICT echo system and has defined time lines along with quantitative target to comply with this national mission.

Non-profit organizations and private sector have immensely contributed to the journey of digital inclusion in India. DAISY Forum of India is a consortium of Not for Profit organizations from India who are involved in production and

**Both national and state governments have legal compulsion to ensure that digital service delivery channel incorporates universal design and offers equal access to all, including citizens with disability. e-Services within digital India would empower citizens with disability, including senior citizens with changing abilities due to aging.**

distribution of books and reading material in accessible formats for persons who cannot read normal print due to visual, cognitive or physical disabilities. DAISY forum of India (DFI) in collaboration with Government of India has launched Sugamya Pustakalaya, an online library of digital books in accessible format for print impaired citizens. DFI is currently in the process of converting course curriculum of primary, secondary and higher education for 19 major states of India. DFI proactively was involved in campaigning for negotiating of Marrakesh VIP Treaty which Facilitate Access to Published Works to Visually Impaired Persons and Persons with Print Disabilities. The Treaty permits for copyright exceptions to facilitate the creation of accessible versions of books and other copyrighted works for visually impaired persons and those with print disabilities. The Treaty sets a norm for countries ratifying the treaty to have a domestic copyright exception covering these activities, and allowing for the import and export of such materials. India was the first country to ratify the treaty on 24 July 2014.

Ministry of Urban Development, Government of India has issued a notification mandating that all cities within Smart City Mission project have to ensure that their ICT is digitally accessible, enabling citizens with disability to avail Government services with ease. Various State Government, such as Chattisgarh and Karnataka have already initiated measures to incorporate technical specifications for digital inclusion in their existing and new ICT initiative ensuring equal access to Government services for all citizens including citizens with disability.

Dial 112 mobile app, initiative undertaken by Government of Chattisgarh, enabling citizens of Chattisgarh to report emergency by dialing 112. This central number integrates all three emergency services such as police, fire and ambulance working together to serve citizens during emergency situation. This app is equipped to respond to hearing impaired citizens through texting features and can interact in real time.

**Instead of creating dedicated solutions for citizens with disability within the cyber space, the aim should be to create a Universal Design offering access to all, including citizens with disability. The design of products, environment, programs and services should be made user friendly for all regardless of sex, age, situation or disability and to the greatest extent possible, without the need for adaptation or specialized design.**

Recent passage of the revised Person With Disability Act (RPWD) 2016 further stresses on digital inclusion within digital India mandate conformance to international accessible standard for all government e-Services. Section 42 of this Act requires the appropriate government to ensure that all content in audio, print and electronic formats are accessible, that there is access to electronic media for all by providing audio descriptions, sign language and close captioning and that daily use electronic goods are available in universal design.

## Digital Accessibility and Universal Design

Digital accessibility is enabling an environment that helps easy access of computer, software and electronic resources (including web pages, software, mobile devices, e-readers etc.) and communications. It also facilitates navigating the web, mobile apps, electronic media, etc. and empowers citizens with disabilities like blindness, low vision, colour blind, auditory disability, motor disability, speech disability, cognitive disability and seizure disorder.

Instead of creating dedicated solutions for citizens with disability within the cyber space, the aim should be to create a Universal Design offering access to all, including citizens with disability. The design of products, environment, programs and services should be made user friendly for all regardless of sex, age, situation or disability and to the greatest extent possible, without the need for adaptation or specialized design. Universal design shall not exclude assistive devices for particular groups of citizens with disabilities where this is needed. Universal design would empower the blind and visually impaired individuals to navigate cyber space through their screen reader with ease, person with color blindness can distinguish content using different colors, audio-video content can be accessed alternatively by hearing impaired citizens, citizens with motor disability could use their devices to navigate cyber space efficiently and citizens with cognitive difficulties can understand better with the help of assistive technologies. Accessibility ensures that digital material is truly accessible to all users.

## Conclusion

It is a business imperative to ensure that the products and services are digitally accessible as it risks consequences of not being able to tap USD 8 trillion dollars of purchase power which United Nations estimates that friends and relatives along with persons with disability globally possess. Both National and State Governments have legal compulsion to ensure that digital service delivery channel incorporates universal design and offers equal access to all, including citizens with disability. e-Services within digital India would empower citizens with disability, including senior citizens with changing abilities due to aging.

Access to web, mobile apps, software applications, eBooks, soft copy of documents, etc. are the basic rights of every citizen of this world and inclusive e-Services facilitate citizens with disability to avail these rights and bridge the growing digital divide. ❑

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YE-1142/2018

# ICT Enabled Farm Centric Agricultural Services

*M Moni*

Agricultural services such as agricultural advisories, financial services, agricultural marketing and risk transfer are required for each Agricultural Commodity Value System (AVS) of a farmer and India has been blessed with about 400 Agricultural Commodity Value Systems. Many national level programmes, viz. Digital India 2015, Make In India 2015, Skill India 2015, Startup India 2015 and Stand-Up India 2015 have faced operational difficulties for its impact at farm level and farmer level, and that too at small and marginal farmers level. The Indian agricultural system is confronted with its own sheer complexity, inadequate factors of production, weather uncertainties, multiplicity of schemes and multiplicity of institutions, at farm level, and hence there is no size neutral solution possible.

**The emerging Agri StartUps may consider providing digitalised services (providing information on) to farmers through Farmer Producer Organisations (FPOs), for impacting farming community**

Digital Network for Farmers (DNF) – AGRISNET, AGMAKNET, FISHNET, APHNET, FETNET etc., visualised by the ISDA-95 Conference held at Vigyan Bhawan (New Delhi), was viewed as a strength, wealth and prosperity for farming households in India, of which the Marginal Scale Farmers are about 67 per cent, the Small Scale Farmers are about 18 per cent, the Semi-Medium Scale Farmers are about 10 per cent, the Medium Scale Farmers are about 4.3 per cent, and the Large Scale Farmers are about 0.7 per cent. The ISDA-95 Informatics Blueprint for Agricultural Sector has impacted Informatization of Agricultural System through the Government efforts very effectively in Farm sector (On-Farm and Off- Farm Input System, Production System, Output System) as well as Non-Farm Sector.

## Bridging the Gaps in Human Resources Development

In India, there are about 263 million people (54.6 per cent) engaged in the agriculture sector and over

The author is Professor Emeritus and Chairman, Centre for Agricultural Informatics and e-Governance Research Studies.

50 per cent of them are agricultural labourers (Census 2011). According to the IAMR (2013) Report, total agricultural workers are expected to decline to 190 million by 2022, with an expected decline of 33 per cent. In India, 90 per cent of current jobs in agriculture are "skill based" where only about 6 per cent of work force has received vocational training. There is thus a pronounced "skill gap" both in terms of quality and quantity.

The existing farm extension system needs to broad-based problem oriented, as depicted in Figure-1, to help farmers overcome their "point of no return" difficulties. ATMA and KVK are the two eyes of the present extension system which further require a "third eye" for problem resolution, may be ICT enabled Agricultural Polytechnics for bridging the emerging gaps in development of human resources for farm level functionaries. Development of human resources in the disciplines of agricultural informatics met with challenges since 2010. Agricultural Informatics Programme Courses are advocated at M. Tech, B. Tech and P.G. Diploma level, to prepare about 100,000 Rural Youths, for undertaking S&T based agricultural development and to rejuvenate and usher in agricultural dynamism in the country, by 2022, through agricultural informatics and e-Governance.

The regulators of higher education in India – the University Grants Commission (UGC) and the All India Council of Technical Education (AICTE) – have, of late, realised the higher potential of agricultural Informatics, in Rural India. E-Governance and Agricultural Informatics is the Pathway for Development 2.0 in food and agriculture in India. This requires an institutional approach by creating National Centre for IT in Agriculture (NCITA), State Centres for IT in Agriculture (SCITAs), District Centres of IT in Agriculture (DCITAs), and Block Centres for IT in Agriculture (BCITA) to convert "agricultural information" into a "commodity" for use.

The National Digital Communication Policy 2018, under its Mission 2022, has envisaged (a) **Connect India** - BharatNet, GramNet, NagarNet and JanWiFi Infrastructure, (b) **Propel India** through services based on 5G, AI, Blockchain, IOT, Cloud Computing and Big Data Analytics, and (c) **Secure India** ensuring sovereignty, safety and security of digital communications. Digitalisation of Agriculture facilitates farm centric services on demand, through Internet enabled End-User computing devices.

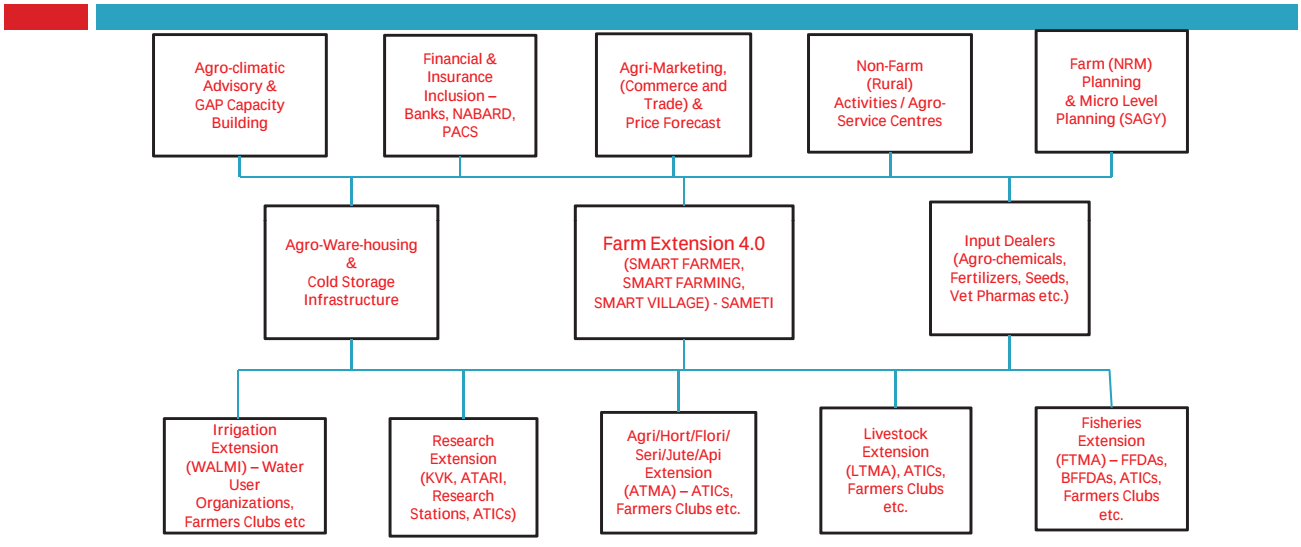
## Digitalised Farm Centric Services: e-Agriculture

The JAM (Jandhan, Aadhaar & Mobile) based Citizen Centric services has facilitated Direct Benefits Transfer (DBT) to reach eligible citizens at grassroots level, since 2014 onwards in the country. There has been a paradigm shift in providing services: Government-To-Citizen (G2C) vis-à-vis Citizen-to-Government (C2G) over the period. In the Agricultural sector, it is "location-specific", "farm-specific" and "farmer-specific" services that are required to be facilitated. Services based on "generic models," viz. Broadcasting Model, Comparative Analysis Model, Critical Flow Model, E-Advocacy Model and Interactive Service Model are expected to facilitate farming community on a larger scale, for its "inclusivity".

