



COMPENDIUM of Selected Papers



20th National Conference
on
e-Governance

Compendium of Selected Papers

20th National Conference
on e-Governance



Department of Administrative Reforms & Public Grievances
Ministry of Personnel, Public Grievances & Pensions
Government of India

Table of Contents

Chapter 1	
Cyber Security Policy for Digital India- Roadmap for Secure Cyber Space	1
<i>Jagdish Chander Sharma (IAS), Shailender Kaushal, Ajay Singh Chahal</i>	
Chapter 2	
Augmented Transformational Methods for Effective e-Governance	6
<i>SMMM Kalyan Kumar NIC, S C Pradhan NIC</i>	
Chapter 3	
Digital Transformation in Himachal Pradesh Transport Department: Reaching out to Last Mile Rural Population	11
<i>Dr. Sunil Kr. Chaudhary, IAS, Bhupinder Pathak, Ajay Singh Chahal</i>	
Chapter 4	
Digital Transformation – Processes, Challenges and Managing Changes	18
<i>N. Natarajan, Scientist ‘C’</i>	
Chapter 5	
Digital Transformation- India Perspectives	24
<i>Keyur C. Sampat</i>	
Chapter 6	
Mee-Seva – Easier. Faster	30
<i>Sanjay Jaju</i>	
Chapter 7	
Mobile Oriented Development Initiatives for GIS to Citizens – ‘MODI – GIS 2C’	36
<i>Dr. R Balamurali Krishna</i>	
Chapter 8	
“SAKSHAM”: Technology led Monetary Transactions System leading to Financial Inclusion	41
<i>Dr. Saurabh Gupta, Sameer Rajan</i>	
Chapter 9	
The Role of Intermediaries in e-Government adoption in India: Bridging the Digital Divide	48
<i>Rajiv Kumar, Dr. Amit Sachan</i>	
Chapter 10	
Unique Property Identification Number	53
<i>Dr Vasantha Kumar N, IAS; Santulan Chaubey, Director</i>	

Cyber Security Policy for Digital India- Roadmap for Secure Cyber Space

Jagdish Chander Sharma (IAS), Shailender Kaushal, Ajay Singh Chahal,

Principal Secretary (IT), Senior Systems Analyst/Scientist-C, State Informatics Officer/Scientist-F
HP Secretariat, Government of HP, National Informatics Centre, Himachal Pradesh, HP Secretariat, Shimla-171002 (HP)
jagdish.chander22@ias.nic.in, kaushal.shailender@nic.in, ajay.chahal@nic.in
9418000066, 94184-57724, 94182-75076

Abstract

Sun is essential to all lives on earth, but too much exposure to Sun can also be harmful similarly connectivity is essential in contemporary world but excessive exposure to cyber world can also be risky. Cyber security is very crucial not only for individual but equally important for the economy and security of our country. Cyber security cannot be left to the Government alone to solve. Organizations and Individuals play equally important role in minimizing cyber security threats. India is growing rapidly and Information Technology has played major role in the development of India. In order to keep the momentum going, we need to ensure all Information & Communication Technology (ICT) services and infrastructure present in the country must be protected. Well defined Cyber Security Policies will ensure the protection of our ICT infrastructure from the natural, accidental or intentional threats. Threats will continue in the long run. Private sector and individuals must understand and implement the new policy. Implementation of such policies will provide resistance to any major cyber-attack. In case any attack occurs, these policies will ensure to minimize the risk and recovery should be possible in a reasonable time frame.

Keywords- Digital India, cyber security, security policies, cyber threats, security audit.

1. Introduction

The Government of India is committed to enabling innovation, growth and prosperity for all Citizens through implementations of programs like Digital India, Smart Cities, BharatNet, Digital Locker, Jan Dhan and many more. These programs will bring more and more people connected through internet and also expose them to the threats of Cyber world. India is increasingly a target for cybercrime and espionage. All of our Governments, businesses and individuals need to work together to build resilience to cyber security threats and provide more services online.

IT sector has been one of the most significant growth catalysts for the Indian economy in the last decade. In addition to the economic growth, it is also influencing the lives of individuals directly or indirectly. If an organization is connected to the Internet, it is vulnerable to compromise. As people and systems become ever more interconnected, the quantity and value of information held online has increased, so have efforts to steal and exploit that information, harming our economy, privacy and safety. Cyberspace, and the dynamic opportunities it offers, is under persistent threat. Malicious cyber activity is a security challenge for all. All organizations across the Government, public and private sectors have been compromised by state-sponsored or non-state actors. Overseas, large multinational companies and government organizations have been targeted, losing substantial amounts of sensitive commercial and personal information or incurring major damage to their business

and reputation. To grow our cyber security capabilities and to anticipate and respond to cyber threats, we must identify our weaknesses and address our concerns. It is critical that we build our nation's stock of cyber security skills, which are becoming increasingly essential for life and work in our connected world. Ultimately, to deal with all these challenges, we need to understand the kind of cyber threats that are taking place in the cyber-world, as shown in Figure-1. It shows the trend of attacks in recent years. As we can see, numbers of incidents are increasing every year. It is the right time for us to be proactive and define our priorities and policies for cyber world.

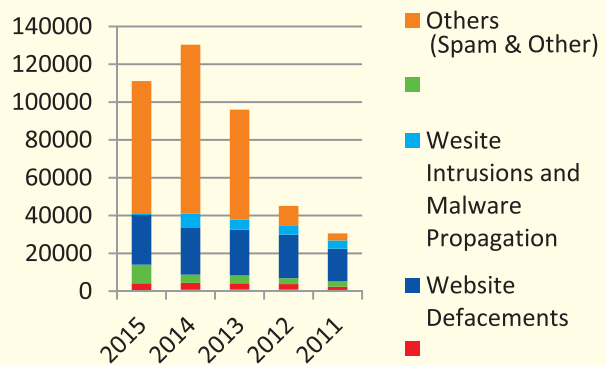


Figure-1: Year-wise incident report of cyber attacks in India.

2. The Role of Government

The Government is a key player in the whole cyber scenario, but it has to be a collective effort by all stakeholders, be it businesses, organizations or

individuals. Government around the world has begun to develop policy and standards to protect themselves against cyber threats while trying to promote the benefits of cyber enabled world. Implementation of Smart cities will bring the details of infrastructure to the cyber world. Government of India plans to shortly issue a RFP to set up the national cyber coordination Centre (NCCC) which will safeguard India's cyberspace against potential threats. The process has been fast tracked since the government runs many critical websites, with DigiLocker being one of online schemes wherein users upload their personal information and documents. NCCC will also be critical to the success of the government's Digital India programme. It comes in the backdrop of many government websites, mainly state departments or ministries, being hacked recently. The security of cyber space is not optional, but mandatory in view of its impact on national security, public safety and economic impact [1]. The key considerations for securing the cyber space include following points.

- To improve the resilience and robustness of critical information infrastructure in Government sector like State Data Centers and State Wide Area networks and similar infrastructure in public and private sector.
- To continue coordination with international partners and international organizations to ensure that cyber space remains open, secure, unitary and free and able to facilitate economic and social development.
- To raise awareness of the responsibilities of businesses and of private individuals around securing their networks, devices and information and to support them in this by means of information, training and voluntary codes of practice.
- Use of adequately trained and qualified manpower along with suitable incentives for effective results in highly specialized field of cyber security.
- To ensure that the State has a comprehensive and flexible legal and regulatory framework to combat cybercrime by protection of sensitive or personal data.
- To ensure that the regulatory framework that applies to the holders of data, personal or otherwise, is robust, proportionate and fair.
- To build capacity across public administration and the private sector to engage fully in the emergency management of cyber incidents.

The Figure-2 shows the various stages of data in cyber world from where data can be stolen or manipulated. We need to ensure that all the layers of network are protected from the known threats in cyber world [3]. All data needs to be encrypted and proper access control systems should

be implemented. Second layer is application, where application hardening and antivirus solutions is required. Next layer is host, which can be protected using HIDS, HIPS and Operating system hardening and patches should be done regularly to ensure all vulnerabilities are removed from the host. Network layer can be protected using Network based Intrusion detection systems and secure network protocols. Implementation of firewalls, VPNs, IPS and IDS at perimeter network. Physical security is also very important for these tracking devices, locks and deployment of security agencies at all data centers is important [4].

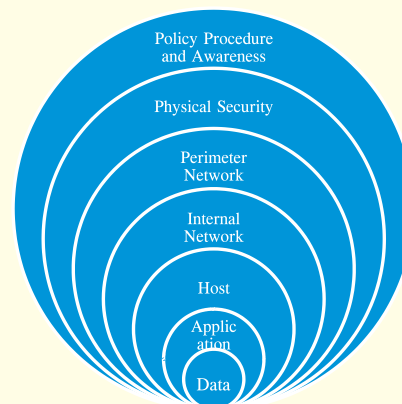


Figure-2: Information life cycle in cyber world.

At the top level, we need to make aware all the users about the policies and procedures to ensure protection of their data. Most of these layers will be taken care by technology. Government role is in the formation of policy and procedures and to bring awareness among the people about the importance of cyber security.

3. Indian Cyber Security Key Agencies

Some of the most important agencies that are involved in cyber surveillance or dealing with cyber crime in India are working under Ministry of Information and Broadcasting, Ministry of Home affairs and Ministry of Electronics and Information Technology. Some of the important agencies functional in India are [2]:

a) *National Information Board*

The National Information Board is the highest policy making body for cyber security. It was set up in the year 2002 and is chaired by National Security Advisor. It acts as the highest policy formulation body at the national level and periodically reports to the cabinet committee on security of the Government of India headed by the Prime Minister.

The NIB consists of 21 members and most of them are the secretaries of the Government of India of various Ministries. The National Technology Research organization (NTRO) provides technical cyber security and the intelligence.

b) *National Security Council*

The National Security Council (NSC) of India is an executive government agency tasked with advising the Prime Minister's office on matters of national security and strategic interest. The National Security Council Secretariat (NSCS) is the apex agency looking into the political, economic, energy and strategic security concerns of India and act as the secretariat to the National Information Board.

Besides the National Security Advisor (NSA), the Deputy National Security Advisor (DNSA), the Ministers of Defence, External Affairs, Home, Finance of the Government of India, and the Deputy Chairman of the now NitiAyog are members of the National Security Council. Other members may be invited to attend its monthly meetings, as and when required.

c) *NATGRID*

The National Intelligence Grid or NATGRID is the integrated intelligence grid connecting databases of core security agencies of the Government of India to collect comprehensive patterns of intelligence that can be readily accessed by intelligence agencies.

NATGRID is an intelligence sharing network that collates data from the standalone databases of the various agencies and ministries of the Indian government. It is a counter terrorism measure that collects and collates a host of information from government databases including tax and bank account details, credit card transactions, visa and immigration records and itineraries of rail and air travel. This combined data will be made available to 11 central agencies, which are: Research and Analysis Wing, the Intelligence Bureau, Central Bureau of Investigation, Financial intelligence unit, Central Board of Direct Taxes, Directorate of Revenue Intelligence, Enforcement Directorate, Narcotics Control Bureau, Central Board of Excise and Customs and the Directorate General of Central Excise Intelligence.

d) *National Technical Research Organisation*

The National Technical Research Organisation, originally known as the National Technical Facilities Organisation (NTFO), is a highly specialised technical intelligence gathering agency. While the agency does not affect the working of technical wings of various intelligence agencies, including those of the Indian Armed Forces, it acts as a super-feeder agency for providing technical intelligence to other agencies on internal and external security. The agency is under the control of India's external intelligence agency, Research and Analysis Wing, although it remains autonomous to some degree. The organisation does hi-tech surveillance jobs, including satellite monitoring, terrestrial monitoring, internet monitoring, considered vital for the national security apparatus. The agency develops

technology capabilities in aviation and remote sensing, data gathering and processing, cyber security, cryptology systems, strategic hardware and software development and strategic monitoring.

The National Critical Infrastructure Protection Centre, an agency under the control of National Technical Research Organisation, has been created to monitor, intercept and assess threats to crucial infrastructure and other vital installations from intelligence gathered using sensors and platforms which include satellites, underwater buoys, drones, VSAT-terminal locators and fiber-optic cable nodal tap points. The officials have identified countries from where such gadgets could be procured but refused to reveal them due to 'security and other implications'.

e) *The National Cyber Coordination Center*

National Cyber Coordination Centre is a proposed cyber security and e-surveillance agency in India. It is intended to screen communication metadata and co-ordinate the intelligence gathering activities of other agencies. Some have expressed concern that the body could encroach on Indian citizens' privacy and civil-liberties, given the lack of explicit privacy laws in the country

Some of the components of NCCC include a cyber crime prevention strategy, cyber crime investigation training, review of outdated laws, etc. Indian and U.S. intelligence agencies are also working together to curb misuse of social media platforms in the virtual world by terror groups

f) *National Information Infrastructure Protection Centre (NIIPC)*

NIIPC is a designated agency to protect the critical information infrastructure in the country. It gathers intelligence and keeps a watch on emerging and imminent cyber threats in strategic sectors including National Defence. They would prepare threat assessment reports and facilitate sharing of such information and analysis among members of the Intelligence, Defense and Law enforcement agencies with a view to protecting these agencies' ability to collect, analyze and disseminate intelligence. NIIPC would interact with other incident response organizations including CERT-In, enabling such organizations to leverage the Intelligence agencies' analytical capabilities for providing advanced information of potential threats.

g) *National Disaster Management Authority (NDMA)*

The National Disaster Management Authority (NDMA) is the Apex Body for Disaster Management in India and is responsible for creation of an enabling environment for institutional mechanisms at the State and District levels. NDMA envisions the development of an ethos of

Prevention, Mitigation and Preparedness and is striving to promote a National resolve to mitigate the damage and destruction caused by natural and man-made disasters, through sustained and collective efforts of all Government agencies, Non-Governmental Organizations and People's participation.

h) CERT

CERT-In (the Indian Computer Emergency Response Team) is a government-mandated information technology (IT) security organization. The purpose of CERT-In is to respond to computer security incidents, report on vulnerabilities and promote effective IT security practices throughout the country.

CERT-In was created by the then Indian Department of Information Technology in 2004 and operates under the auspices of now MeitY. According to the provisions of the Information Technology Amendment Act 2008, CERT-In is responsible for overseeing administration of the Act. Table-1 shows the year wise incidents handled/ reported to CERT India [5].

