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Introduction - Transformational Shift in the Delivery of Services

- 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.
- 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. 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.
- 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.
- 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.

Empowering Citizens Through e-Services

The Digital India programme, launched in 2015, takes forward the pioneering vision of PM 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.

It has ensured citizen participation and empowerment with the technology that is transformative, affordable and sustainable.

Digital India and Aadhaar -

- 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, Presenceless and Cashless 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 crores.

The statistics -

- The coverage of Aadhaar (123 crore), Jan Dhana Yojana (36 crore) and mobile connections (118 crore) has moulded the digital profile of India.
- Each of the individual components 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 Dhana 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.
- 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.

The change -

- 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 crores.

- The BPO movement for smaller towns is facilitating balanced regional growth and creating job opportunities.
- 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).

New initiatives -

- **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.
- 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.
- **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.
- **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.
- 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.

Tracking Schemes through GIS

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 Programme, Ministry of Information and Technology had launched National Centre for Geo-Informatics (NCoG) in December 2015.

What is NCoG?

NCoG platform 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.

Features -

1. 1:5000 Basemap
2. Open Source and in-house development

3. Integration of technologies (including web, mobile, GIS, GPS, image processing, mathematical models).
4. Compatibility with multi-purpose geo-datasets.
5. Dynamic query - Logical and Boolean operations based query models.
6. Training - Two-way capacity building.
7. Authentication - The representation of data on GIS platform is authenticated by the user/owner department/agency.
8. Acceptability, affordability and adoptability by the user departments.
9. A solution-based approach.

Benefits of GIS -

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.

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.
- **Industrial Information System (IIS)** - GIS mapping of Industrial Parks, estates, clusters, areas, zones under the National Plan for Manufacturing Clusters for DPIIT.
- **Interactive Management Information System (MIS)** - Plot-wise details (land availability usage, employee count) enables Central/State officials to take decisions regarding optimum utilisation of industrial land.
- **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.
- **Industrial Development Scheme for North East including Sikkim (NEIDS) and for Himalayan States (IDS)** - It allows applicants from eight North Eastern States, J&K, Himachal Pradesh, and Uttarakhand to apply for incentives online, track their application and receive status related notification.
- **Social Benefits Management System (SBMS)** - An online platform (web based application) developed for Ministry of Social Justice and Empowerment, SBMS managed the disbursement of benefits to Schedule Castes/Backward Classes/Safai Karamchari applicants.
- **Geographic Indications of India (GIs)** - Mapping and promotion of GIs of India, mapping of all registered users of GIs to be tabled under this project.
- **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.

- **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.
- **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.

Digital Infrastructure - Core of Governance

National Informatics Centre, an attached office of the Ministry of Electronics and IT, has been working closely 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.

Pan India Network -

1. **NICNET** - It is the Pan India communication network for exclusive use of Government. It 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.
2. **National Knowledge Network (NKN)** - It 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.

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.
- Realising the importance of Data Centres, National Informatics Centre (NIC) has established large Data Centres at Delhi, Hyderabad, Bhubaneswar and Pune.
- Hosting support is being provided from Data Centres and National Cloud for approximately 10,000 various critical e-Governance projects.
- 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.

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 specialised centre to provide nationwide view for ICT infrastructure for effective monitoring and management and also to ensure the availability of all critical services.

National Cloud (Meghraj) -

- In order to utilise and harness the benefits of Cloud Computing, Government of India initiated a Government Cloud initiative called 'Meghraj' in 2014.
- Various Government initiatives and schemes, such as Swachh Bharat Mission, MyGov, e-Hospital, National Scholarship, e-Transport etc have been successfully launched due to a robust and agile cloud infrastructure.

Geospatial Technology -

- **Geographical Information System (GIS)** - It has 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 geospatial technology for effective service delivery.
- **Bharat Maps** is a multilayered GIS platform/web service comprising of seamless country wide base maps, satellite images and hybrid maps aligned as per the global geospatial standards.
- **GIS** is helping MGNREGA workers to get information about the availability of work in the near locations, work site location information, real time transparent attendance and payment information.