The emerging Agri StartUps may consider providing digitalised services (providing information on) to farmers or through Farmer Producer Organisations (FPOs), for impacting farming community (crops, livestock, fisheries (inland and marine), agro-forestry and forestry) very positively – in respect of:

- Development Schemes and Programs (village wise) – Agricultural and Non-Agricultural

Figure-1: Farm Extension 4.0



- Agricultural Institutions for farmer link – KVK, ATMA, Agri StartUps, NABARD, eNAM, FPOs, NGOs etc
- Quality Pesticides, Fertilizers and Seeds
- Farm Health (Plant Health, Animal Health, Soil Health, Water Health, Fishery Health)
- Forecasted Weather and Commodity-wise Agro-met advisories
- Market Information Prices and Arrivals of agricultural commodities to facilitate the farmer in getting better prices
- Interaction through Trading Platform and Transport Services for farmers and buyers of agricultural produce
- Minimum Support Price (MSP) and Government Procurement Points (GPPs) for commodities
- Marketing infrastructure, Post-Harvest facilities including storage infrastructure
- Farmer Training schedules of various institutions
- Sharing Good Agriculture Practices (GAPs) – IndGap and Bharat
- Irrigation and Drainage System infrastructure – minor irrigation, micro-irrigation, drip irrigation etc.

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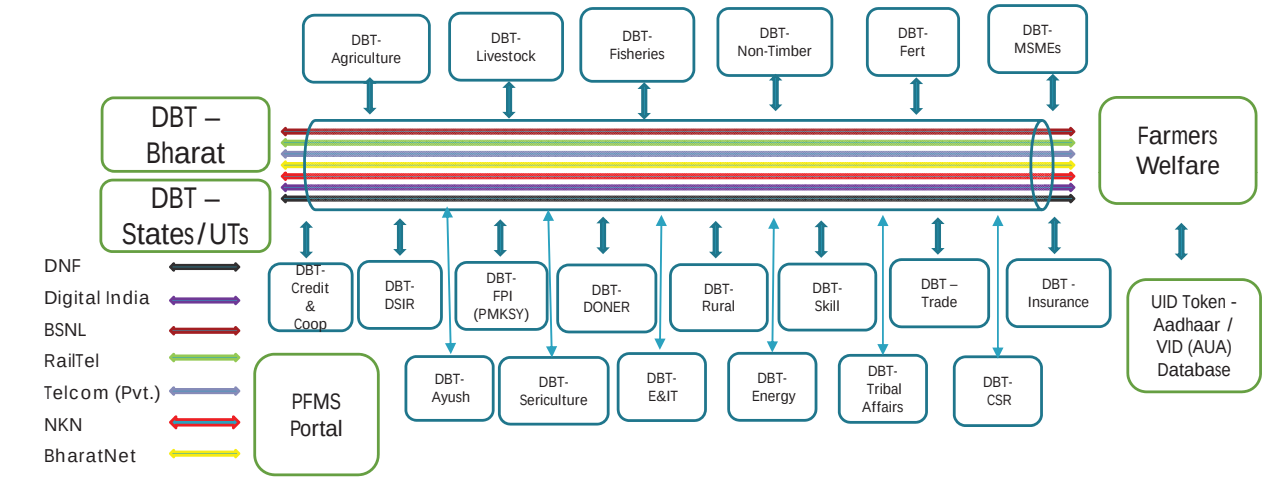
Har Ghar e-Sakshar PMGDISHA

- Use Plastics in Agriculture and Allied sector
- Aromatic and Medicinal Plants
- Agricultural wages to agricultural labourers
- Inputs (e.g. fingerlings) for fishery farming
- Fodder availability - its location and production – for Livestocks
- Farm Machineries & Implements availability
- Drought and Disaster related matters
- Processing Technologies for agricultural produces
- Financial and Credit, and Micro-Finance Services
- Agricultural Insurance and Micro-Insurance Services
- IPR on traditional practices
- Electronic certification of imports and exports
- Knowledge System and Management
- Agricultural Value Chains
- National Missions (Digital India, Skill India, etc)

Study undertaken by Moni & Saurabh Sharma (2017)[1] shows that the Small and Marginal farmers, who constitute about 85 per cent of the Operational Holdings of size (< 2 Ha.): (a) progressively use Mobile Communication Technology - Feature Phones and Smart phones; (b) have Traditional (Tacit) farming methods (knowledge); (c) take farm level decision based on past experience; and (d) access to Extension only through neighbourhood Farmers; and (e) watch out for effective Information Service delivery on Agro-met Advisory Services, Soil and Water Sample Analysis (Farm Health) and Advisory Services on Management of Salt affected Soils, etc.

This Study has also brought out challenges faced by the farming community with respect to: (a) Citizen Charter, (b) Investment & Risk Management, (c) Technology Solution - Authentication, Accessibility,

## Figure-2: Farmers Welfare e-Governance Architecture



Availability and Affordability, (d) Capacity Building & Competency Development, and (e) Information Security Issues. This study also highlighted the need for Agri StartUps in (a) Farm Management Services, (b) e-Commerce Services, and (c) Government Schemes O & M which are spread across the entire Agri Value System (Input Supply Chain and Output Value Chain).

Achieving Farm Extension 4.0 (Figure-1) leads to development of SMART Farmer, Smart Farming and SMART Village in an agricultural eco system. As of now, Direct Benefit Transfer (DBT) related to farming system is facilitated by more than 20 Central Government Departments, and about 100 State Government Departments. A proposed Farmers Welfare e-Governance Architecture is depicted in Figure-2 so as to facilitate creation of a robust Farmers Welfare Portal for information access in 22 constitutionally recognised Indian languages, empowering farmer as "SMART Farmer" by 2022. At least 12 categories of Agri StartUps (Figure-1) can meaningfully define Farm Extension 4.0 – Future Agriculture for India. There has been emphasis on (i) marketing innovations in agriculture (input supply chain for cost reduction, and output supply chain for increase in profitability), (ii) agricultural extension system 4.0 for increase in farm productivity, (iii) convergence of agricultural technologies and digital technologies for SMART Farming in Irrigated Areas, Rainfed areas and Tribal areas, and (iv) rural processing enterprises and processing technologies (including technologies for generating wealth from agricultural waste).

In order to boost farmer's income, India requires to adopt strategic intervention of ICT in Farming System Life Cycle, through a robust National Level Farmers Database. Digitalisation in Farming System aims at farm as 'economic unit', household (farmer) as "social unit," and land as "environmental unit". These three units will be the "core kernel" of the multi-threaded agricultural system, for achieving agricultural reforms through digitalisation and geo-spatial technologies. Farmer Database for promoting farm centric services and delivery.

The Agricultural sector include sub-sectors viz., Agriculture, Horticulture, Agri-Engineering, Floriculture, Apiculture, Sericulture, Livestock, Dairy, Poultry, Fisheries, Agro-Forestry, Processing, Marketing and Post-Harvest Management. Farming type includes irrigated, rainfed, dryland and tribal. Agricultural Value System (AVS) is from "Farm" to "Profit". It is therefore understood that entities such as "Farmer" and "Farm Resource", "Animal Resource", and "Fishery Resource" are essential components of the Agricultural Value System. The First Mile Connectivity (FMC) needs to have a Database on these essential components built on "core and acceptable" parameters at village level (more than 6.75 Lakh villages as per http://www.lgdirectory.gov.in). This is very much required for precision planning at National, State, District, Block and Village level.

The convergence of various sectoral programmes / schemes of agricultural and rural development is essential at Village level, to achieve desired impact at farm and farmer level. Both agricultural and rural development officers, working at block level, are not yet professionally trained to operationalise "Integrated Landuse Planning for Sustainable Agricultural and Rural Development" at grassroots level. The Ministry of Finance has made the mandatory use of Public Finance Management System (PFMS) for all Central Sector Schemes, so as to ensure that the benefits of the various Government Schemes reach to the last mile, and also to know the actual status of utilization of funds by the multiple implementing agencies of the Central and the State Governments.

Moni (2018)[2] discusses the need for creating a National level Farmers Database based on core parameters, for providing "personalized services" for each and every farmer based on his/her agricultural assets and resources, including grievances redressal in an effective manner, through language computing. In view of its importance to achieve the objectives of "Doubling Farmers' Income by 2022" Mission, it is essential to undertake creation of National Farmers Database, built on the principles of Aadhaar Database Platform and GSTN Database Platform, on about 130 Million farmers and associated their agricultural resource assets, as a Mission Mode Project, involving 2.25 lakhs Common Services Centres (CSCs) of Digital India Initiative.