Table-1: Incident-wise Details of Cyber Incidents in India

Incidents/Year	2015	2014	2013	2012	2011
Phishing	534	1122	955	887	674
Network Scanning and Probing	3673	3317	3239	2866	1748
Virus/ Malicious Code	9830	4307	4160	3149	2765
Website Defacements	26244	25037	24216	23014	17306
Website Intrusions and Malware Propagation	961	7286	5265	4591	4394
Others (Spam & Other)	69841	89269	58161	10567	3720
Total	111083	130338	95996	45074	30607

CERT organizations throughout the world are independent entities, although there may be coordinated activities among groups. The first CERT group was formed in the United States. Following are the roles and functions of CERT-IN:

- Collection, analysis and dissemination of information on cyber incidents
- Forecast and alerts of cyber security incidents
- Emergency measures for handling cyber security incidents
- Coordination of cyber incident response activities
- Issue guidelines, advisories, vulnerability notes and whitepapers relating to information security

practices, procedures, prevention, response and reporting of cyber incidents

- Such other functions relating to cyber security as may be prescribed

In addition to these organizations, with an objective to make India, a Global Information Technology Super Power and a front-runner in the age of Information revolution is the key Ministry of Electronics & IT, to promote and run e-Governance services and infrastructure. All critical eGovernance infrastructure of Government is managed by MeitY, as given in Figure-3. Its various agencies are responsible for managing the cyber security aspects in the country on a regular basis.

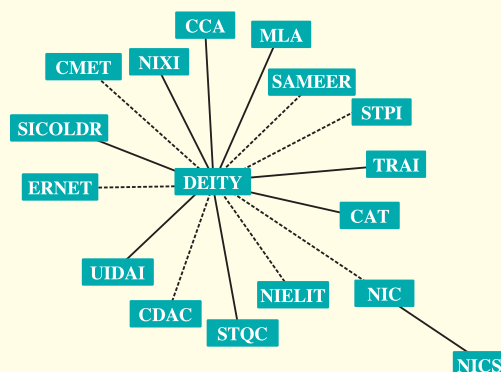


Figure-3: Structure of MeitY, GoI.

Figure 3 shows the structure of MeitY and its organizations which have mandate to promote eGovernance for empowering citizens and ensure a secure cyber space. MeitY has already taken many important initiatives to secure government services. Many of its organizations are following ISO 27001 standards to ensure international security standards. The Chief Information Security Officers (CISO) has been identified and regular training sessions are conducted for its employees.

4. Recommendations

Government must coordinate different efforts, manage stockholders interests and educate the public to establish cybersecurity as a priority. This can be incredibly effective but ultimately the case might be made for stronger government intervention through policies and regulations. In addition to the policies Government must identify critical computer infrastructure and ensure such infrastructure is safe from such cyber attacks. We have critical Government infrastructure in shape of NKN, State Data Centers, State Wide Area Network All types of infrastructure face some level of risk associated with various threats. Threat can be natural, accidental or intentional. Regardless of the nature of threat, these must be identified and necessary prevention mechanism must be defined. We must ensure that all known vulnerabilities are removed. We must enhance the capacity of critical ICT infrastructure to resist any major cyber attack. In case of an attack on infrastructure, we must be able to minimize

it and recovery should be possible in reasonable, shortest possible time frame. The key actions to reduce security threats and related vulnerabilities are:

- Identify and classify critical information infrastructure assets.
- Use of latest and secure products, protocols and communication system.
- All Internet Service Providers would be closely associated in providing secure information flow through their networks and gateways by implementation of Multiple Protocol Label Switching (MPLS) or VirtualPrivate Network (VPN) technology.
- Process for national level security threat and vulnerability assessments to understand the consequences.
- Identification of national level security organizations to act as a nodal agency and co-ordinate all matters related to information security in the country, with clearly defined roles & responsibilities.
- Emergency preparedness and crisis management (Mirror Centers, Hot/warm/cold sites, communication, redundancy, and disaster recovery plans, test & evaluation of plans etc
- Periodic as well as random verification of the level of emergency preparedness of critical information infrastructure facilities in resisting cyber attacks and minimize damage & recovery time in case cyber attacks do occur.
- Development of comprehensive repair and maintenance policy so as to minimize false alarms and increase cyber resource availability to all users efficiently.
- In order to effectively deal with targeted cyber attacks on sensitive sectors. Different teams must be formed to deal with different critical sectors such as finance, defense, energy, transportation, telecommunication etc.
- Establish public-private architecture for responding to national level cyber attack.
- Cyber security drills and exercises in IT dependent business with continuity plans to access the level of emergency preparedness of critical information infrastructure facilities in resisting cyber attacks with minimum damage and recovery time in case any attack happens.

5. Conclusion

The initiatives taken by the Government of India to make cyber space more secure have been analysed thoroughly in this paper. However, actions for securing information and information systems are required to be done at different levels within the country. In addition to the actions by Government, other stakeholders such

as Internet Services Providers (ISP), large corporate and small users/home users are also required to play their part to enhance the security of cyber space within the country. Role of Government should be restricted to make policies and procedures and educate citizens about cyber security. All of us should understand our responsibilities for our own cyber space and should at least take care of safety of our personal devices.

Community in cyberspace is based on the interaction between people and society. All key agencies formed by Government must support each other and with the huge growth in the number of Internet users in the coming years, the security of data and its proper management will play a vital role for future prosperity and potential. Threats on IT systems have made Governments to re-think about regulatory solutions but care must be taken not to disturb privacy and ease of existing systems that are supported by IT and above all, we should aspire for more computer literacy to understand the safety issues related to our cyber space. At the same time we need to utilize the specialization of private sector in the field of cyber security and government should promote more PPP projects for the national cyber space. The Law & IT, Minister, GoI has stated recently that companies with information technology as significant part of their business should get their cyber security audit by third party and appoint an officer to manage their IT security. This is a significant step towards ensuring national cyber security [6].

There will be debate about the merits and drawbacks of government involvement in controlling cyber security. With respect to cyber security regulations, we are still in early days of what the government role should be, what tools are available. Policymakers and stakeholders should take security risks seriously, but be careful that attempts to strengthen one system do not irreparably harm other systems.

References

1. *Ministry of Electronics and Information Technology website* at <http://meity.gov.in/content/strategic-approach> accessed on 21 October 2016.
2. *Article on "An overview of India's cyber security agencies"* <http://www.medianama.com/2016/04/223-indias-cyber-security-agencies/> accessed on 21 October 2016.
3. *Coverage on "Cyber Security and Related Issues" at* <http://www.insightsonindia.com/2014/11/25/cyber-security-related-issues-comprehensive-coverage/>
4. *National Cyber Security Policy 2013* at https://en.wikipedia.org/wiki/National_Cyber_Security_Policy_2013 accessed on 23 October 2016.
5. *Annual report of Cert, India available at* <https://cert-in.org.in> accessed on 28 October 2016
6. <http://economictimes.indiatimes.com/tech/ites/ravi-shankar-prasad-for-cyber-audit-of-firms-in-it-business/articleshow/55376609.cms> accessed on 11 November 2016

Augmented Transformational Methods for Effective e-Governance

SMMM Kalyan Kumar nic

Meity
ND, 100003
kumar.kalyan@nic.in

S C Pradhan nic

Meity
ND, 100003
pradhan@nic.in

Abstract

e-Governance is emerging as an imperative paradigm and basic tool for sustainable development. The digital transformation required for this development with utopian goals can be achieved by selective and adaptive methods. These methods of ICT with stakes in provider, consumer, medium-of-connecting and other widely deployed technologies are needed to be augmented for efficient governance.

In that line, here is presented the stack of augmented technologies of E-governance with respect to infrastructure, literacy, delivery and security strategies with help of digital, scientific and technological innovation to deal with technical difficulties associated with ensuring interoperability and integration of systems across sectors and rapid proliferation of technologies.

Keywords- Cloud; E-governance; Mobile

1. Introduction

Effective e-Governance is possible by clear strategy to address the issues and their analysis pertains to the digital divide, infrastructure development, open standards and educational uses of IT. Governance refers to the system of directing and controlling the actions, policies and functions of an organization, or nation. As it should ensure that the spending of public money for information and communication technology development, control and maintenance activities is done in a transparent, effective and efficient way. Potential of e-Governance lies in promoting transparency, accountability, efficiency and citizen engagement in public service delivery. Accountable and inclusive institutions at all levels are possible through advanced electronic and mobile services. Integrated public services like one-stop platforms allowing accessing a range of public services. This approach makes it easier for people to interact with public administration and get adequate and holistic responses to their queries and needs. E-governance effectiveness in the delivery of basic economic and social services to people can be improved based on technological augmentation and infrastructure reach.

Government infrastructure [4] spans through at different levels includes central, provincial (state), regional and local. Particular difficulties for government units due to both their heterogeneity in these resources and legacy apps. Examples of these apps range from better access to information on available services to complete on line processing of requests for permits, certificates,

payments, issues of privacy and electronic voting etc. Its need to identify the required technical areas for these concerns with efficient service paradigm and minimal redundancy. Rapid advances in technology have allowed more advanced equipment and applications. It needs to cope up and with longer vision, matching tools to deal these issues dynamically.

The policy framework [1] of IT activities in governance comes as IT act 2000/08, which is one of its kind to grant Egov rights to the citizens of India and e-commerce also encourages start-up ecosystem. At the same time, related rules and laws are there to regulate the system. Other laws in support include providing preventive vigilance and penalties to activities with copyright act 1957 and Aadhaar ACT 2016. Overall, it eases to deliver a common language to enable and secure on a global basis to customers, 3rd parties, business partners, regulators, users and other stake holders.

The current stakeholders [3] of e-Governance are NIC, UIDAI, NeGD, SeMT, State IT wings, CGG, eGCA and District IT cells. The infrastructure spans across as National Information Infrastructure(NII) like National, State and Mini Data centers, connectivity through SWAN, NKN, NICNET, NOFN, SATCOM. Cyber protective agencies like CERT-In, NTRO, IB wing are part of regulative processes. More integrated projects [7] are already in place like MMPs, MeghRaj, CSCs, SDSs through Egov planning of NeGP, NeST and Digitize India Platform (DIP).

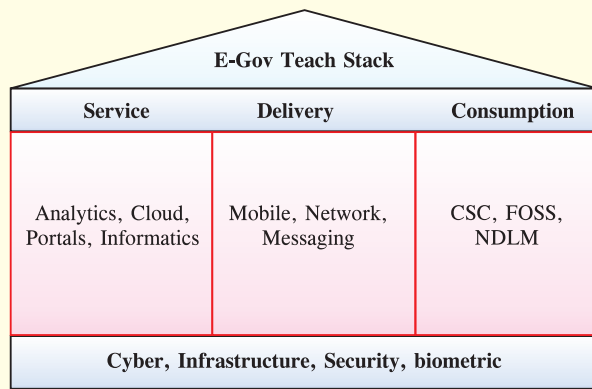


Figure 1: E-governance allies

2. Transformation Strategies

Various technologies of IT intricately bounded for e-gov domain. Also standards of governance might dovetail with fast pace of technology changes and contingent goals. Hence, technology updating & isolation in fact requires for selective and adaptive measures. It leads to conceptually discern and apply them to roles of Egov practices. Effective Service, Conductive Delivery Channel and Optimal Consumer societies are allies to the system of E-governance. Technologies for these as depicted in Figure:1 elaborated precisely further.

2.1 Augmented services

The Egov model of delivery need to deal with diverse and variable set of requirements on citizen and government applications. These applications can be integrated to cloud model for better throughput by incorporating multitenancy and orchestration of these services. Various cloud prototypes are there for implementing Egov services like public, private, hybrid model, Infra, platform, software model, overlay model which are delivered with 'as a service' version of deployed applications. Cloud helps to pool out the ICT resources for all Egov services for efficient utilization. It prohibits man-ual maintenance costs incorporated in traditional model of deployment. Its need to adopt matching model of cloud version for a particular use case, in-order to establish efficient Egov arrangement with in the governance.

The selection of a particular cloud model in Egov depends upon the following factors as Location, automation, category and authority. As India is diversified group with central, states, districts, villages and up to blocks, the applications designed for particular group need to implement matching cloud model. Another factor includes customization of one application for different groups dynamically and deploys it as a one instance. The Egov applications developed by multiple parties at different levels at center and states need to consolidate in to single multitenancy model so duplication of efforts can be minimized.

By means of all these factors, it's been noticed that ser-vices generated at different levels need to be consumed at diversely placed resources. All these virtual Egov communities need to act collaboratively for incorporating the model of computation for constructing and consuming different data generated at different levels using custom routines of cloud.

The discourse of all these establishments will be managed to unbind the payloads and distribute free resources across all levels via set of processes and procedures. The methodology starts to act by identifying the nodes which are taken a part of this system and assigning the roles to contribute. The detailed description is given below:

"Mi" Represents the number of the Main node i.

"Ri" Represents the number of Rear node.

"N1" Represents the number of user requests.

"N2" Represents the number of resources available.

"Lij" Represents the number of Main nodes for all Rear node ij.

"ij" lists the relation of node j in job i.

"Pij" Lists the parents of node j in job i.

"Rf" Multitenancy factor.

Partition the N2 resources among N1 user request Super rear assigned as service requester for request among N1

Allocate at least $M_i + R_f * R_i$ number of nodes to each request i Form the overlay cloud on identified network on N2 nodes.

for each job request i do

do Select M_i tree nodes as Mains;

Select R_i nodes as Rears;

for each assigned Mains i do do

Select the parents of node j according to locality DC of node;

Assign the multiple Parents for each node i as P_{ij} and L_{ij} at multiple levels of the rears;

,

end for

end for

Configure node hierarchies by calling Rears() and Mains() routines;

The processing for given service runs on $M_i + R_i$ nodes; After Processing completes at each node results are sent back to current rear;

Collection of the results from super rear node.


```

for each node j in Mi + Ri do do
    identification of current rear Pij
    if j == Rear then then
        Pij current parent in Pij 1 to Lij or super rear
        having the result
    else
        Pij current rear in Pij 1 to Lij having the result
    End if
end for

```

De-allocation of nodes/Termination of service.

```

for each node j in Mi + Ri do do
    De-allocate the node j from request i, after getting
    the results from all the rears and mains of j and its
    results send back to its rear j;
end for

```

After getting the results from all rear nodes, processing terminates at super rear;

This algorithm [8] works to wrap out the distribution and collection of workloads assigned to the cloud [5]. It works by identifying the units of computation at different locations try to organize the overlay upon it. It does not depend upon the intermittent failures between different data centers by maintaining the nominal replication or tenancy factor.