Direct Benefit Transfers -

- **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.
- **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.
- **Swachh Bharat Mission** platform extensively used Direct Benefit Transfer Technology for transfer of funds to beneficiaries. 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 -

- X-400 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 today offer security features such as Geo-fencing, device mapping and adaptive authentication.

Video conferencing -

- NIC has been offering video conferencing services since 1995 for connecting and bringing administration close to each other.
- Video conferencing is now extensively used at all levels of governance i.e. Centre to State, State to District and sub-District.
- This has resulted in substantial savings of time and cost.

Cyber Security -

- 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 the objective of analysing, monitoring and responding to cyber threats on critical government cyber infrastructure like websites, emails and various services.
- NIC-CERT works in close guidance of CERT-In, which is the national nodal agency for responding to computer incidents as and when they occur.

Digital Platform -

- Availability of cloud infrastructure in Government has given rise to the launch of number of digital platforms at National level (One Nation One Platform).
- These platforms have addressed the issues of interoperability, seamless integration and consolidation by creation of National Registers for vehicles, houses, toilets, ration cards etc.
- New citizen focused initiatives like mobile-based traffic enforcement solution through e-challan, mobile extension for services in the form of Parivahan app.
- e-Way bill system has been a key lever in the success of GST implementation. This brings the consigner, consignee and the taxpayer on a single platform.

Digital Empowerment through ‘Maximum Governance, Minimum Government’

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.

By making governance simple, fast, flexible and effective by application of innovations and technology will lead to participative governance, a key element of a responsible democracy.

To achieve this, the Digital India Programme of the Government of India is playing an important role in empowering citizens.

The initiatives -

- 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 democratising the decision making.
- 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.
- The experience of **UPI** has transformed the digital payment ecosystem in a span of two years. Transactions on the BHIM/UPI platform have increased in volume from 70 lakh to 7996 lakh per month over the 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.
- India has moved ahead from the era of dongles/keys required for digital signatures with the advent of Aadhaar based e-Sign, that is an easy, efficient and secure way to sign and authenticate documents digitally.
- 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**.
- 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 **National Policy on Electronics 2019** aims to further promote domestic manufacturing and export to achieve a turnover of approximately Rs 26 lakh crore by 2025.
- 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. Towards this end, Central and State Governments, private sector and social sector organisations can come together to build strategic public-private-social partnerships.

Less Cash India : Vision to Reality

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.

3. Cash-based payments seem to be zero-cost and hassle-free as cost of cash is distributed and invisible.

Till November 2016, only 15 lakh merchants had been enabled with PoS by over 40 banks. This meant that only 2.5 percent of India's 6 crore merchants had an option of receiving payments through cards. Today, there are over 1.2 crore merchants having QR codes who give an option to their customers to pay through their wallet or bank account.

Facts and figures -

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

Cash v/s digital payment debate -

- Wallets and UPI have been leading the growth of digital payments in addition to traditional modes like netbanking, debit card and credit 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.
- 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. This greatly removes frauds/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.

Financial Inclusion -

- 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 marginalised sections of the society are also brought into the financial mainstream.

Promoting security -

- In order to promote the 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 phones.

- At the same time, technology is evolving so that any patterns for hacking/cyber crime are quickly understood and preventive measures are taken in order to prevent the spreading of such crimes.
- While discussing digital payments, user privacy is of paramount importance. The banking and financial services industry is eagerly awaiting the passage of **The Personal Data Protection Bill** which sets out how the personal data of individuals is processed by the Government and private entities incorporated in India and abroad.

Way forward -

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.

Reimagining Citizen Services with Open Fintech Platforms

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. The number of mobile users in India has crossed 1 billion mark and most of them have experienced the internet for the first time on their smartphones.

Data revolution -

- Data usage in smartphones was primarily used for entertainment earlier, however there is a considerable shift being observed towards utility services, financial services etc.
- 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.
- 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.

PSD2 -

- Revised Payment Services Directive or PSD2 are set of guidelines which financial institutions in SEPA (Single Euro Payment 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 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.