This Farmer Database will be the "Core Database" for developing all other transactional databases of various schemes/programmes of the Agricultural Sector of both Central and State Governments, using Block Chain Technology, through Farmer Welfare e-Governance Architecture as proposed in Figure-2. This needs a robust digital framework for data organisation, seamless integration of agricultural information systems by adopting open data standards, and structured approach for decision making process system, for effective service delivery to farmers in 22 constitutionally recognized Indian languages.

This is the first step towards establishing e-Farmer and Farming 4.0 in the country.

## Way Forward

Digitalization of farming system is the step towards achieving sustainable agricultural production and minimizing Farmers' Distress. The Doubling Farmers' Income by 2022 (DFI-2022) Committee Report 2018, in its Volume – XII, has deliberated and suggested the following "Digital Technology Mission Mode Projects" for strengthening "Farm-centric" and "farmer-centric" services: -

a. Digitalised Agriculture: Digital Technology and Innovation in Agriculture – Synergisation of

Digital India, Make in India, Skill India and StartUps India Programmes for Transformational Reforms in Agricultural Sector (SMART Irrigated Farming, SMART Rainfed Farming and SMART Tribal Farming);

b. Digitalised Agro-Met Advisories & Agricultural Risk Management Solution;

c. Digitalized Agricultural Resources Information System and Micro-Level Planning for achieving SMART VILLAGE & SMART FARMING;

d. Digitalized Value Chain for about 400 agricultural Commodities;

e. Digitalised Access to Inputs, Technology, Knowledge, Skill, Agricultural Finance, Credit, Marketing and Agribusiness Management, to Farmers;

f. Digitalized Integrated Land and Water Management System – Per Drop More Crop;

g. Digitalized Farm Health Management for reduction of Farmers' Losses.

These DFI-2022 Digital Technology Mission Projects are envisaged to usher in Agriculture 4.0 in India. Digital Technologies in Agriculture (DTA) and Digital Networks for Farmers (DNF) are essential components for empowering farmers, reducing cost of cultivation, increasing their income, and enhancing agriculture productivity. The possible Action Plan for 2019-22 shall be as follows: -

a. Setting up of a National Centre for IT in Agriculture (NCITA)

b. Operationalisation of the DFI-2022 Digital Technology Mission Mode Projects, in identified topologies as Pilots, to begin with - one District in each State and UT of A&N Islands

c. Creation of National database on 13 Crore Farmers

d. Strengthening the operational Digital Network for Farmers (DNF) – AGRISNET, AGMARKNET, HORTNET, APHNET, FISHNET, FERTNET etc.

e. Steps to operationalise NeGP-AMMP Projects which have been in cold storage for a long time

f. Steps to dedicate BharatNet for Farmers

g. Creation of a Farmer Welfare Portal in 22 constitutionally recognised languages, for proactively dealing with their grievances redressal

h. Agricultural Informatics Programme at M. Tech, B. Tech and P.G. Level to attract rural youths into S&T based farming methods.

This may be considered as a possible roadmap for empowering Small and Marginal Farming and Agri StartUps in the country.

## Endnotes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*(E-mail: moni@shobhituniversity.ac.in)*


# J&K WINDOW

## CABINET APPROVES THE JAMMU AND KASHMIR RESERVATION (AMENDMENT) BILL, 2019

Union Cabinet under the chairmanship of the Prime Minister has cleared the decks for approval of "The Jammu and Kashmir Reservation (Amendment) Bill, 2019".

The Bill will replace "The Jammu and Kashmir Reservation (Amendment) Ordinance,2019" by amendments in the Jammu and Kashmir Reservation Act, 2004 and bringing persons residing in the areas adjoining International Border within the ambit of reservation at par with persons living in areas adjoining Actual Line of Control (ALoC)

It will go a long way in providing relief to the persons in Jammu and Kashmir living in areas adjoining international border who can now avail reservation in direct recruitment, promotion and admission in different professional course.

Due to continuous cross border tensions, persons living alongside International Border suffer from socio-economic and educational backwardness. Hence, it was felt justifiable to extend the reservation benefits to persons residing in the areas adjoining International Border on the similar lines of the persons living in areas adjoining Actual Line of Control (ALoC).

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# Empowering the Marginalized Through Digital Platforms

*Deepak Sharma, Kamini Malik, Jay Verdhan*

Recent achievements of modern democratic New India have been recognised the world over. India's ascent as the world's fastest growing major economy is unlikely to be chased soon as other major economies are going through global trade tensions, India's GDP growth will hover near 7.5 per cent by 2020, compared with 7.25 per cent in 2019, as indicated in latest report of OECD[1].

In historical perspective, the progress is indeed exemplary. India with extraordinary characteristics and diversity having many religions, ethnicities and over two dozen recognized languages and hundreds of dialects, aims to achieve rapid progress over a relatively short period.

India initiated aggressive digital campaigns providing best public services on non-discriminatory basis as the very nature of digital technology. It becomes the duty of the Government in a welfare State to come out with various welfare schemes which satisfy the immediate needs of the deprived class and provide adequate opportunities to enable and empower them.

A democratic Government has the duty to provide the basic necessities of life to its citizens. As Aadhaar verdicts indicated that the idea of a socialist state under a mandate to secure justice- social, economic and political - will be completely illusory if it fails to secure for its citizens the basic necessities in life[2]. Therefore, Government has to come up with a well formulated and substantive methodology to help people who suffer starvation, subjugation, deprivation and marginalization.

Most of these problems can be addressed with the help of technology. Digital technologies are vital for the inclusive growth of a country like India. India has the world's largest youth population with 356 million 10-24 year-olds, the United Nations Population Fund's (UNFPA) State of the World's Population report said[3]. Indian youth with huge aspirations and Government's impetus on digital technologies have taken the country many notches higher in the last two decades.

Aadhaar has devised a methodology where identity of a beneficiary can be ascertained in a flawless manner without giving any leeway to any individual to resort to dubious practices of duplicate/ fake identities. Government has been trying to address the issue of identification and providing unique identity for the last two decades. Towards this UIDAI was established in 2009 and pilots for transfer of direct benefits were done subsequently. In 2015, the Government launched the Digital India Programme with

**India has set an example with the help of technology that supports emerging socio economic rights and ensuring the inclusion of downtrodden, vulnerable and marginalised section of the society. India's journey of Digital Antyodaya has begun.**

The authors are scientists in the Ministry of Electronics & Information Technology (MeitY), Government of India.

the aim of transforming India into a digitally empowered society and knowledge economy. By adopting a citizen centric approach in delivering services with latest technology, the approach of governance has changed remarkably. Digital India Programme launched in 2015 gave strong impetus to Aadhaar,123 crore Aadhaars enrolled. Under Digital India programme, Aadhaar was backed with Parliamentary enactment and the Aadhaar Bill was introduced. The Bill having been passed by the Legislature, received the assent of the President on March 25, 2016 and, thus, became an Act. All of it devised 'Aadhaar', a 12 digit number that is intended to be a 'unique' identity of Indian citizens that is nationally accepted as a proof of identity, although not of citizenship. Direct Benefit Transfer (DBT) based on Aadhaar platform aims to bypass existing leakages and standardise delivery procedures by delivering cash directly to the bank accounts of beneficiaries. DBT ensured accurate targeting of the beneficiaries, de-duplication and reduction of fraud. This addressed the key issue of correct identification of targeted beneficiaries for delivery of various subsidies, benefits, services, grants, wages and other welfare schemes of Government where funds flows from from the Consolidated Fund of India.

Through the utilization of Aadhaar for service delivery, formerly excluded beneficiaries are now able to prove their identity and access their entitlements. Bogus identities have been eliminated by regularly updated Aadhaar database thus removing ghosts and duplicates.

The combination of Jan Dhan bank accounts, mobile phones and digital identity through Aadhaar i.e. JAM trinity is helping the poor to get benefits directly into their bank account. A total of Rs. 7.34 lakh crore have been disbursed through Aadhaar based DBT to beneficiaries of 439 Government schemes which, have led to saving of over Rs. 1.41 lakh crore cumulatively by March 2019, by removing fictitious claimants[4]. DBT brings in efficiency, effectiveness, transparency and accountability in the Government system and infuses confidence of citizens in governance.

The United Nations, in its report titled 'Leaving No One Behind: The Imperative of Inclusive Development', praised India's decision of launching Aadhaar as it will be a step forward in ensuring inclusion of all people especially the poorest and the most marginalized. In a welfare State, where measures are taken to ameliorate the sufferings of the downtrodden, the aim of Aadhaar is to ensure that these benefits actually reach the populace for whom they are meant[5].

Efforts are being made to uplift the marginalised sections with the support of digital technologies, starting from giving ration at reasonable cost with around 23.19 crore Digitized Ration Cards; giving various pensions to the deserving where in 1.99 crore Digital Life Certificate processed; disbursing scholarships wherein over 1.4 crore applications received digitally and over 2128 crore disbursed in AY 2018-19; employment to unemployed under MGNREGA Scheme with 13.14 crore job cards and 7.75 crore number of DBT Transactions during 2019-20.

The National Digital Platforms comprising unique programmes and products such as Aadhaar, DBT, UPI BHIM, Jeevan Praman, Digital Locker etc have already created a huge societal impact.

It is estimated that in India only about 10 per cent people are English-speaking[6] and it is obvious to presume that a large population is deprived of benefits of technologies due to language barrier. The internet and digital technologies can only be useful to people once it serves citizens in local language. Today India has Indian language content in cyberspace in at least 15 languages and the rest would soon be available on the Internet.