2.1.1 Service Security

e-Governance targets the creation of an ecosystem which enables advancement to the existing digital infrastructure and facilitates prompt digital services. This requires the huge analysis of IT methods, in order to address the gaps created with respect to Cyber risk and security. There are many levels to address these spaces as preparation, identification, approach, preservation, examination, analysis, and reporting. Following are the details of all operational factors of network, infrastructure and software components of typical pan do-minion Egov setup.

1. Risk Management: Establishment, roll-out of a risk management framework, procurement and implementation of an automated Governance, with compliance enables the system to have a clear visibility on the risk profile of the en-tire IT infrastructure. It differentially manage key risks with optimized processes and controls and also conducts periodic and automated risk assessment Implementation of appropriate policies, procedure for the treatment of various identified risks will be implement through central and distributed measures as the framework would be created

centrally and would need to be implemented across all locations.

2. Business Continuity Management: Business Continuity Disaster Recovery Procurement and implementation of automated Governance on ISO 22301:2012. Critical services after facing of cyber need to quickly rejuvenate by means of BCM practices.
3. Capacity Management: Learning Management System (LMS) Integration, sourcing and delivery of technical con-tent, Assessment, training and up-skilling are necessary to counter emerging challenges and cybersecurity concerns with changes in technology. Skilled manpower is better equipped at managing life cycle of any incident Knowledge about system Access, terminated users retaining access, accidental provisioning of privileged access, circumvention of business rules using excessive access, knowledge about System Vulnerability, identification of insecurely developed applications and unpatched systems, configuration of detection systems and network architecture to disallow the propagation of malware, unauthorized access mitigation, third Party Misuse and Error, people behavior patterns, compromising through social engineering, unknown roles and responsibilities.
4. Vulnerability Management: Vulnerability scanning, application security, database security malware analysis are key components here. it will uncover the actual risk posture of IT infrastructure (servers, devices, applications) and timely closure of the discovered vulnerabilities. It oversees overall security posture of system with centralized management.
5. Resolution Management Incident and problem Management, incident ticketing, SIEM eases the work of classifying and prioritizing the incidents. It uncovers the actual risk posture of IT infrastructure deployed for the service with central capability.
6. Asset Management Works as asset inventories supported with manual procedures and in the isolated databases of multiple tools with central management by enabling visibility across different modules. It creates the stack of identifiers with naming criteria of individual category and placement. A quick identification of security admin of a resource is guar-anteed by this.
7. Identity Management Ensure mapping of administrative nodes with their digital identity, allows right people have the right access at the right time for the right reasons and makes segregation of duties matrix is created and implemented.

- Cloud Security Formalize guidelines for implementing and enforcing security within a cloud operating environment. Development of secure deployment program based on the leading standards to support multi-tenant security practices.

2.2 Augmented Delivery

Mobile first approach is required for all new generation Egov applications as the mobile connectivity has penetrated most of the rural areas than regular data connectivity Services[2] from Egov are required to reach the every citizen who is mostly resides in rural areas. A framework for addressing the needs of mobile governance, with subtle approach on existing infrastructure enables the users to access these services. It is also essential to provide reliable & secure connectivity for these cloud based appliances and

data to these mobile rural users. The intermittent nature of present networks makes it harder to provide reliable and unified solution.

The proposed approach makes the optimal integration of existing services to provide seamless connectivity to rural areas. The intent here is to create the alternative system of methods with alternative possibilities like SMS mediums which have wider presence in rural areas. This system provides efficacy with improved connectivity having secure communication and easier integration.

```

Fetch data to send from form or web service
Compress the data
Determine the SMS Sender & Recipient
if Send to == Logger Server then
Encrypt the compressed data using Selective Hybrid Cryptosystem
Calculate 'X'='D'='Y' 'X'+ 'Y'=160 'NS'='D'='X' to.
    distribute the data among 'NS' SMS's
Construct the MetafirstSMS from X & Y and NS
Send the MetfirstSMS
Send the 0NS0 SMS to the Logger Server as . .
SecureSMS
else
    Call the JS code to direct the AJAX request.
end if
if Receiver via == Logger Server then
Decrypt and decompress data using Selective Hybrid Cryptosystem
Collect the Metafirst SMS and retrieve X, Y & NS .
Combine the big text from collected parts.
else
Call the JS code to callback the AJAX response.
end if

```

This algorithm[6] as depicted in Figure:2 works by defined encryption, compression and negotiating methods at both server and client places. A generic client runs at user mobile will interprets the request and responses and processes the required methods to form the alternative channel for regular web requests to cloud. The intermediary server(Logger) will do the due process at server side.

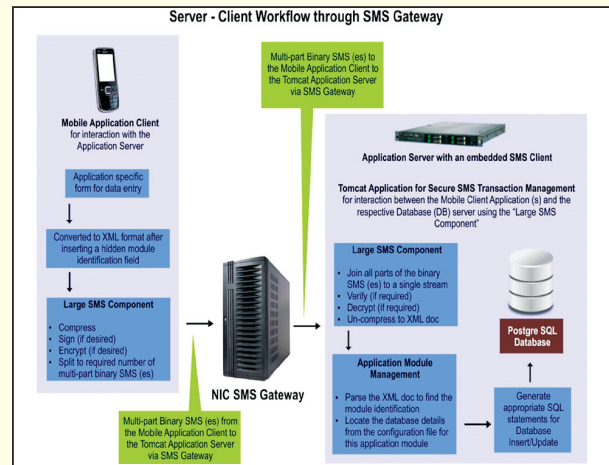


Figure 2: Augmented service Delivery

2.3 Augmented Societies

Massive Open Online Courses, National Digital abhiyan mission tools enable masses anywhere to empower in the design and use of ICTs. ICT applications trends are towards open source and interoperability, which allow for improved reach in digitally divided societies. By reducing learning curves and shortening the time of each technology generation, for ICT-based solutions that eases the applied contents of education, health-care, agriculture, and environmental governance services. Scale up education and incubation of ICT solutions, including through partnerships with the business sector Public-Private Partnerships (PPPs) for ICT-enabled systems enables digital dividends [9] to these societies. The fragmentation of many small demonstration projects need to be transformed into pan-india national-scale programs, infrastructure need to be expanded and upgraded for public reach.

3. Conclusions

Combining new institutional set-ups with transformational technical solutions to manage the government activities at all levels are needed to promote a better approach to public service delivery in diversified conditions. By re-engineering with out-of-box E-governance practices with augmented methods discussed can lead to achieve sustainable development goals and digital transformation. The holistic design and state-of-art IT systems help the processes of effective E-governance mechanism as an object of Digital Governance systems.

References

1. GOI. THE INFORMATION TECHNOLOGY ACT, 2000. <http://www.dot.gov.in/sites/default/files/itbill2000.pdf>, 2000.
2. Meity. Guidelines for Delivery Channels for Provision of Public Services through Mobile Devices. [http://meity.gov.in/sites/upload_files/dit/files/Guidelines%20for%20Delivery%20Channels%20for%20Mobile%20V10%20-August 2.pdf](http://meity.gov.in/sites/upload_files/dit/files/Guidelines%20for%20Delivery%20Channels%20for%20Mobile%20V10%20-August%202.pdf).
3. Meity. Report of the Expert Committee on HR Policy for e-Governance. http://meity.gov.in/sites/upload_files/dit/files/Report%20of%20the%20Expert%20Committee%20on%20the%20HR%20Policy%20for%20eGovernance.pdf.
4. Meity. NPIT. [http://meity.gov.in/sites/upload_files/dit/files/National 20IT 20Policy%20 20.pdf](http://meity.gov.in/sites/upload_files/dit/files/National%20IT%20Policy%202012.pdf), 2012.
5. C. P. MuraliKalyan. Building an internal cloud for it support organisations: A preview. *International Journal of Computer Science and Business Informatics*, 1(1), June 2013.
6. S. C. P. MuraliKalyan. Sms based service delivery platform for mobile cloud applications. oalib.preprints.
7. NeGD. eGCF. http://negd.gov.in/writereaddata/files/Digital%20Repository/e_governance_competency_framework.pdf, 2014.
8. S. K. SK Kumar. A mobile-cloud paradigm for constraint-less computing. *IEEE TECHNOLOGY AND ENGINEERING EDUCATION (ITEE)*, 7:7{11, May 2012.
9. UN. World Development Report 2016: Digital Dividends. <http://www-wds.worldbank.org/external/default/WDSContentServer/WDS/IB/2016/01/13/090224b08405ea05/20/Rendered/PDF/World0development0000digital0dividends.pdf>.

Digital Transformation in Himachal Pradesh Transport Department: Reaching out to Last Mile Rural Population

Dr. Sunil Kr. Chaudhary, IAS, Bhupinder Pathak, Ajay Singh Chahal

Commissioner-cum-Director Transport, Scientist-D/District Informatics Officer, Scientist-F/State Informatics Officer
Transport Department, Govt. of HP, National Informatics Centre, Himachal Pradesh, HP Secretariat, Shimla-171002 (HP)
transport-hp@nic.in, 94184-67676, pathak.b@nic.in, 94181-11012; ajay.chahal@nic.in, 94182-75076

Abstract

e-Governance is the effective use of Information & Communication Technology to improve the system of governance that is in place, and thus provide better services to the Citizens. eGovernance is considered as a high priority agenda of the Digital India program, as it is considered to be the only means of taking Information & Communication Technology (ICT) based services to the “Common Public” through Digital Transformation. The paper discusses the role, these ICT systems play in providing various Transport sector services Online at the doorstep of rural/urban community or individual by bringing all services related to the Driving License, Learner’s License and complete relevant information about the existing Driving License on single web portal. In Himachal Pradesh, it has been achieved where all the information is available in a single web portal covering all the Transport department offices and is accessible online on a 24x7 basis. This contact-less SAARTHI system has simplified the processes, reduced the visits of citizens to Transport offices, reduced footfalls, enabled online payment of fees and has put a check on corrupt practices. The system has helped to consolidate the databases into a centralized platform and deliver core services upto village level.

Keywords: digital transformation, last mile connectivity, transport, Sarathi, driving license, common service centre

1. Introduction

With a view to computerizing all the Regional Transport Offices (RTOs) in the country and bringing about uniformity in the Driving License and Vehicle Registration documents issued by the Regional Transport Offices, the web-enabled Saarthi project has been conceived and implemented. Previously, although the citizens were getting their licenses through a computerized system, they had to visit the Regional Transport Offices-RTO/Registration & Licensing Authorities-RLA offices personally, multiple times, resulting in cost and time of the citizens in addition to various corrupt practices. In order to offer better services, the web-enabled SW was developed by the NIC Central Team and Himachal has been the first State in the country to roll it out in all RTO/RLAs of the State of Himachal Pradesh, ahead of other States, offering the service of driving licenses to citizens from the comfort of their homes. This new web based system has been rolled out in all the 70 RLAs & RTOs in Himachal Pradesh in a period of six months and has been implemented on the backbone of a robust HIMSWAN data network with adequate bandwidth and built-in redundancy to facilitate acceptable standard of speed, information security and fault tolerance. This last mile connectivity has been an important factor in the implementation of the SW at the remotest locations of the State and the BSNL has proved its worthiness for providing the connectivity at remote/ hard/ difficult to

access locations, which will remain un-serviceable by other private services providers for years to come. The data and application for the whole country is being maintained in a National level data centre backed up by a Disaster Recovery Centre – both of which have the latest hardware, software and control infrastructure to achieve optimum operational performance, safety and security.

At the national level, the new system will consolidate the database and applications for all RTOs in all States into a common, centralized platform and deliver the core services of Sarathi throughout the country upto village level. Himachal Pradesh is having a Population of 68 Lakhs, 10.03 % is Urban and 89.97% is Rural Population. The 89.97% of the Rural including Tribal Population is being served. 50% of the applications have been submitted online and the 3700 Common Service Centres established at the last mile at the village level are or the Transport Service Providers are serving the people of Himachal Pradesh. These CSCs/LMKs are bridging the gap of digital divide in rural areas.

Total RTOs	70
RTOs Covered	70
Population Urban Rural	10.03%
	89.97%
Area	55673 Sq. Kms
Application Submitted	195988

The RTO and RLA authorities throughout Himachal Pradesh now operate computerized counters/offices to help citizens to obtain driving licenses. The re-engineered online process now takes less than 24 hours instead of two/ three days, as was necessary under the earlier system. The lack of transparency under the old system resulted in a flourishing business for agents and middlemen leading to corruption. The individual driving License holders can now track the status of their applications online from the Sarathi service portal. Such a State wide Internet based solution and its implementation would have raised many eye-brows few years back. But it has been actually achieved.

2. Objectives

The primary objective of implementing this project in Transport Department is to:

- To provide transparent, timely and citizen centric delivery of services by using ICT.
- Reduction in Time For Delivery of Service
- Re-engineer the entire processes by eliminating non value adding steps and
- Convenience to the citizens
- Anytime Anywhere 24x7 service for application submission and e-payment.
- SMS service to the Driving License Holder from application submission to the approval of Driving License.
- Improve citizen perception about the department
- Citizen Interface with the Department more friendly
- Increasing the Satisfaction Level of Citizens
- Providing information to the applicant about the application status through web tracking.
- To provide the service to other stake holders viz. Insurance companies, Police, RTOs/RLAs of India, MORTH, Courts, Banks and other Govt. Agencies for the verification of Driving License.

Digital Transformation under Digital India

Dr. APJ Abdul Kalam, Former President of India, had visualized e-Governance in the Indian context to mean – “A transparent smart eGovernance with seamless access, secure and authentic flow of information crossing the interdepartmental barrier and providing a fair and unbiased service to the citizen.” [2]

The Govt. of India’s Digital India initiative is an umbrella programme that covers multiple Government Ministries

and Departments. It weaves together a large number of ideas and thoughts into a single, comprehensive vision so that each of them can be implemented as part of a larger goal. Each individual element stands on its own, but is also part of the larger picture. Digital India is to be implemented by the entire Government with overall coordination being done by the Ministry of Electronics and Information Technology (MeitY). Digital India aims to provide the much needed thrust to the nine pillars of growth areas. In 5th Pillar of Digital India is e-Kranti, which is an essential pillar of the Digital India initiative. Considering the critical need of e-Governance, mobile Governance and Good Governance in the country, the approach and key components of e-Kranti have been approved by the Union Cabinet on 25.03.2015 with the vision of “Transforming eGovernance for Transforming Governance”. There are 44 Mission Mode projects under e-Kranti under which Transport Sector is one of the project for the delivery of services. [3]

E-Governance in India has steadily evolved from computerization of Government Departments to initiatives that encapsulate the finer points of Governance, such as citizen centricity, service orientation and transparency. Lessons from previous e-Governance initiatives have played an important role in shaping the progressive e-Governance strategy of the country. Due cognizance has been taken of the notion that to speed up e-Governance implementation across the various arms of Government at National, State, and Local levels, a programme approach needs to be adopted, guided by common vision and strategy. This approach has the potential of enabling huge savings in costs through sharing of core and support infrastructure, enabling interoperability through standards, and of presenting a seamless view of Government to citizens.