Features -

- 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.
- 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.

Benefits -

- 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 customers from his bank and complete onboarding digitally. This process requires customer's consent and is similar to Aadhaar based e-KYC.
- 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 - A Glimpse of Open Banking -

- 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.
- In April 2019, UPI transactions clocked 800 million, which was a milestone moment for the fintech domain in India.

Technology based Customer Centric Approach -

- 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.
- 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.

Conclusion -

Open banking and fintech platforms hold a potential to transform levels of citizen in this digital era. It is 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.

Leveraging technology for transforming education

An integral pillar of India's growth story is leveraging technology to leapfrog development by focusing on three pillars : improved connectivity and access, focused skilling and capacity building, and sustainable innovation.

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.

What can be done?

1. **Providing Access and Bridging the Divide** - To become a knowledge economy, we must embrace creation of knowledge and content, and not just consume it passively. Need of end-point devices is of course a necessity to accomplish this, but so is the advent of emerging technologies. Because of the linguistic diversity, technology can help create and translate content to suit a diverse set of customised needs.
2. **Capacity Building of Teachers** - 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 Centres are strategically well aligned with this vision.
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. MAIT, an apex industry body, proposed an EduVision Maturity Model to suit the 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.

Conclusion -

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, administration, and policy makers are all important parts of this equation.

e-Services for the differently abled

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.

Assistive Technology -

- Citizens with disability use assistive technology to access various modes of ICT channels such as web portal, mobile application, kiosk etc.
- 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.
- Kabi, is an app for speech impaired children which assists them for quick communication with the external world by selecting pictograph image on their handheld 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.

e-Services Leads to Inclusion -

e-Services has also led to financial inclusion of citizens with disabilities. 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.

Government initiatives -

- Government of India has undertaken several initiatives to ensure that the digital channel of service delivery mechanism offers equal access to all, including citizens with disabilities.
- Government of India has launched an accessible India campaign with the objective of achieving complete accessible physical infrastructure, transport system and ICT echo system and has defined timelines along with quantitative target to comply with this national mission.
- DAISY Forum of India (DFI) in collaboration with the Government of India has launched **Sugamya Pustakalya**, an online library of digital books in accessible format for print impaired citizens.
- DFI proactively was involved in campaigning for negotiating of Marrakesh VIP Treaty which facilitates 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.

- Ministry of Urban Development 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 disabilities to avail Government services with ease.
- Recent passage of the revised **Person with Disabilities Act (RPWD) 2016** further stresses on digital inclusion within digital India mandate conformance to international accessible standard for all government e-Services.

Digital Accessibility and Universal Design -

- Digital accessibility is enabling an environment that helps easy access of computers, software and electronic resources (including webpages, software, mobile devices, e-readers etc.) and communications. It also facilitates navigating the web, mobile apps, electronic media, etc., and empower citizens with disabilities like blindness, low vision, colour Blind, auditory disability, motor disability, speech disability, cognitive disability and seizure disorder.
- The design of products, environments, 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 for specialised design.
- Universal design shall not exclude assistive devices for particular groups of citizens with disabilities where this is needed.

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 purchasing power which the United Nations estimates that friends and relatives along with persons with disability globally possess.

ICT enabled farm centric agricultural services

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.

Digitising farm technology -

- The ISDA-95 Informatics Blueprint for Agricultural Sector has impacted Informatisation of Agricultural System through the Government efforts very efficiently in Farm sector (On-Farm and Off-Farm Input System, Production System, Output System) as well as Non-Farm sector.
- The existing farm extension system needs to be broad-based problem oriented 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.