"Introduction of PFMS Health Module has eliminated the repeated visits required by mothers to collect cheques and receive payments; it has made the accounting and banking reconciliation easier and hence freeing me up from some of my administrative tasks"

Dr. Krishna Kumar, Medical officer, PHC Bihta

"This time I got my JBSY incentive amount directly into my bank account. After the delivery of my baby, I gave my bank account details to ASHA and received my money into my account within a month. But, at the time of my first delivery, I had to do a lot running around and received a cheque after two months of delivery. This time I got my money without any hassle"

Pushpa Devi, JBSY beneficiary, village- Madhupur, Bihta

Sources:https://dbtbharat.gov.in/successstory/view

Pradhan Mantri Digital Saksharta Abhiyan has been appreciated as the world's largest Government effort to bridge the digital divide. It aims to make 6 crore rural adults digitally literate – one person in every household, out of which 2.21 crore persons have already been trained[7]. Common Services Centres (CSCs) are internet enabled centres allowing near doorstep access to citizens to government, private and social services. These front end service delivery outlets are delivering over 350 digital services. A number of important government welfare services for including PMAY, FSSAI, Soil Health Cards, Swachh Bharat Abhiyan, Pradhan Mantri Fasal Bima Yojana, etc have been added on Digital Seva Portal. CSCs are also implementing the Government's flagship programme of Digital Literacy called PMGDISHA, DigiPay,

"I noticed that in our village, digital literacy is rising due to Pradhan Mantri Gramin Digital Saksharta Abhiyan. Earlier the elderly were inconvenienced but now pension related issues are solved through technology": Jitender Solanki from Gautam Budh Nagar tells PM

"I am associated with a CSC. I have seen how this works and it has given me a new identity. I will always pray for your long life for the good work you have done. At my Centre, a wide range of Government and other services like banking, insurance and pension related issues can be availed. At the same time, I am ensuring more women get access to medical services, they can call doctors": Misbah Hashmi tells PM

"I learnt how to use the BHIM App, which made my life easy": Meenu from Haryana's Yamuna Nagar

"I had no employment but thanks to CSC, I got work opportunities. People in my village, especially the elderly and students are most happy with CSCs": A youngster from Gondia in Maharashtra tells PM

"I had to walk 25 km to get my wages...the CSC has changed that. Due to this my family is very happy": Shanta Ji from Gondia

Sources: PM Interaction with Digital India Beneficiaries

https://www.narendramodi.in/pm-modi-interacts-with-the-beneficiaries-of-digital-india-via-the-nm-app-540470

on Aadhar enabled Payment System (AePS) for online banking services. A vast network of 3.45 lakh CSCs is creating job opportunities for around 11 lakh people including women. CSCs are seen today as social change agents, they are not only ensuring social but also financial inclusion of society to ensure nobody is left behind.

Digital payments allowed services to be delivered at a lower cost with greater scalability while enabling small and micro enterprises to access formal financial services and benefits of e-commerce. Many self-employed people with a steady source of income do not pass conventional bank loan screenings due to strict and outdated credit scoring criteria. Digital payments have enabled alternative methods of credit scoring based on auditable transaction chain and with small ticket loan build over digital payments which is helping people who were left behind in the financial eco-system. This in turn helps in fostering economic growth and financial inclusion. Recent government initiatives have created a catalytic environment for the proliferation and growth of digital payments. Digitization of transactions is an imperative for India; it will benefit the economically disadvantaged, the middle class, the businesses and the government.

The BPO Scheme in Tier-II/III locations are offering services in local languages which is in turn creating employment opportunities for the local youth near their home in small towns. The schemes provide special incentives to the units encouraging employment to women and differently abled persons.

This article covers only few prominent schemes implemented digitally to establish that whether it be Gandhiji's concept of development of Sarvodaya through Antyodaya, and Deen Dayal Upadhyay's Antyodaya- rise of last person, this can only be realised with the use of modern and affordable technologies in a diverse country of 1.3 billion people. Also, there is an emergence of socio-economic rights such as the right to education, employment, an adequate standard of living, health and social security not only in India but in many other countries world-wide and the same should be guaranteed by Governments without discrimination. India has set an example with the help of technology that supports emerging socio-economic rights and ensuring the inclusion of downtrodden, vulnerable and marginalised section of the society. India's journey of Digital Antyodaya has begun.

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YE-1171/2018

SPECIAL ARTICLE

# Development of Metro Rails in India

*Durga Shanker Mishra*

India is urbanizing very fast. As per Census 2011, more than 31 per cent of the population was living in urban areas. This is expected to grow to over 40 per cent i.e. nearly 60 crore in 2031 and 50 per cent, leading to over 80 crore by 2051. At present 65 per cent of country's GDP comes from urban areas and it is likely to grow over 75 per cent by 2030.

As a result of the rapid urbanization, the transport in urban areas has been largely hegemonized by private motor vehicles and supporting ancillary infrastructures like flyovers, road networks etc. The total registered vehicles in the country has grown at a Compound Annual Growth Rate (CAGR) of 10.9 per cent[1] since 1951. This rapid growth of personal vehicles has adversely impacted the share of Public Transport; share of buses has reduced to 1 per cent only. This has led to proliferation of informal operators, such as private minibus and microbus services in many cities. The effect is more pronounced in million plus cities, which accounted for nearly 31.5 per cent of the total registered vehicles in 2015, as compared to 24 per cent in 2001.

Quite evident results of these are increased congestion, pollution[2], road accidents[3], energy consumption[4] and travel time in our cities, which has dropped by about 3 kmph in seven major cities between 2017 and 2018[5]. As per a study by Boston Consulting Group (BCG), the impact of traffic congestion (in peak hour in the four metropolitan cities of Delhi, Mumbai, Kolkata and Chennai) to the economy is Rs 1.47 lakh crores annually[6].

## National Urban Transport 2006

In order to address the challenges of urban mobility and also to provide a clear direction and a framework for future action, Government of India formulated the National Urban Transport Policy (NUTP) in 2006. The vision of this policy is to recognize that people occupy centre stage in our cities and all plans should be people centric. The focus of the policy is to address the movement of people and goods and not the vehicles, so as to make our cities liveable and enable them to become the "engines of economic growth" that power India's development in the 21st century. The objective of this policy is to ensure safe, affordable, quick, comfortable, reliable and sustainable access for the growing number of city residents to jobs, education, health, recreation and such other needs within cities.

## Existing Metro Rail Systems in India

In accordance with the objectives of NUTP, among other solutions, Mass Rapid Transit Systems have been implemented across the country. These systems not only facilitate mobility in cities, but also have a positive impact on the economic growth and quality of lives of citizens.

***"Let's consider urbanisation as an opportunity. Gone are the days when it was seen as a challenge or obstacle."***

***Narendra Modi,***
***Prime Minister of India***
***https://twitter.com/PMO India (June 25, 2016)***

The author is Secretary, Ministry of Housing and Urban Affairs, Government of India.

The first metro rail started its commercial services in Kolkata in 1984. Spanning over 27.39 km, the system took about 10 years for construction. It continued to be the only metro system in the country till Delhi Metro commenced operations along 8.40 km length, which was inaugurated by the then Prime Minister Shri Atal Bihari Vajpayee in December 2002. The success of Delhi Metro inspired other big cities to follow suit and in October 2011 Bangalore Metro started operations. This was followed by operation of mass transit systems in Mumbai, Gurugram, Chennai etc.

Metro rail systems have witnessed exponential growth during the last few years. Before 2002 only 27 km of metro existed in only one city i.e Kolkata. Between 2002 and 2009 another 75 km of the system were added, which increased the network length to 102 km. However, this addition was in the city of Delhi only. Further, between 2009 and 2014, a total network of 147 km was added across the cities of Delhi, Bangalore, Mumbai and Gurgaon, making total length 249 km.

Since 2014, the metro has spread across the country very rapidly and a total of 657 km of Metro rail have been made operational in 18 cities of National Capital Territory of Delhi, Noida, Greater Noida, Faridabad, Ghazibad, Bahadurgarh, Balabgarh, Gurugram, Kolkata, Chennai, Bengaluru, Mumbai, Hyderabad, Kochi, Lucknow, Ahmedabad-Gandhinagar, Nagpur and Jaipur.

More than 800 km of Metro Rail and 82 km of Regional Rapid Rail Transit Systems (RRTS) are under various stages of construction at present. These include extensions of existing networks in Delhi, Bangalore, Mumbai, Kochi, Hyderabad, Lucknow, Chennai, Nagpur, Ahmedabad-Gandhinagar and Kolkata. In addition new metro systems are under development in Patna, Pune, Agra, Kanpur, Bhopal, Indore, Surat and Meerut.

> ***"We live in an era in which connectivity is all important."***
>
> ***Narendra Modi,***
> ***Prime Minister of India***
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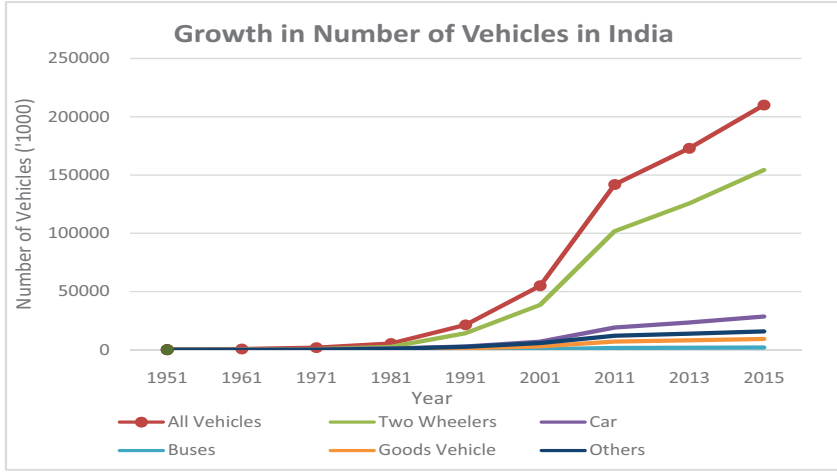



The Delhi- Meerut RRTS corridor is being developed as a fast and reliable transit system with high transportation capacity, to meet the demand of the highly urbanized and industrialized corridor. This is being done for the first time in the country. In addition two more corridors Delhi – Alwar and Delhi - Panipat with a total length of about 290 km are under planning stage.