The National e-Governance Plan (NeGP), takes a holistic view of e-Governance initiatives across the country, integrating them into a collective vision, a shared cause. Around this idea, a massive countrywide infrastructure reaching down to the remotest of villages is evolving, and large-scale digitization of records is taking place to enable easy, reliable access over the internet. The ultimate objective is to bring public services closer home to citizens, as articulated in the Vision Statement of NeGP.

“Make all Government services accessible to the common man in his locality, through common service delivery outlets, and ensure efficiency, transparency, and reliability of such services at affordable costs to realize the basic needs of the common man”

In addition, prior research has also suggested that the main rationale for the use of government and eGovernance is that it can reduce costs and delays in processing and delivering services, expand citizen’s access to public

sector information, increase transparency and public accountability, and weaken authoritarian tendencies. The relationship between e-government and corruption was also studied to infer that as the use of ICT or e-government increases the level corruption decreases. The study suggests that a 1% increase in the government Index may have resulted in a 1.17% decrease in corruption^[1].

3. Challenges

The main challenge faced in starting Online Sarathi4.0 service was:

- How to migrate from existing Sarathi1.0 to Sarathi4.0
- Porting of existing data from Sarathi1.0 to Sarathi4.0
- Porting of subsequent pending data to Sarathi4.0 for which transactions were pending in Sarathi1.0 after initial porting of data.
- How to tackle the old transactions which were not completely processed in Sarathi1.0
- Part of the payment done in Sarathi1.0 after migration.
- Same DL records was available in different RLA/RTO authorities because of previous transactions done. How to take the valid updated records during porting for RLA/RTO data to Sarathi4.0.
- The Last Mile Connectivity in all the RLA/RTOs and even RLA/RTOs of remote tribal areas was a challenge and is a challenge, even today!
- Mapping of different master tables used in Sarathi1.0 & Sarathi4.0
- The master tables codes were not same in all the RLA/RTOs and mapping of such table of different RLA/RTOs to Sarathi4.0
- Testing of software on staging server for different types of transactions and issues faced in tackling such cases in Sarathi4.0
- Issues faced during the pilot run at two pilot sites.

4. Services Offered

The Sugam Kendras are offering many services under one roof in a time bound manner. The services being offered are diverse in nature, so is the delivery associated with it. The software implemented in these centers are role based work flow applications and responsibility associated with one task is assigned to the individual operator assigned for that activity.

The applications are basically on-line transaction processing wherein the information is taken from the applicant on standard government prescribed formats/forms and then same is filled and if required his/her photographs, Digital Signatures and finger prints impressions are taken on spot beside acceptance of cash at the cash counter. If the approving authority is available in the office and no further field verifications are required, immediately the services are provided. Otherwise the applicant is given a date by which the activity would be completed. The main services have been listed in Figure-1.

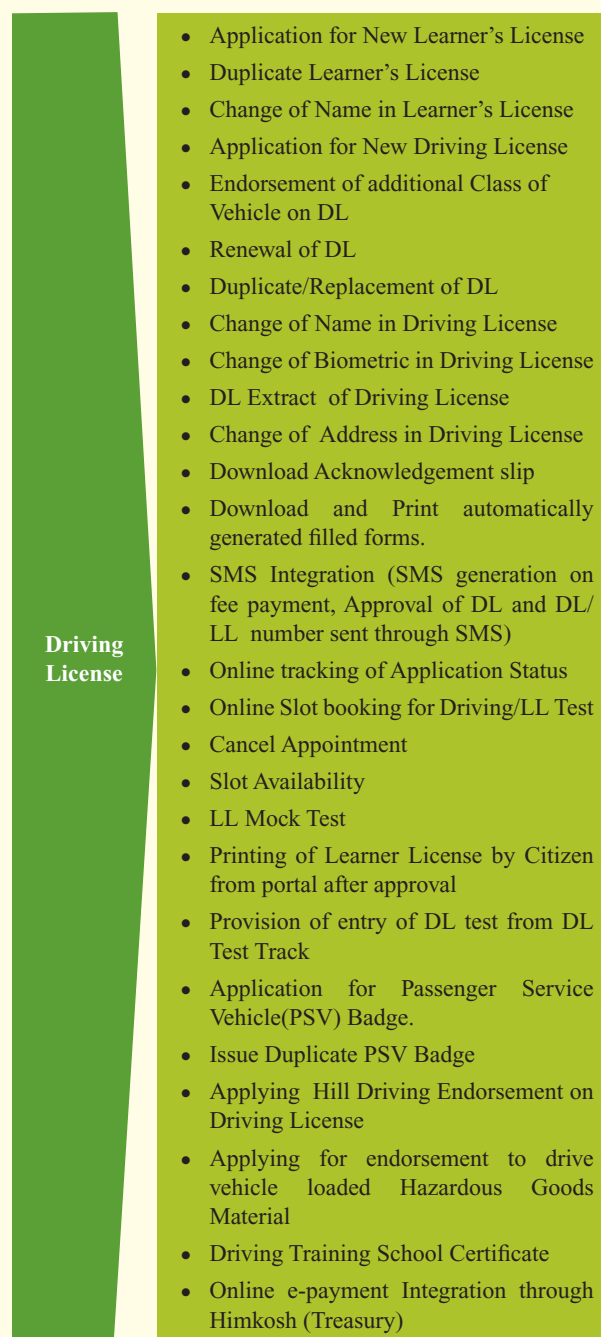


Figure-1: Sarathi Services List

5. Implementation

The new version of Sarathi4.0 facilitates the citizen to file their application online along with uploading of necessary documents. A unique Application Number is generated for each application filed, which can be used by the citizen to track the status of the application. The online Learner's License Test (STALL) slot booking and e-payment integration with HIMKOSH (HP Cyber Treasury) for payment of license fees and various other services are available through this new system. This web application can be accessed through other devices such as mobiles, tablets, etc. The SMS integration is also there and the Driving License holders are being intimated about the action taken and when it has been approved and the LL/DL number generated. The e-mail integration is also there for sending the updates of application to the individual.

In existing system, the public can search their Driving & Learner License details online and also see the status of their applications. The application status will show the flow of application in the office and which dealing hand has processed their application on which date and when it has been approved, printed and dispatched. The Learner License holder can download the Learner Licenses from the web portal once the LL is approved. The SMS is sent to the individual once the LL or DL is approved alongwith the LL/DL number. In earlier system, general public had to visit or contact concerned RLA/RTO office for applying and payment of fees etc.

The Motor Vehicle Inspectors can update the Driving License Test results directly from the Driving Test tracks against each application. The RTO/RLA can track the pending application at different levels in their office and all the pending applications for final approval will be available. Any applicant, if coming for any of the service and if the renewal is also due, then automatically system takes care of the same and alert the individual to pay for the Renewal of Driving License fee too.

An individual passing the driving ground test for one class of vehicle and failing in another class of vehicle has an option to withdraw a service for particular class of vehicle from the public portal to get the Driving License or to wait and pay for the balance fee. The Govt. of Himachal Pradesh has also opened the Common Service Centre (CSC) up to Village level known as LokMitra Kendras in Himachal Pradesh. They are also the stakeholder in this project and are submitting the application on this portal and providing the services to the public living in rural areas of Himachal Pradesh.

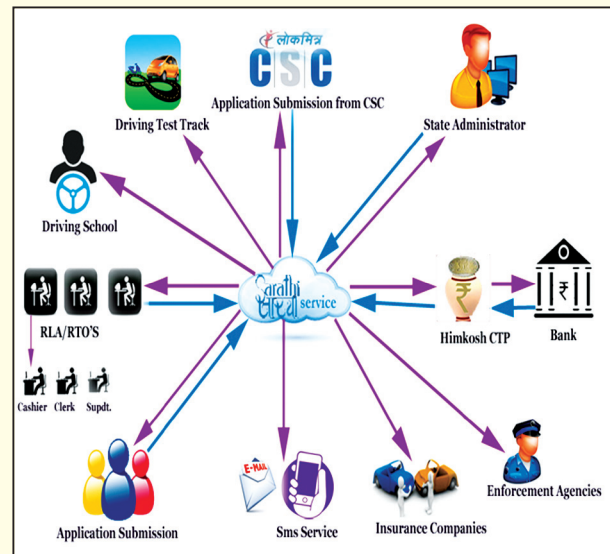


Figure-2: Saarthi 4.0 Flow Architecture

The “Saarthi Service Portal”^[5] provides various types of services to all stakeholders namely, citizens, general public, Driving School business enterprises, students, employees, Drivers, special category people etc. Therefore, coverage of the stake holders and targeted population is 100%. The online system has been hosted at NIC National Cloud ‘MeghRaj’ and available to all stakeholders 24x7 and accessible from anywhere, anytime throughout the State, India and abroad using Internet.

The stakeholders’ geographical coverage is mostly within Himachal Pradesh State except those who are going out of the State and getting their licenses renewed in other states. The other stake holders are Insurance companies who are getting the verification of the genuineness of Driving License, banks who are verifying the authenticity of the DL where the public is giving the Driving License as proof of address and identity for opening bank accounts. The CSCs provide these services in rural areas on payment basis. However, stakeholders residing temporarily anywhere in India or abroad can also access the service from their respective places 24x7. Beside this, the Transport Department has given the License to Transport Service Providers for rendering the various services to the public for online submission of various applications especially for drivers who are Matric passed and are not well versed with IT system. These TSPs are now stake holders in this project.

The public at large viz. General public and taxi drivers, Public and Private Bus Drivers have been helped and benefited most, by implementing the online system. The application status will show the flow of application in the office and which dealing hand has processed their application on which date and when it has been approved, printed and dispatched as shown in Figure-2.

The Learner License holder can download the Learner Licenses from the web portal once the LL is approved. The SMS is sent to the individual once the LL or DL is approved alongwith the LL/DL number. In earlier system, general public had to visit or contact concerned RLA/RTO office for applying and payment of fees etc.

SARATHI 4.0 Implementation in Himachal Pradesh

The software is uniformly implemented in the State of Himachal Pradesh covering all the 70 RLA/RTO who are issuing Driving Licenses. Himachal Pradesh is the first state in India who has implemented this software covering entire area of the state. The coverage aspect as a service is beyond the State too as the Driving License holders residing outside Himachal Pradesh can view / verify their Driving License details in Public Domain.

- Total Driving License issuing RLA/RTOs: 70, Solution implemented in all 70 RLA/RTOs,
- Population: 68 Lakhs, 10.03 % is Urban and 89.97% is Rural Population and Rural Literacy is 81.85%.
- 89.97% of the Rural including Tribal Population is being served.
- Area : 55,673 square KMs including Trans Himalayan arid zone having toughest terrain in the world.
- The dispersed population having density of 123 people per Sq Km are being served.
- Total Application submitted so far: 1,95988 since October 2015 till 20th September 2016.
- Half of the applications (50%) are submitted online.

6. Last Mile Connectivity

In Himachal Pradesh the HIMSWAN is providing reliable network through BSNL for vertical and horizontal connectivity throughout the State and has reduced the cost of communication between Government Departments at different locations and is providing secure network infrastructure to enable electronic transfer of sensitive data, payments etc. with improved capacity for disaster management. HIMSWAN is a highway of connectivity between G2G, G2C and providing round the clock connectivity of minimum 2 Mbps between districts and Sub.Division/Blocks/Tehsils. The key highlights of HIMSWAN are:

- ✓ Data Communication, Voice over Internet Protocol (VoIP), Video Conferencing (VC) and selective Internet available at all Locations.
- ✓ Last mile connectivity through Lease line or VPNoBB.

- ✓ Last mile connectivity through wireless wherever wired line is not available.

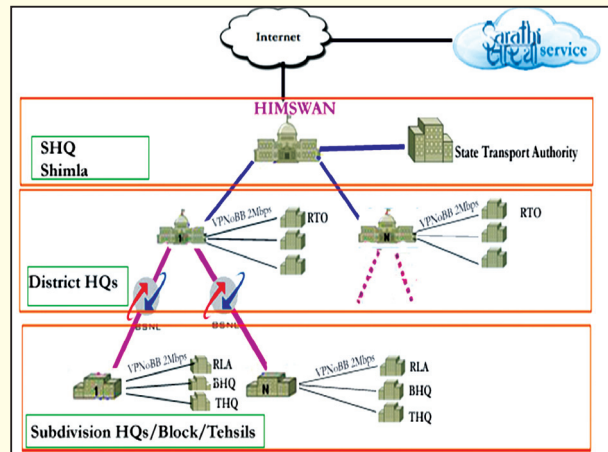


Figure-3: HIMSWAN Architecture

Presently in all the 70 RTOs and RLAs of Himachal Pradesh, 2Mbps VPNoBB connectivity has been provided by the Department of IT, Govt. of HP. The District HQs RLAs and RTOs are connected through NICNET on NIC LAN wherever they are near NIC Offices.