Digitalised Farm Centric Services : e-Agriculture -

- The JAM (Jandhan, Aadhaar and Mobile) based Citizen Centric Services has facilitated Direct Benefits Transfer (DBT) to reach eligible citizens at the grassroots level.
- In the Agricultural sector, it is “location-specific”, “farm-specific” and “farmer-specific” services that are required to be facilitated.
- **Agri Startups** - The emerging Agri StartUps may consider providing digitised services (providing information on) to farmers or through Farmer Producer Organisations (FPOs), in respect of -
 - Development Schemes and Programs (village wise) - Agricultural and Non-Agricultural.
 - Quality Pesticides, Fertilisers and Seeds
 - Farm Health (Plant Health, Animal Health, Soil Health, Water Health, Fishery Health)
 - Minimum Support Price (MSP) and Government Procurement Points (GPPs) for commodities.
 - Irrigation and Drainage System infrastructure - minor irrigation, micro irrigation, drip irrigation, etc.

Reach of IT -

Study undertaken by Moni and Saurabh Sharma (2017) shows that the Small and Marginal Farmers, who constitute about 85 percent of the Operational Holdings of size (<2 hectares) -

1. Progressively use Mobile Communication Technology;
2. Have traditional (tacit) farming methods (knowledge);
3. Take farm level decision based on past experience;
4. Access to extension only through neighbourhood Farmers; and
5. 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.

Challenges -

The study also brought out challenges faced by the farming community with respect to -

1. Citizen charter
2. Investment and risk management
3. Technology solution - Authentication, Accessibility, Availability and Affordability
4. Capacity Building and Competency Development, and
5. Information Security issues.

This study has highlighted the need for Agri-Startups in -

1. Farm management services,
2. e-Commerce services, and

3. Government schemes O & M which are spread across the entire Agri Value System (Input Supply Chain and Output Value Chain)

What needs to be done?

- 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'.
- The Doubling Farmers' Income by 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. 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, AGMARKET, 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 PG Level to attract rural youths into S&T based farming methods.

Development of Metro Rails in India

In accordance with the objectives of the National Urban Transport Policy of 2006, among other solutions, Mass Rapid Transit Systems have been implemented across the country.

Background -

- 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 8.4 km length in 2002.
- 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.
- 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.

Challenges of existing metro systems -

1. Metro rail is a capital intensive system which requires huge investments from centre, state and local governments.
2. Being a fairly new system in India, the technology available is not standardised, 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.

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 for the country.

1. **Value Capture Financing** - The Value Capture Finance (VCF) Policy Framework, 2017 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.
2. **Standardisation 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. 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 percent by 2023 in a phased manner. It was planned that 80 percent of civil work in metro rail project and 50 percent of electrical items should be procured indigenously right away.
3. **Transit Oriented Development** - Government of India issued National TOD Policy, 2017 with the objective to integrate land use and transport planning to develop compact and inclusive growth centres within the influence zone of 500-800m.
4. **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 standardised implementation process and will enable rapid digital penetration.
5. **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 organisation like UMTA that monitors, integrates and coordinates various aspects related

to urban transport like route, time table, fare, inter-modal integration etc in the city. A draft UMTA bill has been formulated by MoHUA and shared with the states.

Towards a National Digital Health Ecosystem

In November 2018, to take forward the concept of National Health Stack designed under the aegis of NITI Aayog, recognised 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.

National Health Policy 2017 -

It has been designed as a layered framework, with the Vision and a set of Principles at the core, surrounded by other layers relating to Digital Health Infrastructure, Digital Health Data Hubs, Building Blocks, Standards and Regulations, and an Institutional Framework for its implementation.

The objectives of NDHB are aligned to the Vision of NHP 2017 and the SDGs 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 cooperative federalism while working with the States and Union Territories for the realisation 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.

Building blocks of NDHB -

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 and Registries. The uniqueness in identification of Persons (citizens)

is sought to be achieved through a combination of Aadhaar-based Identification/Authentication for schemes notified under the Aadhaar Act.

2. **Citizen to be in Control** - The need for maintaining the confidentiality, security and privacy of health records cannot be overemphasized. The Blueprint achieves these complex and mandatory requirements through a combination of a few Building Blocks, namely, Consent Manager, Anonymiser and Privacy Operations Centre.
3. **Service Access/Delivery** - Omnichannel 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.
4. **Interoperability** - Two Building Blocks, namely, the Health Information Exchange and the National Health Informatics Standards enable and promote the interoperability of various building blocks.

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.

Conclusion -

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