## Challenges of Existing Metro Systems

Any new initiative brings along with it a bouquet of challenges, and the same has been the case for metro rail systems as well. The key among them are:

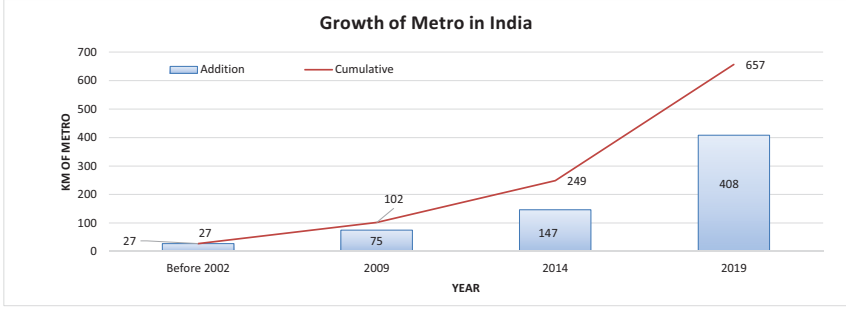
1. Metro Rail is a capital intensive system which requires huge investments from center, state and local governments.
2. Being a fairly new system in India, the technology available is not standardized, resulting in higher costs of construction and operations.
3. Lack of last-mile connectivity keeps the system beyond reach for a large segment of the potential users and limits the catchment area of the system.
4. Parking lots and roads leading to many stations remain poorly lit. Many of the stretches do not have 'eyes on the street', which compromises security.
5. Non-availability of demand forecasts for metro rail projects in the country.

## Addressing the Challenges

For addressing the challenges being faced by the metro system, the following initiatives have been taken by Government of India:

## Metro Rail Policy, 2017

Considering the imminent need for enhancing mobility in cities through metro rails, Government of India, in 2017, framed the Metro Rail Policy[7] for the country. The focus is on systematic



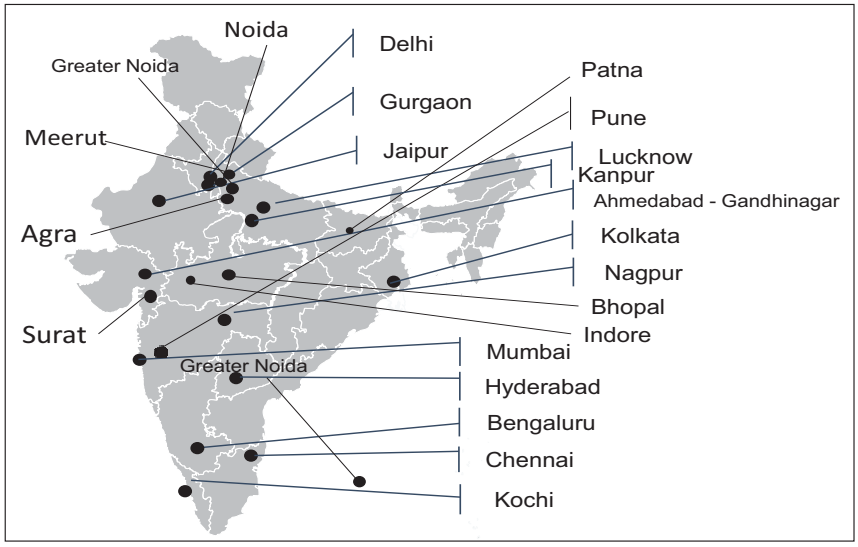



*Figure 1: Metro Rail in India*

planning and implementation of metro rail systems that act as a guide to the state governments for preparing comprehensive proposals for metro rail projects. The policy lays down various financial models for metro rail development including Public Private Partnership (PPP) and provide a proper ecosystem for its growth in the country.

## Value Capture Financing

Mass Transit Systems across the globe are not financially sustainable on fare box revenue alone and are dependent on alternate sources of funding. The Value Capture Finance (VCF) Policy Framework, 2017[8] identifies tools such as transferable development rights (TDRs), betterment levy, fee for changing land use, vacant land tax and land pooling system etc. as sources of financing infrastructure projects. The Metro Rail Policy prescribes adoption of VCF and transfer of financial benefits accruing in the metro influence zone to the metro company.

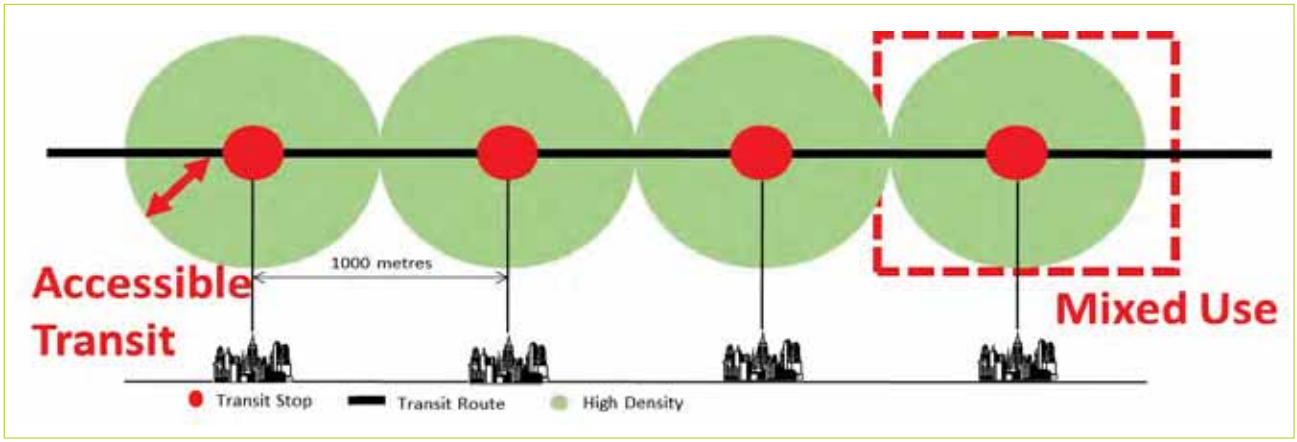
## Standardization of Metro Components

In order to promote 'Make in India', in 2017 the Department of Promotion of Industry and Internal Trade (DPIIT) issued Public Procurement (Preference to Make in India) Order to encourage such initiatives. In pursuance of the said order, MoHUA initiated steps for its implementation immediately and became the first Ministry to issue Phased Manufacturing Plan (PMP) for indigenous procurement of various metro rail components. The aim is to increase minimum local content in rolling stock, telecom and signaling to 50 per cent by 2023 in a phased manner. It was planned that 80 per cent of civil work in metro rail project and 50 per cent of electrical items should be procured indigenously right away.

> ***"The Metro Rail Policy is 'reform oriented'. By ensuring that the metro trains are linked with feeder buses, new walkways and pathways are being developed simultaneously."***
>
> ***Narendra Modi,***
> ***Prime Minister of India***
> ***@narendramodi***

For creating a conducive environment for investment by global players in the country, directions have been issued to all metro rail corporations that minimum 75 per cent of the tendered quantity of rolling stock should be manufactured indigenously and to progressively increase indigenous content either by establishing facility in India or in partnership with Indian reputed manufactures.

In order to promote indigenization and reduction in cost, the specifications of various metro rail components like rolling stock, signalling and telecom systems, electrical and electromechanical systems and civil engineering structures have been standardized. These standards will ensure that metro rail sub systems for all new metro projects conform to the prescribed standards and thus encouraging manufacturers to set



up their units in India, eyeing the enormous future prospects and the economies of scale provided by the large scale production of standard products.

### Transit Oriented Development (TOD)

Government of India issued National TOD Policy, 2017[9] with the objective to integrate land use and transport planning to develop compact and inclusive growth centres within the influence zone of 500-800m. This will promote public transport usage and achieve reduction in the private vehicle ownership.

TOD is being implemented at 3 levels:

- Station level TOD: Development of TOD around existing/proposed mass transit stations – eg. Ahmedabad, Kochi and Surat;
- Area level TOD: Development of TOD around CBD areas – e.g. Delhi, Bhopal, Mumbai, Raipur;
- City level TOD: Development of TOD within an activity node across the city – e.g. Naya Raipur and Navi Mumbai

### National Common Mobility Card

MoHUA initiated the National Common Mobility Card (NCMC) Program to enable seamless travel by metro rails and other transport systems across the country besides retail shopping and purchases. This card meets travel needs based on stored value of money and does away with the need of carrying separate cards for banking, retail purchases and transit requirements. NCMC is an Open Loop Card, which means customer may use the same card for travel across the country. This would allow fast deployment of digital payments due to standardized implementation process and will enable rapid digital penetration.

In order to showcase the NCMC ecosystem, a pilot was deployed in Delhi Metro Rail Corporation (DMRC) across few stations on January 31st, 2019. This pilot helped to improve hardware reliability and fine tune the software. Card was launched across the country by Hon'ble Prime Minister on 4th March, 2019. The initiative will facilitate large scale indigenous production of debit/credit cards equipments compliant to NCMC standards and specifications, and their deployment in Indian transit system.

The metro entry and exit gates which form an important component of the metro automatic fare collection (AFC) systems has been the mainstay of few foreign companies, who provide proprietary solutions and therefore are costly upfront on purchase and also on operations and maintenance (O&M). Bharat Electronics Ltd (BEL) in collaboration with C-DAC has now successfully designed and manufactured metro gate indigenously, which has been tested for international standards by an EMVco accreditation agency in France. This breakthrough will not only bring down the cost of the AFC systems and enable interoperability on account of open-loop standards but will boost India's self-reliance in technology and export. Hon'ble Prime Minister launched the indigenously developed AFC named 'Swagat' on 4th March 2019.

### Setting up of Unified Metropolitan Transport Authority (UMTA)

Urban transport in cities are managed and implemented by different agencies who generally work independently with little synergy between them. There is thus a need for an umbrella organization like UMTA[10] that monitors, integrates and coordinates various aspects related to urban transport like route, time table, fare, inter-modal integration etc. in the city. In order to assist cities in setting up UMTA, operations documents and draft UMTA Bill have been formulated by MoHUA and shared with States/ UTs.

***"In 2022, when we mark 75 years of freedom, I dream that we live in an India in which our petrol imports reduce. In order to achieve this, state of the art mass transit systems are the need of the hour."***

***Narendra Modi,***
***Prime Minister of India***
***@narendramodi (Dec 25, 2017)***

## Multimodal Integration

The National Urban Transport Policy, 2006, recommends multimodal integration as the most critical requirement in creation of seamless public transport services. The MoHUA has taken various initiatives to address this important aspect:

1. Toolkit on City Wide Multimodal Integrated Transport Plan[11].
2. Traffic Management and Information Control Centre (TMICC)[12], operations document.