The Common Service Centres/Lok Mitra Kendras are using BSNL, AIRTEL connectivity and in the remote tribal hard areas of the State the, VSATs have been provided to the Offices and CSCs. In Himachal 3000 CSCs are providing services to the citizens. The Transport Service Providers (TSP) appointed by the H.P. Department of Transport are working at the Block and Village level, who are providing the services to the Citizens who don't have access to Internet.^[4]

7. Post Deployment Benefits

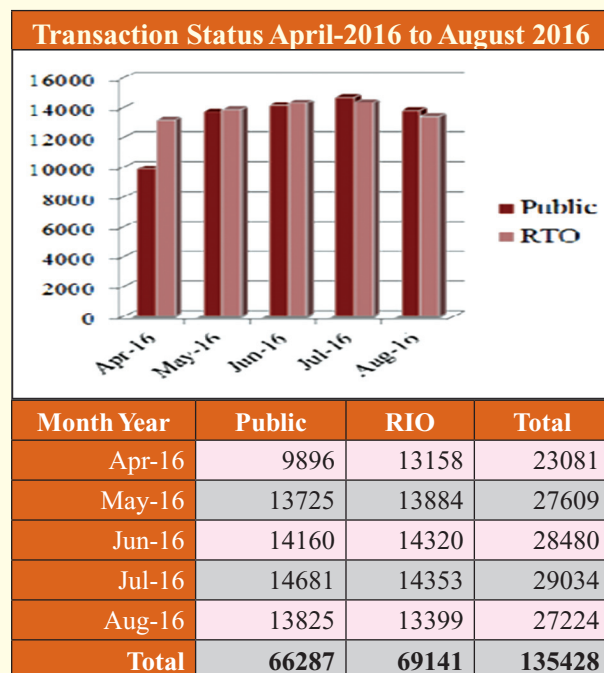
- ✓ One can submit applications online for New DL & LL
- ✓ Online e-payment integration with HimKosh Cyber Treasury.
- ✓ The online slot booking for the appointment for DL and LL test.
- ✓ Services of LL and DL e.g. Renewal of DL, Endorsement of Additional Vehicle Class, Duplicate DL etc. are available online.
- ✓ Uploading of Scanned Documents, Photograph and Signature of Applicant.
- ✓ User friendly website with all the information needed for anyone including all the web-fill able forms.
- ✓ The address of the license holder is being captured using the e-Governance standards by taking Census 2011 data having State, District, Tehsil/Town, Village, Ward & Pin code.
- ✓ Real-time Services to the Citizens

- ✓ Tracking of Application Status
- ✓ Automated Alerts to Citizens
- ✓ Elimination of NOC and Clearance Certificate
- ✓ Onetime submission of documents
- ✓ Online sharing of data by RTO, State transport department & DoRTH
- ✓ Online sharing of relevant information by Insurance agencies, banks
- ✓ Use of relevant information by Police department
- ✓ Computerized test for learner's licence and online booking for service.
- ✓ Online Mock test for learning license
- ✓ Online NOC verification of license issued by any authority
- ✓ Single source of all Information for MIS for office

These above are some of the initiatives that have made the department not only responsive but also provide services in a transparent manner. The department maintains a central database and provides services to the police and other departments upon request.

8. Key Learnings

After implementation of online services, RTO department has become much transparent and user friendly resulting in faster licence issue and application turnaround process time. The applicant can apply for a license online by visiting the online portal of Sarathi service



49% of the applications have been received online through portal or through Transport Service Providers/CSCs and 50% applications have been entered through RTO/RLA staff.

Figure-4: Transaction status from April to August 2016

It is evident from the figures given in the diagram that out of the total applications received from April to August 2016, 48% of the applications have been received from the public portal. One can see the success and response of the public in getting the service. It has definitely reduced the number of visits to the RTO/RLA office and waiting time in RLA/RTO office in getting the service with lesser footfalls in their offices.

The learner licence holder need not to visit the office as immediately after the Learner License screen test aid for Learner License (STALL), the result is flashed on the screen and if candidate is passed the LL is approved and applicant is intimated about the Learner Licence on his/her mobile. The individual can take the Learner License print from the Sarathi Service Portal.

The Insurance and Bank companies applying online for the DL extract need not to visit to any of the RLA/RTO office in Himachal Pradesh. They can apply online and make online payment for the fee specified as per the rules and the system will calculate automatically and after payment of fee they can print the DL extract by giving the application number.

One person holding multiple Driving License from different authorities in the past are being stopped when they are coming for any of the transaction. On the basis of Name, Father's Name & Date of Birth each person is being given unique BIOID internally.

Cost effectiveness

The implementation of the web portal of Sarathi services in all the 70 RLA/RTOs of Himachal Pradesh has been appreciated by Govt. Of India and this process re-engineering initiative has benefitted all stakeholders. Now that all services are online, it is saving the time and cost to citizens and hydrocarbon fuel used in motor vehicles on part of the State and Country and contributing towards of clean environment. On part of the Government, there has been huge saving of revenue by eliminating the processes of procurement of paper, printing forms, transporting these forms to various office locations throughout the State, storing, managing inventory and finally issuing/ sending of the Forms to citizens as per their requirements/ requests. The time required to complete the above processes and officials working on these processes has also been saved, which may be seen in terms of revenue saving on part of Government and the State.

Green Digital Governance

Green Initiative: IT has been used to enable paper-less transaction to the extent possible. All the forms as defined in Central Motor Vehicle Rules are being submitted online and the requirement of manual submission of all those forms will be stopped.

Smart & Green Solution: The saving of time and costs to citizens and hydrocarbon fuel used in motor vehicles on part of the State and Country is contributing towards of clean environment.

Paperless office: By utilizing the online services the Government of Himachal Pradesh is aiming to achieve a Paperless Governance and Cashless transactions. This indirectly has impact on reducing the extra Green House Gases that would have been released, had the citizen travelled multiple times to avail the service.

Digilocker: The Driving License has now integrated with Digi locker under the Digital India programme. With this integration people will no longer need to carry around physical copies of Driving Licenses. They can instead access digital copies of the same on their mobile phones via the Digi Locker mobile app.

9. Conclusion

The successful implementation of the Saarthi4.0 web-enabled software in a hilly and difficult State like Himachal Pradesh ahead of all other States of the country signifies the fact that citizens are eager to utilize online services which deliver definite outputs (DL in this case), in difficult to connect scenarios too. The role of user (Transport Department), implementing agency (NIC) and CSCs (LokMitra/TSP) is very important. Of course, there are issues like last mile connectivity,

change management, resistance to change, quick software solution up-gradation as per feedback provided are essential elements in such a large scale State wide roll-out of online services. Connectivity issues need to be addressed through a combination of ISPs like VSATs, VPNoBB, LL, private ISPs, WiFi from nearest connectivity point, inclusion of multiple private service providers, based on ground realities of the locations/offices being covered. Some suggestions like mandatory capturing of Aadhaar number, to capture enrolment from the private driving training schools for accountability, mandatory ePayment of fees, capturing DL test results from driving tracks will further enhance the value of these services to the citizens and Government alike.

References

1. Mistry J.J.; Jalal Abu, "An empirical analyses of relationship between e-Government & corruption"; The International Journal of Digital Accounting Research Vol. 12, 2012, pp. 145 – 176
2. Article on E-Governance Big Challenge: Abdul Kalam, <http://www.cxotoday.com/story/e-governance-big-challenge-abdul-kalam>
3. <http://www.digitalindia.gov.in/>
4. The CSC/Lok Mitra Kendra in Himachal, <http://hp.gov.in/csc/>
5. www.parivahan.gov.in/sarathiservice
6. <https://sarathi.nic.in> National Register Sarathi portal

Digital Transformation - Processes, Challenges and Managing Changes

N. Natarajan, Scientist 'C'

NIC Centre, Department of Consumer Affairs,
Government of India
(natarajan@nic.in)

Abstract

Industries and Governments across the world are undergoing a digital transformation either crisis-induced, as part of a core strategy, or as part of a more controlled business transition, necessitated by the evolution of digital tools and technologies. This has invaded the government working environment and business processes triggering re-engineering of policies and processes resulting in significant changes in the way of work, communication and delivery. Under the fast changing circumstances, Government needs to be well prepared to anticipate the current and future impact of enduring trends and steer their machinery accordingly at the right speed. The benefits of innovative digital transformation are many, to name a few - increase in productivity, improvement in quality, cost reduction and timely delivery thereby improving the quality of life of citizens overall. It is imperative to remember that digital transformation is not just about technology; instead, it is a roadmap across people, processes, behavior and technology that will enable the Government to successfully navigate this transformation. In this paper, we shall briefly discuss the salient features of the Digital Transformation in the Government perspective, its vital role in delivery of citizen-centric e-governance, the challenges and managing changes that are required for the transformation.

Keywords: Digital Transformation, Processes, Challenges, Change Management

“Digital India’ is an enterprise to transform India in a scale unmatched anywhere in the world and it has the potential to make development truly inclusive - Prime Minister Narendra Modi”.

1. Introduction

The huge population and the vast geography of India has mandated towards a total digital economy. Digital transformation, in simple terms, is the use of information technology to drastically improve the performance using various digital advances in software, hardware and communication such as analytics, mobility, social media, and smart embedded devices, thereby bringing in changes in internal processes, policies and value propositions. The digital space in India has, therefore, seen a lot of transformations and Internet of Things (IoT). The Ministry of Electronics and Information Technology (MeitY) has drafted India’s first ‘Internet of Things Policy’. This policy has been developed with an aim to make the IoT industry in India to reach the mark of USD 15 billion by 2020 by increasing the number of connected devices in India to 2.7 billion by 2020.

2. Digital Transformation

Digital technologies - the ways we use them in our personal lives, work and society – have changed the face of both society and government and will continue to. This has always been so but the pace at which it is happening is accelerating and is faster than the pace of transformation in organizations.

2.1 Objective

The main objective of the Digital Transformation is to develop a connected, well secured and smart IoT based systems for India’s Economical, Societal, and environmental needs in-line with the global trends and needs.

2.2 Digitization, Digitalization and Digital Transformation

Digitization: It is the conversion of analog information into digital form” (i.e numeric, binary format). Digitizing, is technically explained as the representation of signals, images, sounds and objects by generating a series of numbers, and expressed as a discrete value.

Digitalization: Unlike digitization, this is the actual “process of the technologically-induced change within the above industries”. This process has enabled much of the phenomena today known as the Internet of Things, Industrial Internet, Industry 4.0, Big data, M2M, Blockchain, Cryptocurrencies etc.

Digital Transformation: Finally, digital transformation is described as “the total and overall societal effect of digitalization.” Digitization has enabled the process of digitalization, which resulted in stronger opportunities

to transform and change existing business models, socio-economic structures, legal and policy measures, organizational patterns, cultural barriers, etc. Digitization (the conversion), digitalization (the process) and the digital transformation (the effect), therefore, accelerates and illuminates the already existing and ongoing horizontal and global processes of change in society (Khan, 2016, Collin et al. 2015).

2.3 Components and Processes of Digital Transformation

Digital transformation projects requires several elements to succeed and digitization is a part of it. Among the many elements, we mention four that are related with technology, people and/or processes.

Digital transformation typically affects operations in various ways such as Government – citizen relations and the success depends on the ability to meet all the expectations and requirements of the citizen by way of enhanced functionality, improved offerings and greater ease-of-use. The four key components are: Cloud – to store and process data, Analytics - to identify trends and improve decision-making, Mobility - mobile solutions to connect to systems and citizens and Information Security to safeguard all the vital information of both the Government and Citizens.

Re-engineering processes: New digital technologies enable to make drastic changes to the operating models and achieve efficiencies by selectively introducing new processes while altering or even eliminating others. There is a need to strike a balance between two powerful imperatives: delivering growth in the short term, and making the necessary investments now for a long-term transformation. Test and learn fast to create options and establish relationships with critical ecosystem partners, and Innovate the “core” moving the dials on the basics and creating new organizational capabilities in terms of citizen-centricity and agility. The are certain important things to bear in mind when implementing a digital strategy viz. understanding the basics properly; working out a strategy with clear vision, developing and

nurturing a citizen-first digital culture in government organization and workforce; capacity building; and, practicing learning, unlearning and re-learning approach to fine tune the outcomes. Figure 1 depicts the various components of Digital Transformation of an enterprise.

2.4 Focus on future and outcomes

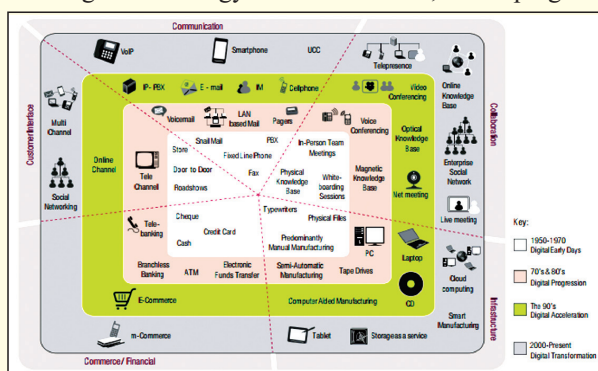
There is a massive change in the life-style, behavior and requirements in the society due to various factors such as open economy, innovation in technology etc. and to meet the expectation of citizen in delivering the services pose a major challenge to the Government. To this challenge, all of us are to reconsider the way we work, the way we communicate and the way we deliver the services to the citizens. Perhaps, this is why digital transformation has risen to the top of strategic initiatives. The intricate web of citizen touchpoints and the subsequent speed and accuracy of our responses pose a real challenge to our traditional infrastructure. Also, Digital Transformation results in Productivity, Saving in Costs and Time.

2.5 Silos, responsibility and skills

Digital transformation – just as social business, digital business and any form of customer-centric marketing and business processes, requires the ability to work across silos. In many cases, digital transformation even is about totally reworking organizational structures, which can be as much about collaborative methods, Centers of Excellence as removing specific silos. The debate about the responsibility over digital transformation as a whole and within specific functions and processes in that sense of genuine transformation is archaic, even if it needs to be held as Chief Digital Officers or CIOs, all play a role. Here again, there is no ideal solution regarding responsibility: context does matter. The role of Government in delivering services in which there is total government monopoly need to be broken and a complete change of mindset, processes and skills need to be infused as fresh blood with building private partnership with various agencies in the field.

3. Digital Transformation – Reforming through Technology

Digital transformation is not just about technology. Digital transformation starts with the goals, challenges, customers and context of the organization. There are plenty of pressures has built in the delivery system to begin digital transformation. The digital transformation has many dimensions and require a focused overview of things from past, present and future. Transforming operational processes from manual to digital is the key area. This needs transforming business models. Adapting to new technology quickly is the vital parameter. The digital capabilities of the Government agencies need a complete revamping by way of processing re-engineering



Source: Capgemini Consulting Analysis

Figure 1 Digital Transformation of Enterprises

to suit the need of the day, adding fresh and new skills, adding extra infrastructure and capacity building.

3.1 Citizen-Centric Services under the Digital India Programme:

Digital India is a flagship programme to transform India into digital empowered society and knowledge economy. The vision of Digital India aims to transform the country into a digitally empowered society and knowledge economy.

Government Process Re-engineering using IT has helped to simplify the government processes more efficient and successful delivery of services to the common man. There are three key elements of the Digital India program and vision, namely, Digital infrastructure as a utility to every citizen, Governance and services on demand, and Digital empowerment of citizens. Various measures taken by the government towards this like simplification of collection of information by adapting to simple and user friendly forms, switching over to complete online automated application, use of online repositories e.g. for certificates, educational degrees, identity documents, etc., integration of services and platforms e.g. Aadhaar platform of Unique Identity Authority of India (UIDAI), payment gateway, Mobile Seva platform, sharing of data through open Application Programming Interfaces (API) and middleware such as National and State Service Delivery Gateways (NSDG/SSDG) have facilitated integrated and interoperable service delivery to citizens and businesses. Continuous efforts are being made to establish databases and information in electronic form. IT tools are being used to automate, respond and analyze data to identify and resolve persistent problems for process improvements. For example, programmes like such as Jan Dhan Yojana, Jeevan Praman etc.

Some Important Digital India initiatives:

e-Sign: A facility that enables citizens to digitally sign documents and open bank accounts remotely.

DigiLocker: Digital Locker facility helps citizens to digitally store their important documents like passport, mark sheets and degree certificates etc. Digital Locker will provide secure access to Government issued documents. It uses authenticity services provided by Aadhaar. It is aimed at eliminating the use of physical documents and enables sharing of verified electronic documents across government agencies.

MyGov.in: MyGov.in is a platform to share inputs and ideas on matters of policy and governance. It is a platform for citizen engagement in governance, through a “Discuss”, “Do” and “Disseminate” approach.

SBM Mobile app: Swachh Bharat Mission (SBM) (Clean India) Mobile app is being used by people and Government organisations for achieving the goals of Swachh Bharat Mission.

eSign Framework: eSign framework allows citizens to digitally sign a document online using Aadhaar authentication Online Registration System (ORS).

eHospital application: The eHospital application provides important services such as online registration, payment of fees and appointment, online diagnostic reports, enquiring availability of blood online etc.

National Scholarships Portal: National Scholarship Portal is a one stop solution for end to end scholarship process right from submission of student application, verification, sanction and disbursement to end beneficiary for all the scholarships provided by the Government of India.

Jan Dhan Yojana: Jan Dhan Yojana is a massive programme on financial inclusion. It targets to have at least one bank account in each household. Further each account holder should have the insurance policy.

Jeevan Praman: This programme facilitates Pensioners from Government to furnish life certificates every year electronically. More than 1.5 million registered pensioners in the country are availing of this digital facility to continue to claim their pension regularly. The Aadhaar Based Biometric Authentication System for Pensioners (Jeevan Pramaan /Life Certificate) is being used effectively. Pensioners can submit their Digital Life Certificate (DLC) from their home by using PC/Mobile with Biometric devices.

Digital India aims to provide the much needed thrust to the nine pillars of growth areas, namely (i) Broadband Highways, (ii) Universal Access to Mobile Connectivity, (iii) Public Internet Access Programme, (iv) e-Governance: Reforming Government through Technology, (v) e-Kranti - Electronic Delivery of Services, (vi) Information for All, (vii) Electronics Manufacturing, (viii) IT for Jobs and (ix) Early Harvest Programmes.

There are important things to bear in mind when implementing a digital strategy, to name a few: (a) Get the basics right; (b) Define a clear strategy and business model; (c) Develop and nurture a citizen-first digital culture, organization and workforce. (d) Build capabilities to collect data and turn it into actionable insights.

3.2 eKranti – Electronic delivery of services

Government of India has approved the e-Kranti programme with the vision of “Transforming e-Governance for Transforming Governance”. All new and on-going e-Governance projects as well as the existing projects, which are being revamped, are now follow the key principles of e-Kranti namely ‘Transformation and not Translation’, ‘Integrated Services and not Individual Services’, ‘Government Process Reengineering (GPR) is mandatory in every Mission Mode Project’.

3.3 Internet of Things (IoT)

IoT can be defined as interplay for software, telecom and electronic hardware industry and promises to offer tremendous opportunities for many industries. IoT is a seamless connected network system of embedded objects/devices, with identifiers, in which communication without any human intervention is possible using standard and interoperable communication protocols. Phones, Tablets and PCs are not included as part of IoT. With the advent of the Internet of Things (IoT), fed by sensors soon to number in the trillions, working with intelligent systems in the billions, and involving millions of applications, the Internet of Things will drive citizen and government behavior that will demand increasingly intelligent industry solutions, which, in turn, will drive trillions of dollars in opportunity for IT industry and even more for the companies that take advantage of the IoT. By 2020, Internet-connected devices are expected to number between 26 billion and 50 billion globally. As per Gartner Report the total revenue generated from IoT industry would be USD 300 billion and the connected devices would be 27 billion by 2020 globally. It has been assumed that India would have a share of 5-6% of global IoT industry. The Indian Government's plan of developing 100 smart cities in the country, for which Rs. 7,060 crores has been allocated could lead to a massive and quick expansion of IoT in the country. Also, the launch of the Digital India Program of the Government, which aims at transforming India into digital empowered society and knowledge economy will provide the required impetus for development of the IoT industry in the country. Some of the key aspects of a smart city are Smart parking, Intelligent transport system. Tele-care, Woman Safety, Smart grids, Smart urban lighting, Waste management, Smart city maintenance, Digital signage and Water Management. Among other things, IoT can help automate solutions to problems faced by various industries like agriculture, health services, energy, security, disaster management etc. through remotely connected devices. IoT offers avenues for telecom operators & system integrators to significantly boost their revenues and has resulted in their taking lead in adoption of IoT applications and services being offered by the technology. Apart from direct IoT applications, the IT industry also has an opportunity to provide solutions, services and analytics related to IoT.

3.4 Information for All

Open Data platform facilitates proactive release of datasets in an open format by the ministries/departments for use, reuse and redistribution. Online hosting of information & documents facilitate open and easy access to information for citizens. Government pro-actively engages through social media and web based platforms to inform and interact with citizens.

3.5 Early Harvest Programmes

Early Harvest Programme basically consists of those projects which are to be implemented within short timeline such as IT Platform for Messages, Government Greetings to be e-Greetings, Biometric attendance, Wi-Fi in All Universities, Secure Email within Government, Standardizing Government Email Design, Public Wi-fi hotspots, School Books to be eBooks, SMS based weather information, disaster alerts, National Portal for Lost & Found children etc.

3.6 Digital transformation and intelligent information

Managing information and data is crucial and it has to be fully supported by insights, intelligence and actions also play an equal role to get the expected fruitful outcomes. That's where context, semantics, artificial intelligence and activation come in. With the Internet of Things and Web 3.0, the intelligent dimension becomes more important in regards to making sense of unstructured information, automation and connected devices and putting information at work. Making data actionable, introducing devices (IoT) in an increasingly complex and growing data landscape, the steep growth of unstructured data, deriving meaning and insights from information and leveraging it at the right time and right moment for the right reasons and actions are all critical.

This isn't just about 'managing' information in the traditional sense anymore. It's also not just about connecting systems and data nor even connecting through information. With the advent of the Internet of Things, the need to ensure data quality and the increasing need to use and unlock it faster, despite the sheer volume, adds several elements to the information and transformation equation such as - intelligence (as in artificial intelligence as the only way to add and extract meaning from ever more data and as the only way to use information and data in an IoT and inter-device context); speed (with speed being a customer experience and even competitive benefit); a holistic security approach (with information and data as assets); and an increasing focus on accuracy, quality and outcomes. On top of the existence of systems of records and systems of engagement, we are moving to systems of intelligence and intelligent automation and optimization, ecosystems of code, algorithms, cognitive computing and fast/smart data as ways to succeed with digital transformation and, vice versa, information-based challenges as transformational drivers.

3.7 Digital transformation and business process outsourcing

Both digital transformation and business process management go hand-in-hand. Digital transformation

has a profound impact on business process outsourcing (BPO) and thus the industry of BPOs. Business process outsourcing is moving from its traditional predominant cost-saving and (outsourced) process optimization roots to a cost plus optimization plus innovation plus value proposition. When organizations transform, then so do their partners to whom they outsource specific business processes.

4. Challenges and Change Management

The ultimate challenge in Digital transformation is managing the change because it impacts not only basic governance structures and strategic positioning but all levels of an organisation including tasks, activities and processes.

4.1 Challenges

Government Delivery Systems often face challenges in providing economical and efficient citizen-centric services and solutions at the ground level to cater to various needs of the common man vis-à-vis problems and grievance redress mechanisms. The penetration of technology on one hand and the illiterate poor rural citizen on the other, often throws special challenges in delivery of e-governance. Governance with Accountability, Transparency and Innovation through the digital platform is the true requirement in meeting the expectation of the common man. Optimization of business processes, how to get business insight out of the collected information, using the same for the betterment of citizens, employees and partners and managing the risk of growing volumes and complexity of information are the key challenges.

One of the biggest hurdles to this transformation, in fact, is the workforce and the way in which they work. Insufficient human capacity would be a hurdle in achieving the goal.

4.2 Change Management

Change Management is a very critical and vital for any organization to become successful when it undergoes a major change. The digital transformation is a very big leap and hence it would require Capacity development (Human & Technology) for IoT specific skill-sets, Research & development and Developing IoT products specific to Indian needs in various domains.

The Policy framework of the IoT Policy of MeitY proposes a multi-pillar approach. The approach comprises of five vertical pillars namely Demonstration Centres, Capacity Building & Incubation, R&D and Innovation, Incentives and Engagements, Human Resource Development and 2 horizontal supports namely Standards & Governance structure.

Digital transformation should not be an end in itself, and, in the role of data and analytics in digital transformation, there are even more opportunities for change and needs for change management. Like all other forms of

business transformation it should be guided by clear managerial goals and realizable business benefits. Once a clear roadmap has been defined, digital transformation can help organizations address their most significant priorities and achieve both internal and external benefits, in areas such as innovation, citizen experience, efficiency, or productivity. While carving out the Roadmaps, the intent, priorities, pain points and actual needs are to be worked out on case to case basis. There is never a one size fits all solution and intent, outcomes and priorities steer the digital transformation efforts, on top of changing parameters in the system. Priorities also means prioritization, often including looking at the low hanging fruit but always with the next steps and ultimate goals in mind, knowing these goals – and the context within which they were set – will evolve.

5. Lessons Learnt during Implementation

Digital transformation is not just about disruption or technology. It is beyond technology. To understand digital transformation, it's key to put people and processes above technology, even if technology is a change agent – or at least the ways we use it to evolve, innovate, adapt and “pro-dapt”. Digital transformation is about using digital technologies to improve (and connect and often radically change) processes, enhance customer experiences, focus on the area where business and customer value meet and seeing new and better possibilities, while using different and digital-intensive ways to realize them. Digital transformation even goes beyond the use of digital technologies to support or improve processes and existing methods. It is a way to alter and even build new business models, using digital technologies. In that sense, it also goes beyond digitization (although that's often a condition to make it happen) and certainly beyond a digital-savvy skillset and capacity which is nothing less than a must in the age of an increasingly channel-agnostic and digital customer. Digital transformation is also about responding to the changes that digital technologies have caused – and will continue to cause – in our daily lives, individual businesses and organizations, industries and various segments of society. These changes are obviously not brought upon us by the technologies themselves. The human dimension is not just an important focus of digital transformation, it's a catalyst whereby the ways we use and see digital technologies can have very unexpected consequences, regardless of whether it concerns consumer/customer behavior or the innovative capacity of disruptive companies (nearly always a mix), in the end also people.

Test and learn continuously to fine-tune all elements of the road map. We believe the best approach to introducing a digitalization strategy includes quick wins and the use of prototypes to support a test-and-learn approach that can then be scaled up. Innovations can be implemented in the form of pilots or limited-scope projects, then fine-tuned and expanded in line with the outcomes they achieve.

In the end, the mindset, ‘culture’, and approach are needed for continuous optimization, holistic improvement and a focus on what people need, far beyond the digital context.

6. Conclusion

Digital transformation should not be an end in itself. Like all other forms of business transformation it should be guided by clear managerial goals and realizable business benefits. Once a clear roadmap has been defined, digital transformation can help organizations address their most significant priorities and achieve both internal and external benefits, in areas such as innovation, customer experience, efficiency, or productivity.

It is a mistake to think that organizations are really ready for profound digital transformation in a broad way. There are still far too many gaps in regards to the digitization (and automation) of existing processes and the digitization of data from paper carriers. Worse: what is sometimes called digital transformation is sometimes “just” digitization (turning paper into electronic information into processes). You need digitization in order to optimize in a digital transformation context but digitization does not equal digital transformation. What matters is the combination, strategic and prioritized interconnecting and the actions you take to achieve business goals through digitization and combining data.

Furthermore, there is an even bigger gap between back-office processes and the front end. An example of this phenomenon can be seen in the financial industry, where there are extremely strong disconnects between the back-office and front end. There are lots and lots of digitization efforts that still need to be done in many areas of business and society and we all know and feel it, whether it’s in our daily experiences as “business people” or in the often totally unnecessary administrative tasks in regards to our government-related or finance-related ‘duties’ and interactions with business where we’re forced to use paper, the phone or channels we really don’t want to use anymore.

Digital transformation is probably not the best term to describe the realities it covers. Some prefer to use the term digital business transformation, which is more in line with the business aspect. However, as an umbrella term, digital transformation is also used for changes in meanings that are not about business in the strict sense but about evolutions and changes in, for instance, government and society.

The development of new competencies revolves around the capacities to be more agile, people-oriented, innovative, connected, aligned and efficient with present and future shifts in mind. Digital transformation is a journey with multiple connected intermediary goals, in the end striving towards continuous optimization across processes, divisions and the business ecosystem of a hyper-connected age where building the right bridges in function of that journey is key to succeed. In this online

guide we explore the essence of digital transformation, its evolutions and how it is present across various business processes and industries.

Businesses have always been changing and innovating, technologies always came with challenges and opportunities, regulations and ecosystems have always evolved.

It’s in the degree of interconnectedness and of various accelerations as we cover them that digital (business) transformation is to be seen as more than a buzzword but as a profound challenge, force and most of all opportunity for organizations that will enable them to achieve the core business competencies they need to succeed in rapidly changing environments where speed of change touches upon a myriad of phenomena, ranging from the acceleration of technological innovation and disruptions challenging the status quo of common business models to the need for speed in dealing with changing customer and partner demand across the value and supply chains.