Initiatives taken in metro systems to promote multimodal integration includes:

- Rapid metro rail in Gurgaon is integrated with metro station of Delhi Metro with a flyway of 90 m. The Noida-Greater Noida metro is being integrated with Delhi metro via a skywalk and pedestrian pathway at Sector 71 Noida. Various corridors of Delhi metro are integrated to provide seamless interchange within the system.
- Feeder Service in form of buses, autos, e-rickshaws, and public bicycle sharing have been provided in cities like Delhi, Bangalore, Bhopal etc. to improve last mile connectivity.
- In order to ensure fare integration, Kochi1 Card has been introduced which is acceptable across all modes of transport. Similar systems have been implemented in Ahmedabad, Bangalore and Delhi. MMRDA plans to have a common mobility card for travel in suburban rail, metro and buses of Mumbai.

## Future of Metro Systems in the Country

There were 53 urban agglomerations in India with a population of over one million in 2011 census. Now 18 cities have operating metro rail system and apart from these, in another 9 cities it is at various stages of development. Most of the remaining cities are aspiring to introduce mass transit system to address the growing mobility needs and its associated challenges.

Currently metro systems are governed by The Metro Railways (Construction of Works) Act, 1978 and The Metro Railways (Operation & Maintenance) Act, 2002. However, in view of the Metro Rail Policy, 2017 a new Metro Rail (Construction, Operation & Maintenance ) Bill is under preparation, which combines the provisions of existing two Metro Acts. This unified Act will enable Private participation in metro rail, and delegation of greater powers to the State Governments and Metro Rail Administration (MRA). This Act will align with the provisions for compensation, rehabilitation and resettlement of The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act, 2013[13]. The proposed Act envisages to have an independent permanent Metro Rail Fare Regularity Authority for timely revision of metro rail fares.

I-Metros (Indian Metro Rail Organisations' Society), an association of Indian metro rails has been launched in March 2018, as a platform to exchange ideas, pooling of knowledge and sharing of experience, best practices, innovations etc. among our companies to nurture excellence in performance. It will enable adoption of the latest technologies and improving performance and passenger experience enhancement in future through resonance of each other's strengths.

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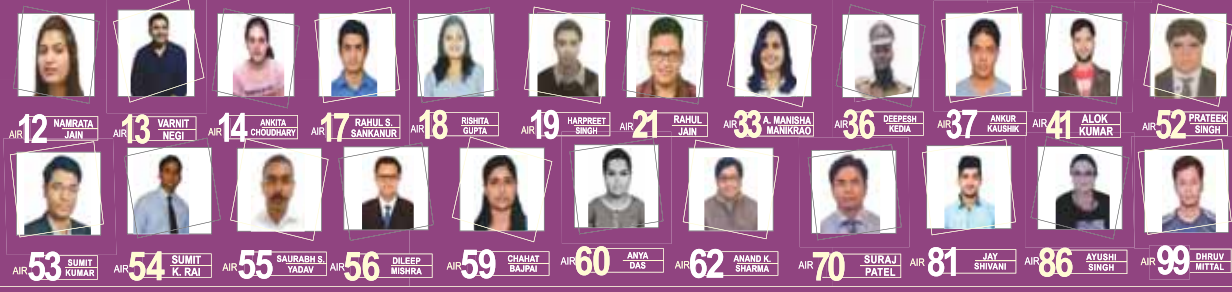


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# DO YOU KNOW?

## e-Health Services

The Central Government has undertaken various initiatives using Information & Communication Technologies (ICT) for improving efficiency and effectiveness of the public healthcare system. Ministry is continuously working on planning and introducing more of ICT initiatives. The ICT initiatives are briefed as under:

### National Health Portal

With an overall objective to create awareness amongst the citizens about health, Government programmes & services in Health Sector, National Health Portal (NHP) provides information to citizens and stakeholders in different languages (currently six languages Hindi, English, Tamil, Gujarati, Bengali, and Punjabi). A voice portal, providing information through a toll-free number 1800-180-1104 and Mobile App are also available. Website: http://www.nhp.gov.in

### e-Hospital

e-Hospital@NIC a Hospital Management System is a workflow based ICT solution for Hospitals specifically meant for the hospitals in Government Sector. This is a generic software which covers major functional areas like patient care, laboratory services, work flow based document information exchange, human resource and medical records management of a Hospital.

### Online Registration System (ORS)

In order to improve ease of services for citizens, Online Registration System (ORS) launched in July 2015 provides services to citizens for taking online registration and appointment, payment of fees, online viewing of diagnostic reports, enquiring availability of blood online etc. in various public hospitals.

### Mera Aspataal (Patient Feedback) Application

To empower citizens to participate in improvement of healthcare service delivery by providing feedback on service quality, facilities etc. at hospitals and ultimately help establish patient driven, responsive and accountable healthcare system, this application has been launched which is an IT based feedback system to collect information on patients' level of satisfaction using a multi-channel approach viz. SMS, Outbound Dialing, Web Portal, and Mobile App. It is expected to help the government to take appropriate decisions for enhancing the quality of healthcare delivery across public facilities which will improve the patient's experience. The patient will be able to receive an effective and appropriate care. Website: http://meraaspataal.nhp.gov.in/

### Food Safety and Standards Authority of India (FSSAI)

For ease of services to food sector stakeholders, Food Safety and Standards Authority of India is offering services for Online License, Clearance, Product approval to the Food Business Operators. Website: http://www.fssai.gov.in

### National Organ & Tissue Transplant Organisation (NOTTO)

In order to promote organ donation amongst citizens at large, National Organ & Tissue Transplant Organisation through its web-portal offers services for Online Registration for Organ/Tissue Transplantation or Retrieval and Online pledge registry by citizen for organ donation. Website: http://www.notto.nic.in/

**To harness the wide penetration of mobile connectivity, various mobile apps have been launched so far, namely :**

i. **Vaccine Tracker (Indradhanush Immunization) :** support parents in tracking immunization status of their children and helps them in ensuring complete and timely vaccination. Google Play http://www.nhp.gov.in/nhp-indradhanush_pg and https://play.google.com/store/apps/details?id=com.nhp.ui&hl=en

### NHP Swasthya Bharat

The "NHP Swasthya Bharat" is an Android based mobile application, which can be installed on any device with Android OS version 2.3 or above.

The access to authentic health information is the primary right of the citizen. Providing authentic health information to the society is arguably one of the most important factors in improving health outcomes. Inadequate or poor health information can increase the risk of hospitalization or even disease burden.

MoHFW through its e-governance initiatives is launching a mobile application "NHP Swasthya Bharat" to empower the citizens to find reliable and relevant health information. The application provides detailed information regarding healthy lifestyle, disease conditions (A-Z), symptoms, treatment options, first aid and public health alerts. http://www.nhp.gov.in/nhp-swasth-bharat_pg

### Mother and Child Tracking System (MCTS) / Reproductive Child Health (RCH) Application

It is an individual-based tracking system implemented across all the States & UTs to facilitate timely delivery of antenatal and postnatal care services and immunization to children with an objective of improving IMR, MMR, & morbidity; providing alerts to health service providers about the services due list and service delivery gaps; appropriate health promotion messages to beneficiaries. Currently over 12 crore pregnant women and around 11 crore children have been registered on MCTS/RCH portal since inception. Website: http://www.rch.nhm.gov.in/RCH/

### Kilkari

It delivers free, weekly, time-appropriate 72 audio messages about pregnancy, child birth and child care delivery to families' mobile phones. Approximately 6 crore successful calls have been made so far under Kilkari in Bihar, Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh and Uttarakhand.

### TB Patient Monitoring System "Nikshay"

For tracking of individuals for treatment-adherence has been implemented across all States for monitoring of TB patients. Also a Missed Call Centre facility with Toll Free No: 1800-11-6666 for reaching to unreached TB patients is available, for counselling and treatment support. Approximately 80 lakh patients have been registered on Nikshay.

### Tobacco Cessation Programme

It is a mobile-based interventional initiative for counselling and helping people to quit tobacco, by giving a missed call to 011-22901701. Currently over 20 lakh total missed calls have been captured and around 15 lakhs users are registered for this programme. Website: http://www.nhp.gov.in/quit-tobacco

### Hospital Information System (HIS)

HIS is being implemented in hospitals for automation of hospital processes to achieve better efficiency and service delivery in Public Health facilities upto CHC level. Targeted impact includes facilitation in hospital workflow management leading to better delivery of services to patients and improvement in efficiency of processes at hospitals. Key implementation milestones include:

a) **e-Hospital developed by NIC** has been implemented on cloud platform in over 100 hospitals as on date and more than 50 hospitals are on stand alone platform.

b) **e-Sushrut application of C-DAC Noida** has been functional in Rajasthan (State-wide: 80 facilities) & 15 hospitals in other states.

**Source - https://mohfw.gov.in/about-us/departments**

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# Towards a National Digital Health Ecosystem

*J Satyanarayana, Lav Agarwal*

Healthcare has always been central to all development efforts be it at the state, national or global level. The National Health Policy 2017[1]approved by the Government of India (GoI) had defined the vision of 'health and well-being for all at all ages'. Continuum of Care is a concept strongly advocated by the Policy. These lofty ideals are sought to be achieved by refactoring the existing schemes and introducing several new schemes including some digital initiatives. Citizen-centricity, quality of care, better access, universal health coverage, and inclusiveness are some of the key principles on which the Policy is founded. The realization of all these aspirations can be facilitated by leveraging the power of the digital technologies. In the context of India, with its size and diversity, this mammoth task requires that a holistic, comprehensive and interoperable digital architecture is crafted and is adopted by all the stakeholders. In the absence of such an architecture, the use of technology in the health sector continues to grow in an uneven manner and in silos.