References

1. *The Nine Elements of Digital Transformation Opinion & Analysis January 07, 2014* George Westerman, Didier Bonnet and Andrew McAfee <http://sloanreview.mit.edu/article/the-nine-elements-of-digital-transformation/>
2. <http://www.i-scoop.eu/digital-transformation/>
3. *Leadership in the Digital Age - a study on the effects of digitalization on top management leadership* by Khan (2016), Collin, et al. (2015)
4. <http://blogs.worldbank.org/ic4d/transforming-india-through-digital-innovation>
5. *Digital Transformation Begins With Transforming the Way We Work* by Allison Lloyd <http://documentmedia.com/article-2329-digital-transformation-begins-with-transforming-the-way-we-work.html>
6. *Moving toward transformation: Steps you can take to become a Digital Transformer* By Jean-François Gasc.
7. *Capgemini Consulting Analysis; The European environment Agency, State and outlook 2010: “Accelerating technological change: racing into the unknown”, Nov 2010; Forrester Research eReader Forecast, 2010 To 2015 (US), July 2010*
8. *Gartner: “Gartner CEO and Senior Business Executive Survey, 2010: Anticipating the Post-Recession Landscape”, March 2010*
9. *‘Digital India’, an Enterprise to Transform India: PM Modi*
10. *India’s digital transformation* by Kaushik Basu <http://www.thehindu.com/opinion/op-ed/indias-digital-transformation/article8224206.ece>
11. *Country Paper from India - Best Practices in e-Governance For Citizen-Centric Online Services, July 18 -22, 2016 , National Institute of Public Administration (INTAN), Kuala Lumpur, Malaysia By Dr. (Mrs.) Meenakshi Mahajan, Senior Technical Director & N. Natarajan, Scientist ‘C’*

Digital Transformation- India Perspectives

Keyur C. Sampat

Joint Director

Sardar Patel Institute of Public Administration (SPIPA)

Ahmedabad, Gujarat – 380015

keyur_sampat@yahoo.co.in

+919426962111

Abstract

India is on the path of reforming the public administration organizations with the aim to deliver more efficient and cost effective public oriented services and better information and knowledge, to people at the last mile. Digital transformation is the effective way to improve the system of governance that is in place and provide better services to citizens at large.

Digital transformation is considered as a high priority agenda in India by taking Information and Communication Technology (ICT) to the common public. Advancements in digital transformation will harness the power of ICT to make the governance processes quicker, efficient, inexpensive, accountable and transparent. This paper discusses about basic challenges, opportunities, initiatives and future road map for digital transformation in India.

Keywords- Digital Transformation, ICT, e-Governance, Cyber Security.

1. Introduction

1.1 Digital Transformation

Digital Transformation refers to the bunch of five technology components;

1. **Social-** Allowing people to communicate electronically on social platforms in real time
2. **Mobility-** Connecting with people irrespective of place
3. **Analytics-** Using data to analyze program and policy areas
4. **Cloud-** Changing people to leverage and pay for technology
5. **Cyber Security-** Providing secure communication and data storage

In this digital era, governments shall target all these five components together to address specific needs. They are useful to connect with the citizens, manage workforce, reduce cost and automate processes.

1.2 Digital Maturity

Digital Maturity is measured by a framework consisting of- People, Processes and Preparedness. People include citizens with digital know-how, able leadership, skilled workforce, and enabled talent. Processes involve innovation and collaboration, service and involvement of citizens, use of open source technologies and faster procurement. Preparedness requires strategy articulation, investment reaction and response to digital trends and capability benchmarking.

Governments across the globe are at very different stages in the digital maturity. A small percentage is 'maturing' however the majority are still in the 'early' or 'developing' stages. Even in India some states are in the 'early' and some are in 'developing' stages. Digital India initiative is a step forward to put India in the 'maturing' stage.

1.3 Digital Transformation- Key factors and Barriers:

Five key factors that influence digital transformation in public service organizations are; Strategy, Leadership, Workforce Skills, User Focus and Digital Culture. Characteristics of a digitally early/ developing/ maturing organization are given in Table-1.

The top five barriers to digital transformation of organizations are- lack of strategy, lack of digital mindset, lack of entrepreneurial spirit or un-willingness to take risks, too many competing priorities and lack of organizational agility. Lack of overall strategy is the leading barrier limiting early stage organizations from taking full advantage of digital trends. On maturing, lack of strategy falls away and then barriers become too many competing priorities, insufficient funding and handling cyber security. Objectives of strategy shall include increase efficiency, improve citizen experience and engagement and transparency, create valuable information or insights for innovation and improved decision making and transform organization processes.

Table-1: Characteristics of a Digitally Early/ Developing/ Maturing Organization

	Early	Developing	Maturing
Strategy	Aimed at Cost Reduction	Aimed at improving Citizen Experience and Decision Making	Aimed at Transformation of Processes
Leadership	Lacks Awareness and Skills	Digitally Aware	Digitally Sophisticated
Workforce Skills	Insufficient Investment	Moderate Investment	Adequate Investment
User Focus	Absent	Gaining Traction	‘Central’ to Digital Transformation
Digital Culture	Risk averse, Disintegrated	Risk Tolerant, Accommodates Innovation and Collaboration	Risk Receptive, Fosters Innovation and Collaboration

2. Challenges for India

Dr. A.P.J. Abdul Kalam, the former President of India has expressed, *“Delivery of services to citizens is considered a primary function of the government. In a democratic nation of over one billion people like India, e-Governance should enable seamless access to information and seamless flow of information across the state and central government in the federal set up. No country has so far implemented an e-Governance system for one billion people. It is a big challenge for us”*.

The issues relating to India are broadly- poverty, technical illiteracy, funding, management of change, authentication of transactions and processes, impediment of process re-engineering, interoperability, use of local languages and technology issues. The public sector must cope with additional management issues, including multiple agencies, a range of organizational mandates and constituencies, longer appropriations timelines, and the challenge of maintaining strategic continuity even as political administration change.

Therefore, it is important that private-sector companies supporting public IT transformations understand that the public sector operates in a different context. For example, it can be more challenging to set a specific target, build consensus, align on a leadership structure, secure funding, and meet implementation timelines in public sector organizations than private sector organizations.

Similarly, when systems and data are owned by different departments and functions, on a range of platforms and with differing taxonomies and access requirements, it can be difficult to invest at such a scale and generate sufficient economies. Silos, fragmentation, and the absence of a central owner for nationwide IT infrastructure and common components can make it hard to connect the internal “plumbing” to create a seamless experience for the end user, be it a government servant, a business user, an average citizen, or another inter-governmental office. It doesn’t make the task easier when the complexity of large-scale digital projects requires specialized skills and expertise that come at a high price and are often in short

supply. In consequence, many e-government efforts fall short of their promise.

3. Government of India Initiatives

e-Governance initiatives in India took a broader dimension in the mid 1990s for wider sectored applications with emphasis on citizen-centric services. The major ICT initiatives of the Government included, some major projects such as railway computerization, land record computerization, etc. which focused mainly on the development of information systems. Later on, many states started ambitious individual e-governance projects aimed at providing electronic services to citizens.

Though these e-Governance projects were citizen-centric, they could make less than the desired impact due to their limited features. The isolated and less interactive systems revealed major gaps that were hindering the successful adoption of e-governance along the entire spectrum of governance. They clearly pointed towards the need for a more comprehensive planning and implementation for the infrastructure required to be put in place, interoperability issues to be addressed, etc. to establish a more connected government.

The policy-makers in India tend to justify the adoption and expansion of e-governance on the grounds that it costs less, promotes transparency, eliminates corruption, generates possibilities to resolve rural poverty and inequality, and guarantees a better future for citizens. Government tends to show e-governance as the cure for all ranges of problems confronting India, and therefore Indian Government has set the target of delivering at least 25 percent of its dealings and services electronically. To achieve the target Indian Government has decided to boost computer density by making computers easily affordable; to increase connectivity by improving the telecommunication based on optical fiber networks. Indian government has taken major initiatives to setup institutions for making policy, control and account deployment of e-Governance which will provide effective and efficient services.

3.1 Information Technology Act, 2000

One of the most important initiatives undertaken by the central government is the Information Technology Act, 2000, which is to regulate cyberspace and define offences and penalties related to IT such as tampering with computer source documents, breach of confidentiality and privacy, publication of false digital signatures and so on.

3.2 The National e-Governance Plan (NeGP), 2006

NeGP was launched in 2006 with a vision to make all government services accessible to the common man in his locality, through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realize the basic needs of the common man.

31 Mission Mode Projects covering a wide range of domains, viz. agriculture, land records, health, education, passports, police, courts, municipalities, commercial taxes, treasuries, etc. were initiated. Most of these projects have been made operational and have started providing services. However, despite the successful implementation of many e-governance projects across the country, e-governance as a whole has not been able to make the desired impact and fulfill all its objectives especially in ensuring anytime anywhere availability of services and their seamless integration. Even though India is known worldwide as a powerhouse of software, the availability of electronic government services to citizens is still comparatively low.

3.3 National Cyber Security Policy (NCSP), 2013

In light of the growth of IT sector in the country, ambitious plans for rapid social transformation and inclusive growth and India's prominent role in the IT global market, providing right kind of focus for secure computing environment and adequate trust and confidence in electronic transactions becomes one of the compelling priorities for the country. NCSP enables creation of suitable cyber security eco system in the country, in tune with globally networked environment and at the same time assures its citizens as well the global community about the seriousness of its intentions and ability to act suitably.

3.4 Ministry/Department of Electronics and Information Technology (MeitY/DeitY)

MeitY/DeitY plays a crucial role in facilitating e-governance by reinforcing knowledge based enterprises, encouraging coordination among users, adopting procedures based on international standards, promoting the internet and introducing IT education.

3.5 National Institute of Smart Government (NISG)

The Indian Government has established NISG in order to enhance capacity-building in e-Governance at all administrative levels.

3.6 Centre for Electronic Governance (CEG)

CEG is to promote IT and e-governance in the country which is to identify the appropriate forms of ICT necessary for better service delivery, to conduct training for generating awareness among government officials and to help state governments in implementing policies and reforms based on best e-governance practices.

3.7 National Institute of Electronics and Information Technology (NIELIT)

NIELIT is an autonomous society under MeitY, has identified more than 5000 facilitation centers across the country for training courses which will equip a person to undertake e-Governance transactions through computers and other basic activities, like e-mail, browsing the internet, etc. NIELIT has also signed MoUs with industry partners towards jointly conducting courses and online examinations on digital literacy.

3.8 Digital India

Digital India is a flagship program of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy.

A lot more thrust is required to promote inclusive growth that covers electronic services, products, devices and job opportunities. Moreover, electronic manufacturing in the country needs to be strengthened. Currently, India imports around \$100 billion worth of electronic goods which may reach \$400 billion by 2020. India today is at the tipping point where technology has to be leveraged more holistically to meet the aspirations of its 1.2 billion citizens. The stark differences between digital haves and have-nots need to be bridged to ensure that the government services reach the doorstep of every citizen and create a long-lasting developmental impact.

In order to transform the entire ecosystem of public services through the use of information technology, the Government of India has approved the 'Digital India' program with the vision to transform India into a digitally empowered society and knowledge economy.

The Digital India program is centered on three key vision areas:

1. Digital Infrastructure as a utility of every citizen.
2. Governance and Services on Demand.
3. Digital empowerment of citizens.

Digital India is an umbrella program that covers multiple Government Ministries and Departments. It weaves together a large number of ideas and thoughts into a single, comprehensive vision so that each of them can be implemented as part of a larger goal. Each individual element stands on its own, but is also part of the larger picture. Digital India is to be implemented by the entire Government with overall coordination being done by the Department of Electronics and Information Technology (DeitY). Digital India aims to provide the much needed thrust to the nine pillars of growth areas, namely Broadband Highways, Universal Access to Mobile Connectivity, Public Internet Access Program, e-Governance: Reforming Government through Technology, e-Kranti - Electronic Delivery of Services, Information for All, Electronics Manufacturing, IT for Jobs and Early Harvest Programs. Each of these areas is a complex program in itself and cuts across multiple Ministries and Departments.

All the initiatives, including establishing and expanding core ICT infrastructure, delivery of services ...etc under the Digital India program have definitive completion time targets. Majority of the initiatives are planned to be realized within the next three years. The initiatives planned for early completion (“Early Harvest Programs”) and citizen communication initiatives (“Information for All”) have already started going live and are being completed.

The Digital India program aims at pulling together many existing schemes. These schemes will be restructured, revamped and re-focused and will be implemented in a synchronized manner. Many elements are only process improvements with minimal cost implications. The common branding of programs as Digital India highlights their transformative impact. While implementing this program, there would be wider consultations across government, industry, civil society, and citizens to discuss various issues to arrive at innovative solutions for achieving the desired outcomes of Digital India. DeitY has already launched a digital platform named as “myGov” (<http://mygov.in/>) to facilitate collaborative and participative governance. Moreover, several consultations and workshops have been organized to discuss the implementation approach of the vision areas of Digital India.

4. e-GOVERNANCE BEST PRACTICES IN GUJARAT STATE

Gujarat has been one of the best administered states of the country. Apart from the several policy initiatives which have fuelled growth and development of Gujarat, there have been various initiatives taken by the state government towards good governance. Good governance is one of the key enablers behind Gujarat growth story. The state government is exploring further innovations

to yet better its performance for the overall good of the society and the nation. Some of such initiatives are ‘Chintan Shibir’, Jan Seva Kendra, State Wide Attention on Grievances by Application of Technology (SWAGAT), e-Procurement, e-City, e-Dhara, e-Gram, Aapno Taluko Vibrant Taluko (ATVT) and Swantah Sukhay etc. Jan Seva Kendra and SWAGAT have been noteworthy of the above list.

4.1 Jan Seva Kendra

Jan Seva Kendra has been envisaged as an integrated approach to citizen centric administration, which focuses on access to key services through the e-governance infrastructure using ICT. It offers G2C services for the subjects covered in the Citizen Charter. Citizen centric services of Revenue, Panchayat, Health, Education, Agriculture etc. departments are covered. It is a single window offering services from all taluka head quarters. Jan Seva Kendras imparts queue free operations with increased efficiency and convenience, greater transparency, accountability and better control, operating through private ICT firms in PPP mode. 156 types of public services classified in to Tatkal Services- in less than 2 hours, One Day Services- within working hours on the same day and Non-One Day Services- in the timeline specified by the Citizen Charter. In 2007, DeitY assessed the project as a Model Project in the country for district-level governance.