## Ecosystem, not System!

In the above context, a Committee constituted by the Ministry of Health and Family Welfare, GoI in November 2018, to take forward the concept of National Health Stack designed under the aegis of Niti Aayog, recognized the need for creating a framework for the evolution of a National Digital Health Ecosystem (NDHE) – an Ecosystem and NOT a System! The result is the National Digital Health Blueprint (NDHB), which is more than an architectural document, as it provides specific guidance on its implementation as well. This report describes the salient features of NDHB. The report on NDHB submitted by the Committee is under the consideration of the Ministry. It will go through the process of a series of consultations with the States, the Industry and other stakeholder groups, before its formal adoption.

The Blueprint keeps the overall vision of NHP 2017 in perspective and recommends a pragmatic agenda to start with, adopting the principle of 'Think Big, Start Small, Scale Fast'. To this end, it has been designed as a layered framework, with the Vision and a set of Principles at the core, surrounded by the other layers relating to Digital Health Infrastructure, Digital Health Data Hubs, Building Blocks, Standards and Regulations, and an Institutional Framework for its implementation.

**Digital Health is but a small lever in the evolution of the overall national health ecosystem. A substantial impact in the health sector is possible only through a posse of reforms and enhancements in the sector. These include improving the ratios like Doctor : Population, Specialist : Doctor, Bed : Population; enhancing the spread and quality of health infrastructure and improving knowledge and skills among the health professionals and workers.**

National Health Portal

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The Vision of NDHB is stated below:

"To create a National Digital Health Ecosystem that supports Universal Health Coverage in an efficient, accessible, inclusive, affordable, timely and safe manner, through provision of a wide-range of data, information and infrastructure services, duly leveraging open, interoperable, standards-based digital systems, and ensuring the security, confidentiality and privacy of health-related personal information."

The Objectives of NDHB are aligned to the Vision of NHP 2017 and the SDG's[2] relating to the health sector. These include:

1. Establishing and managing the core digital health data and the infrastructure required for its seamless exchange;
2. Promoting the adoption of open standards by all the actors in the National Digital Health Ecosystem, for developing several digital health systems that span across the sector from wellness to disease management;
3. Creating a system of Personal Health Records, based on international standards, and easily accessible to the citizen, and to the service providers, based on citizen-consent;
4. Following the best principles of co-operative federalism while working with the States and Union Territories for the realization of the Vision;
5. Promoting Health Data Analytics and Medical Research;
6. Enhancing the efficiency and effectiveness of Governance at all levels;
7. Ensuring Quality of Healthcare.
8. Leveraging the Information Systems already existing in the health sector.

## NDHB Principles

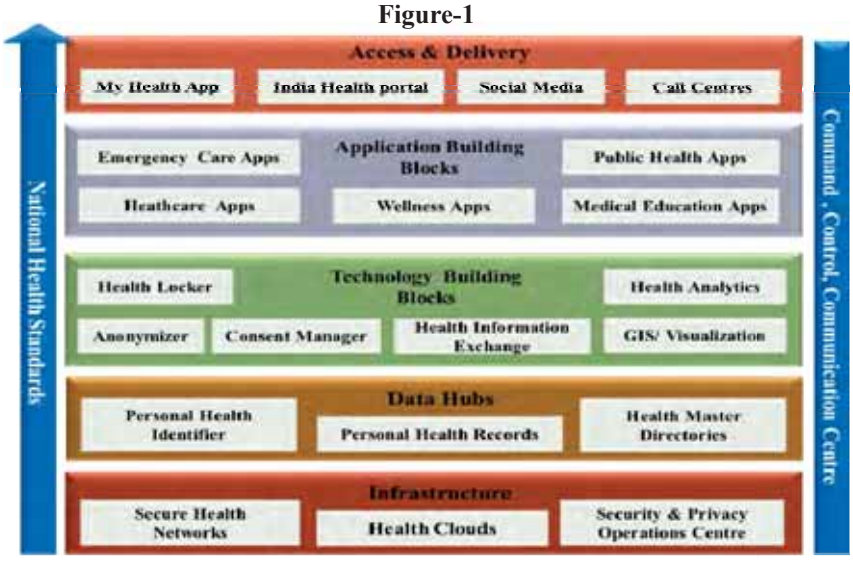
An Ecosystem cannot be built – it must evolve. Given this, a set of Principles - rather than specifications- have been recommended to enable the evolution of the NDHE. The key principles of the Blueprint include, *from the domain perspective*, Universal Health Coverage, Inclusiveness, Security and Privacy by Design, Education and Empowerment of the citizens; and *from the technology perspective*, Architectural Building Blocks, Interoperability through adoption of a condensed set of health information standards, a set of Registries as Single Sources of Truth, Open Technology Standards, Open APIs and above all, a minimalistic approach.

## Building Blocks of NDHB

In the context of the evolution of a digital Ecosystem, as is the case of NDHE, building blocks are reusable frameworks or artefacts that most stakeholder groups need to rely upon for designing, developing and delivering their services. The Blueprint identifies the Minimum Viable Set of Building Blocks required for the NDHE to evolve, and describes their capabilities at a high-level. Conformance to the NDHB Principles on the one side and to the NDHB Standards and Regulations on the other side, are critical for an efficient design and development of the Building Blocks.

Architectural Building Blocks constitute the core of NDHB. These are represented schematically in the Figure-1.

**Figure-1**




While the Blueprint has 23 Building Blocks, a few of the critical requirements and capabilities of NDHE, addressed by appropriate combinations of the Building Blocks, are explained briefly:

1. **Identification**: Unique identification of Persons, Facilities, Diseases and Devices is a key requirement and challenge as well in the evolution of NDHE. The Blueprint handles this requirement through 2 Building Blocks, namely, Personal Health Identifier (PHI), and Health Directories & Registries. The uniqueness in identification of Persons (citizens) required as an essential attribute of PHI is sought to be achieved through a combination of Aadhaar-based Identification/Authentication for schemes notified under the Aadhaar Act, and through other specified types of identifiers in respect of the rest. However, the design of the PHI is to be finalized by the Ministry, in consultation with MeitY and UIDAI duly taking into consideration the regulatory, technological and operational aspects. PHI in tandem with Health Locker will facilitate the creation and maintenance of Personal Health Records.
2. **Citizen to be in Control**: The need for maintaining the confidentiality, security and privacy of the health records cannot be over-emphasized. These requirements are built into the design of NDHB a priori, rather than being retrofitted later. The Blueprint achieves these complex and mandatory requirements through a combination of a few

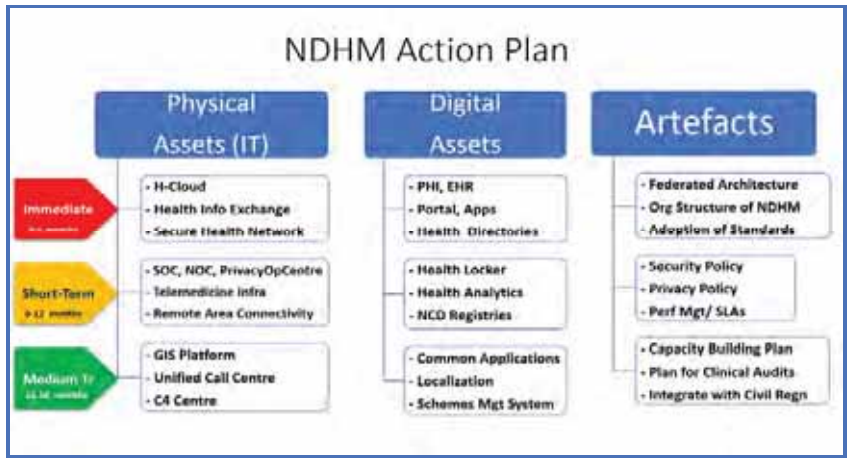
Building Blocks, namely, Consent Manager, Anonymizer and Privacy Operations Centre. Besides these Building Blocks, application-specific features and relevant international standards defined in the Blueprint fortify the privacy regime.

3. **Service Access/ Delivery**: Omni-channel access/delivery is an important capability required in NDHE. This is achieved by a combination of Web (India Health Portal), Mobile (MyHealth App) and Call Centres besides Social Media Platforms. The Command, Control and Communication Centre enables real-time monitoring and real-time interventions needed in the NDHE. Given the significant spread of smartphones and the prospects of its further growth, the Blueprint emphasizes the 'Mobile First' principle for majority of stakeholder-facing services.
4. **Interoperability**: Interoperability is a pre-requisite not only for the development of integrated digital health services and continuum of care but also for the autonomous development of innovative value-added services by entrepreneurs. Two Building Blocks, namely, the Health Information Exchange and the National Health Informatics Standards enable and promote the interoperability of various building blocks.

## National Digital Health Blueprint (NDHB) Applications & Digital Services

The Application Layer of the Blueprint is merely a placeholder in so far as it identifies the thematic areas for development and deployment of applications but refrains from listing them. Such an approach has been adopted not only because of the large number and variety, but also because the applications must evolve in an innovative way that cannot be defined upfront. It is necessary here to underline the importance of leveraging some applications in the health sector that have evolved and matured over the last few years. Taking the legacy applications on board to the NDHE requires that each application is rigorously assessed w.r.t it's conformance to the digital service standards.

**Figure-2**




The value of the Blueprint can be realized mainly in terms of the impact the Digital Health Services make on the various stakeholder groups. The Blueprint provides an illustrative, but by no means exhaustive list of Digital Health Services, to indicate the qualitative difference its implementation can make on the delivery of health services.

## Standards

National Health Informatics Standards form the cornerstones of the foundation of NDHB. The health sector must adopt the international standards in a large number of areas. However, the Blueprint adopts a pragmatic approach and recommends only the minimum viable set of standards, to make it easier for the Ecosystem players to adopt the same. Standards for Consent Management, Interoperability, Privacy, Security, Patient Safety and Data Quality have been recommended in NDHB. FHIR Release 4[3], SNOMED CT[4] and LOINC[5]are among the standards recommended. To illustrate the principle of minimality, while FHIR enumerates 143 resources, NDHB has identified 26 resources among them to be adopted initially.

## Implementation Challenges

A Blueprint is only as good as its implementation. NDHB is to be implemented in a mission-mode and a dedicated institution, preferably in the form of a National Digital Health Mission (NDHM) has to be entrusted with this responsibility.

It is desirable that the Blueprint is implemented over 3 phases – Immediate, Short-term and Medium-term. The Figure-2 is an indicative phased approach to implementing NDHB.

## Realizing Outcomes

Digital Health is but a small lever in the evolution of the overall national health Ecosystem. A substantial impact in the health sector is possible only through a posse of reforms and enhancements in the sector. These include improving the ratios like Doctor : Population, Specialist: Doctor, Bed: Population; enhancing the spread and quality of health infrastructure and improving knowledge and skills among the health professionals and workers.

In conclusion, NDHB forms the foundation on which the edifice of an entire National Digital Health Ecosystem can be built in a phased manner.

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# Payment and Settlement Systems- RBI's Vision Document

Payment and settlement systems are the backbone of any economy. The last decade has witnessed substantial developments in this area of activity across the country. The Reserve Bank of India (RBI), under powers from the Payment and Settlement Systems Act, 2007, has endeavoured to ensure that India has 'state-of-the-art' payment and settlement systems that are not just safe and secure, but are also efficient, fast and affordable. Efforts in this direction have yielded handsome results. The RBI Vision document outlines the road map for the three-year period spanning from 2019 to 2021.

## Positive Developments during 2015-2018

- Some of the positive outcomes of the developments during the period 2015-2018 include ushering introduction of new and innovative systems, distinctive shift from paper to electronic payment modes, sizeable increase in transaction turnover, customer centric initiatives, international recognition, etc.
- Growth in electronic payments has been substantial with retail payments reflecting large growth in volume terms, while the Systemically Important Financial Market Infrastructures (SIFMIs), such as the Real Time Gross Settlement (RTGS) system and Financial Markets Clearing through Clearing Corporation of India Ltd. (CCIL), dominate in value terms.

  The Payment Systems Vision 2021 recognises the need for continued emphasis on innovation, cyber security, financial inclusion, customer protection and competition.
- Quantitatively measured, digital payment transaction turnover vis-à-vis GDP (at market prices-current price) increased from 7.14 in 2016 to 7.85 in 2017 and further to 8.42 in 2018., The turnover in payment transactions (after including CCIL figures and paper) vis-à-vis GDP (at market prices-current price) increased from 14.41 in FY 2015-16 to 14.73 in FY 2016-17 and further to 15 in 2017-18.

## Highlights of Payment Systems Vision – 2021

- Empower every Indian with access to a bouquet of e-payment options that is safe, secure, convenient, quick and affordable. While the pursuit towards a 'less cash' society continues, accompanied by the ambition to have a less-card India as well, the endeavour is to also ensure increased efficiency, uninterrupted availability of safe, secure, accessible and affordable payment systems as also to serve segments of the population which are hitherto untouched by the payment systems.
- The decade to follow will witness a revolutionary shift in the way Indian citizens use digital payment options and will also empower them with an e-payment experience that will be exceptionally safe, secure and truly world class.
- The Vision envisages four goal-posts (4 Cs) – Competition, Cost, Convenience and Confidence. For enhancement of Competition in the payment systems landscape, specific thrust areas like creating regulatory sandbox, authorising new players, etc., have been incorporated.

## Expected Outcomes of The Payment Systems Vision 2021 (Up To December 2021)

Vision 2021 focuses on further enhancements/improvements in all facets of payment systems. The specific outcomes include-

- It is expected that the volume of cheque-based payments would be less than 2.0 per cent of the retail electronic transactions by 2021.
- Payment systems like UPI / IMPS are likely to register average annualised growth of over 100 per cent and NEFT at 40 per cent over the vision period. The number of digital transactions is expected to increase more than four times from 2069 crore in December 2018 to 8707 crore in December 2021.
- Measurably, the digital payment transaction turnover vis-à-vis GDP (at market prices-current price) is expected to further increase to 10.37 in 2019, 12.29 in 2020 and 14.80 in 2021. Payment transaction turnover, including CCIL transactions and paper, is expected to be 22.30 times the GDP (at market prices-current price) by December 2021.
- Increase in use of digital modes of payment for purchase of goods and services through increase in debit card transactions at PoS (35 per cent increase during the vision period) and continued growth in PPI transactions.
- Usage of debit cards at PoS transactions is expected to be at least 44 per cent of total debit card transactions (at PoS + ATM). In value terms it is 15.2 per cent in 2018-19 (5.2 per cent in 2014-15) which is expected to be 22 per cent by end 2021.
- Increased deployment of card acceptance infrastructure across the country including at smaller centres with a substantial portion of the infrastructure taking care of processing contactless card payments. Given the current growth trend it is expected to have 5 mn active PoS by end 2021.
- Enhanced healthy competition in the payments space and establishment of new PSOs during the Vision period is envisaged.

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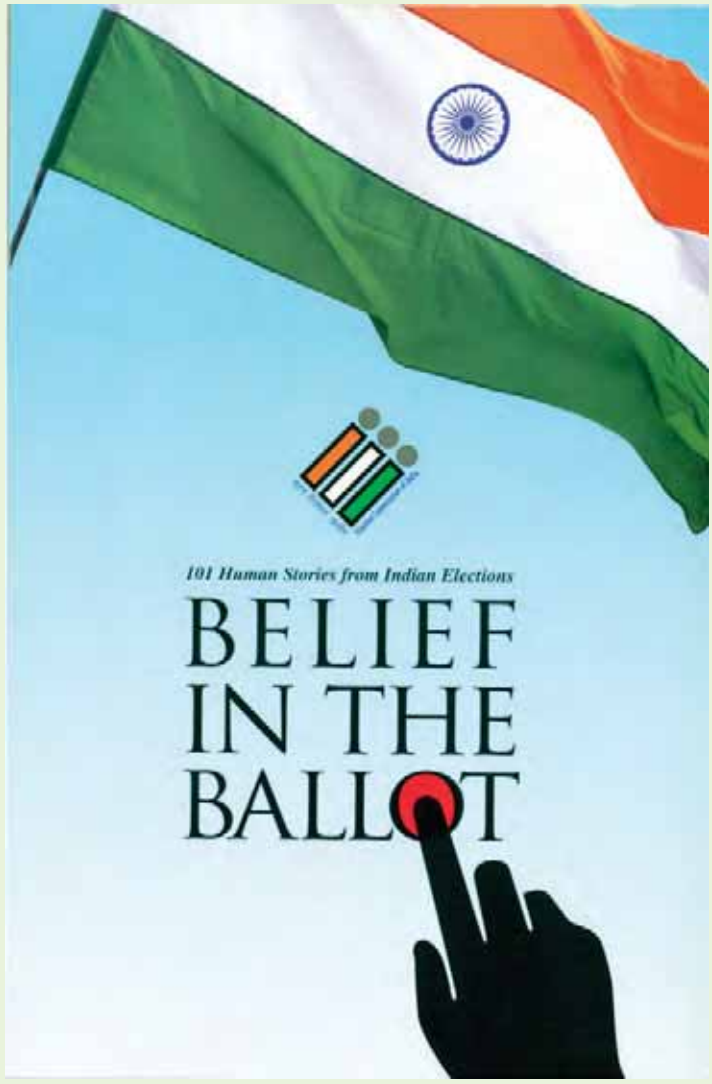


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# PRIME MINISTER HIGHLIGHTS IMPORTANCE OF GOVERNING COUNCIL OF NITI AAYOG AS A PLATFORM TO INSPIRE COOPERATIVE FEDERALISM

In his address at the fifth meeting of the Governing Council of NITI Aayog the Prime Minister highlighted the importance of the Governing Council of NITI Aayog as a platform to inspire cooperative federalism, stressing the need to collectively combat poverty, unemployment, drought, pollution, pockets of under-development and all such factors that constrain India's progress. He emphasized that the goal is to realize the potential of this great country, to create a New India by 2022 and a USD five trillion economy by 2024.

The Prime Minister emphasized the need for every State to focus on increasing its share in the country's GDP by evaluating the export potential of the State and determining the steps necessary for increasing exports and boosting employment. Welcoming the constructive discussion and suggestions made by various Chief Ministers, the Prime Minister assured the Council that these suggestions would be seriously considered in the course of decision-making.

The Prime Minister appreciated the efforts of the States towards water conservation and urged all States to streamline and implement innovative water management measures. The creation of the Ministry of 'Jal Shakti' is a key step by the Union Government to develop an integrated and holistic perspective on water as a developmental resource.

The Prime Minister also called upon the Fifth Governing Council Meeting to undertake foundational reforms in the agri-economy, leading to a complete transformation of the agriculture sector in India. The Governing Council also reviewed the implementation of the Aspirational Districts Programme. The Prime Minister reaffirmed the commitment of the Government to combat Left Wing Extremism (LWE), noting that many of the aspirational districts are affected by Naxal violence. He assured the Council that the Ministry of Home Affairs will coordinate with all affected States to decisively end LWE violence and drive the agenda of development in these regions.

On the health sector, the Prime Minister said that several targets are to kept in mind, to be achieved by 2022. He also mentioned the target of eliminating TB by 2025. The Prime Minister urged those States who have not implemented PMJAY under Ayushman Bharat so far, to come onboard this scheme at the earliest. Elaborating on the Union Government's guiding principle of Sabka Saath, Sabka Vikas and Sabka Vishwas, the Prime Minister said the schemes of the Union Government are no longer limited to certain people, or to certain regions, and are reaching everyone without discrimination, in a balanced way.

The Prime Minister announced the creation of a high-powered committee on structural reforms in agriculture. He further said that global circumstances currently offer a unique opportunity to India. He said India is establishing itself on global benchmarks such as Ease of Doing Business. To achieve the goal of becoming a five trillion dollar economy by 2024, the Prime Minister urged States to aim to increase their economy by 2 to 2.5 times, which would also increase the common man's purchasing power. He called upon Chief Ministers to study their State's export potential and work on export promotion.

The Prime Minister thanked the Chief Ministers for their suggestions and reiterated that the Union Government is keen to partner with the States, and work together for India's development.

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