4.2 SWAGAT

SWAGAT initiative was started in 2003. It is an innovative concept that enables direct communication between the citizens and the Chief Minister, as also between the citizens and other functionaries of government. The fourth Thursday of every month is designated as SWAGAT day, wherein the highest office in administration attends to the grievances of the common man.

There is a four-tier grievances redressal system under SWAGAT- at State, District, Taluka and Village levels. Grievances submitted at Village, Taluka and District levels are first resolved by the authorities at the respective levels and thereafter, all pending grievances are reviewed by the Chief Minister himself. An applicant under SWAGAT is given a unique ID through which he/she can access the case details and status online. The review at the highest level is done based on the problems solved not simply disposed of.

Complaints are divided into three categories- Policy matters, long pending and first timers. SWAGAT at village level named Gram-SWAGAT was launched in 2011. Taluka and Gram-SWAGAT is held on every fourth Wednesday i.e. a day before District and State-SWAGAT. It has helped the rural people living in the remotest corner of the state to get their problems solved quickly. SWAGAT relies on ICT infrastructure, more particularly

Gujarat State Wide Area Network- GSWAN. It connects secretariat to hundreds of district/ taluka/ village level offices providing video conferencing facility. SWAGAT won 2nd place in the United Nations Public Service Award for improving transparency, accountability and responsiveness public service, in 2010.

5. Future Strategies for India

To build technical infrastructure across the country, India lacks in full-fledged ICT framework for implementation of e-governance. Complete implementation of e-Governance in India will include building technical hardware and software infrastructure. It will also include better and faster connectivity including faster broadband connections and faster wireless networks such as 3G and 4G.

The infrastructure may be built by government, private sector or individuals. Infrastructure shall also include promotion of Internet Cafes, Information and Interactive Kiosks. Apart from building technical infrastructure, the Government needs to build its institutional capacity. This will include training of Government employees, appointment of experts etc. Government has to create an Expert database for better utilization of intellectual resources and to equip the departments with hi-technology. To build legal infrastructure for better implementation of e-governance, the Government will need to frame Information Technology and cyber security related laws incorporating the established as well as emerging technology. Currently India has only the IT Act, 2000 and National Cyber Security Policy, 2013 which are mainly e-Commerce legislations. India has also modified many laws to include electronic technology; however they are not sufficient to cover e-governance completely.

To make all the information available online, the government should make use of all available means such as websites, blogs etc. This can be facilitated through centralized storage of information, localization of content and its management. The information of government is public information and therefore the citizens should have absolute access to information from the Government.

Literacy rate and computer literacy rate in India are alarming. The whole world is moving towards digital transformation, but India still lacks in this segment due to illiteracy. The people not only needs to be educated but also made e-literate for e-governance to flourish. The Government needs to campaign for increasing people's awareness towards advantages of digital transformation. Government should encourage all the procedures to go online which in turn will save time and efforts of the public as well as government authorities. Leaders can also motivate the people to use e-governance portals.

Indian setup is quasi-federal therefore Centre-State and inter-state cooperation is necessary for smooth functioning of the democratic processes. This cooperation is also necessary for successful implementation of digital transformation. This cooperation shall extend to centre-state, inter-state and inter-department relationships. Government should setup a Central Hub like the current Government of India portal, for accessing the information of all the organs of the central and state governments as well. The states must cooperate with the centre to create a national database of best practices.

While digital transformation in the public sector is particularly challenging, a number of successful government initiatives show that by translating private-sector best practices into the public context it is possible to achieve broader and deeper public-sector digitization. These six most important levers best described with a success story are as follows;

1. Government's commitment to specific digital target i.e. to make the most accessible digital-governance services in the world e.g. <https://www.gov.uk/>
2. Establish government-wide coordination of IT investments e.g. **IT Projektraad of Denmark.**
3. Redesign processes with the end user in mind e.g. **i-NUP of Logius, Netherlands.**
4. Hire and nurture the right talent e.g. UK hires CIO from private sectors.
5. Use big data and analytics to improve decision making e.g. <https://www.data.gov/> and **Apps for Democracy** and **Apps for America** in USA.
6. Protect critical infrastructure and confidential data e.g. **UK Fusion Cell.**

Regardless of where a public-sector organization is in its digital journey, these six lessons can help as it starts, scales, or evaluates its program. When digital transformations succeed, citizens and businesses will benefit from better access, and governments can operate more nimbly and achieve substantial savings.

6. CONCLUSION

In India, the challenge and opportunity is to entrust existing processes and structures to a demand-driven system. The role of the government is to improve accessibility by the common citizens in the rural areas to digital government. However, there is not enough awareness about the availability of online services, and in some areas and departments there is not sufficient connectivity causing poor speed, availability and quality of some services which ultimately limit the level of adoption of e-government. Advancement in technology through cloud services, mobile and social media for departments to reach out through customer services

centers to citizens to understand need can be considered as opportunities.

Government should encourage departments to produce new services through new funding models like PPP and provide a great leap in service delivery process through transformation and re-engineering through ICT, web and mobiles. Government departments focusing on user needs and experiences can provide services and improved interactions with citizens.

The key trends which are emerging and that will help the government to evolve a demand-driven ecosystem for both government and for citizens that improves over time are;

- ensuring that the services are integrated as experienced by citizens,
- focusing on integrating services and not just providing end-services to citizens,
- using intelligence and big data so that government can better understand and respond to patterns of service delivery and demand by location, experiences, performance etc. and
- applying design processes for effective and efficient service delivery.

Digital transformation is a way to solve the social as well as economic problems existing in the developing countries like India. Deepak Ghaisas, former Chairman NASSCOM Product Forum and CEO India Operations has estimated that “23 percent of government spending goes on defense, while 46 percent of it on governance. If a small fraction is spent on technology, namely to streamline the processes, it will really boost the domestic technology industry.”

According to WEF Global Information Technology Report, India ranks 24th out of 134 countries with 5.38 score in accessing and overall priority of ICT. Therefore, there is a tremendous potential for digital transformation to provide exponential benefits to their citizens and maximize return on government investment which represents the growth of e-Governance in India, is quite encouraging.

References

1. Ali M. Al-Khouri, Emirates Identity Authority, Abu Dhabi, UAE, An Innovative Approach for e-Government Transformation, International Journal of Managing Value and Supply Chains (IJMVSC) Vol. 2, No. 1, March 2011
2. e-Governance and Digital India: Empowering Indian Citizens through Technology, Deloitte & ASSOCHAM, September, 2015
3. William D. Eggers and Joel Bellman, The journey to Government's digital transformation, A Deloitte Digital Global Survey, 2015, Deloitte University Press Publication.
4. Cem Dilmegani, Bengi Korkmaz, and Martin Lundqvist, Public-sector digitization: The trillion-dollar challenge
5. Digital Government Strategies for Transforming Public Services in the Welfare Areas, OECD Comparative Study, © OECD 2016
6. Kiran Yadav and Sanatan Tiwari, E-Governance in India: Opportunities and Challenges, ISSN 2231-1297, Volume 4, Number 6 (2014), pp. 675-680, © Research India Publications
7. Khushboo Batra and Jasmeet Kaur Kapoor, e-Governance in India, International Journal of Computing & Business Research, ISSN (Online): 2229-6166, Proceedings of 'I-Society 2012'.
8. Dr. Sanjay Kumar Dwivedi and Ajay Kumar Bharti, e-Governance in India: Problems and Acceptability, Journal of Theoretical and Applied Information Technology, © 2005 - 2010 JATIT & LLS.
9. Nikita Yadav and V. B. Singh, e-Governance: Past, Present and Future in India
10. e-Governance Policy Initiatives under Digital India, May, 2015, DeitY, MeitY, Government of India.
11. Agents of change: How government CTOs can drive digital transformation- Government & Public Sector Insights, © 2015 EYGM Limited, EYG no. FK0121, BMC Agency, BACS 1002970.
12. Poonam Malik, Priyanka Dhillon and Poonam Verma, Challenges and Future Prospects for E-Governance in India, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3, Issue 7, July 2014 1964 ISSN: 2278 – 7798 © 2014 IJSETR
13. Dr. Pardeep Mittal, Amandeep Kaur, ISSN: 2278 – 1323, E-Governance - A challenge for India, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 2, Issue 3, March 2013 © 2013 IJARCET.
14. Monika Pathak and Gagandeep Kaur, Impact of e-Governance on Public Sector Services, International Journal of Emerging Research in Management & Technology ISSN: 2278-9359 (Volume-3, Issue-4), 2014.
15. Analysis of National Cyber Security Policy (NCSP – 2013) by Data Security Council of India, A NASSCOM® Initiative
16. M.P. Gupta, Promise of e-Governance: Compilation of Papers presented in International conference on e-Governance, December, 2003, Compiled by Power Grid Corporation of India, 2005.
17. Compendium of Good Governance: Recent Best Practices in Gujarat, Compiled by SPIPA, Gujarat.
18. Tanmoy Chakrabarty, Towards an ideal e-Governance scenario in India, Vice President, Tata Consultancy Services © 2008.
19. Discussing the Future of Digital Government-Challenges, Priorities, Insights and Smart Solutions, International Council for IT in Government Administration, World Bank Blog. (<https://blogs.worldbank.org/ic4d/files/Discussing%20the%20Future%20of%20Digital%20Government%20-%20WB%20-%20L4T.pdf>)

Mee-Seva – Easier. Faster.

Sanjay Jaju

NHIDCL, 3rd Floor, PTI Building, 4-Parliament Street, New Delhi – 110 001

jajus@gov.in

+91-11-2346-1604, +91-98491-32344

The author served as the IT Secretary to Government of Andhra Pradesh during 2011-2014.

Abstract

“Angrez chale gaye par angrezi chhodd gaye”.

While English might have been a boon, considering it helped us connect with the world, they also left behind Bureaucratic Red-Tape-ism. Most Red-Tape, or “Due Procedure” as it is called, is always a hindrance in the functioning of Governmental Agencies. A service that would not, and should not take more than 15 minutes, takes several weeks. Seeing this, officials often ask bribes from innocent public.

Mee-Seva, a one-stop e-governance shop, was launched on November 4, 2011 by Andhra Pradesh Government with the objective of decreasing time and human effort required for service delivery (like issuance of birth certificates etc.), and destroying metaphorical breeding grounds of corruption.

Mee-Seva has automated several service delivery processes with its centralized database containing digitally signed, verified records, and 10,000 Mee-Seva centers, with automatic kiosks for last mile connectivity. Reduced dependency on officials has increased speed of service, and reduced avenues for corruption. Most services now require a visit to Mee-Seva center and 15 minutes. If a citizen has access to computer or mobile phone, they can also access services from the comfort of their homes. Today 3 Lakh transactions take place through the Mee-Seva every day.

Keywords: Last-Mile Connectivity, Digital Transformation, e-Governance, Service Delivery, Government Process Re-engineering (GPR)

1. Methodology

The methodology employed to execute this gargantuan project was multi-tiered.

i) Architecture

One of the key reasons Mee-Seva was successful was its centralized architecture. The entire solution was hosted at a state of art State Data Center. The Web Based System, which was deployed at a central location, ensured that the services were easily accessible to all the stakeholders, anytime and anywhere. The n-tier web-based solution, i.e. Web based application, was developed along with PKI Engine and Payment Processing systems. The project worked on an Integrated Service Delivery Model to provide a single entry point for a wide range of services to the citizens. It also brought in a digital PKI enabled integrated architecture through multiple service delivery points by blending various pre-existing state initiatives with the Mission-mode Projects like State Data Center (SDC), State Wide Area Network (SWAN) and Common Service centers (CSCs).

Mee-Seva adopted the concept of central pooling of records. The records were digitally signed and stored

in the database and were rendered using a web-service. Additionally the fact that citizens/officers can verify the authenticity of such digitally signed electronically made such documents tamper proof.

For processing the service requests pertaining to the departments, the concerned department user had to log in either into the departmental portal or Mee-Seva directly with a secure user id, password and digital certificate. The portal would then display all the requests received from the citizens at various centers like APOne/eSeva/CSC etc. The entire process was done through single sign on facility and this allowed seamless operation of various interfaces and systems. Once the department user processed the requests by conducting field verification, he updated the status and remarks accordingly on the Mee-Seva portal. Thus the system reduced a lot of manual efforts by consolidating the data and also made the decision-making process an easy task. Besides, it also provided integration between heterogeneous systems cutting across departments.

The project also brought in strict adherence to the citizen charter time limits and ushered in a whole new paradigm of across the counter services concept through massive porting and bulk signing of databases.

ii) Standardization and ESD rules:

To ensure that the requests were processed only through authorized channels, IT & C decided to standardize the entire delivery channels across the state. Subsequently, all the authorized/recognized delivery channels, including CSCs, APOne centers etc, were converted into Mee-Seva centers. These centers, both in rural and urban, followed a uniform look and feel, same process models and delivery mechanisms and also were run by self-employed youth. These youths, besides eking their livelihood, provided a decentralized self-governance backbone to the administrative system. These multiple service delivery points, which were run by youths, redefined the governance and brought in strict adherence to citizen charter time limits.

In addition to these, the state also came up with ESD rules. Government of Andhra Pradesh issued Andhra Pradesh Information Technology Rules (Electronic Service Delivery), 2011 in order to provide legal sanctity to the digitally signed certificates. It was also made mandatory for Departments to migrate to electronic service delivery within a period of three years. This ensured that departments moved to electronic delivery of services within a period of time. These initial steps played a vital role in helping the state in stabilizing the initiative right from the beginning.

iii) Government Process Re-engineering (GPR):

Government process re-engineering was done to improve overall efficiency of Government service delivery. IT&C department had envisioned procedural changes in various government processes to enable faster delivery of services, optimization of operational cost and improvement in quality of service delivery. The GPRs were identified in various departments and implemented in various dimensions including technology, human resources, organization procedures etc. WEBLAND for Revenue Department, ISES certificates (for caste, income and nativity), Centralized CARD for Registration Department and Universal Birth & Death Certificate for Municipality & Panchayats and Centralized CDMA system (Commissioner & Director of Municipal Administration); software applications were created. These eliminated unnecessary sections of traditional departmental processes, incorporating advanced technology for automating the services and redesigning existing workflow to reduce overall efforts.

WEBLAND:

Webland system is a web based, centralized land records management system aimed at efficient management of land records and providing quicker and Across-The-Counter services to citizen. It manages 4.25 crores land

records belonging to 1.50 crores Agricultural Land Owners along with Crop details. Entire revenue records were digitized, ported and digitally signed by respective Tahsildars for rendering revenue services across the counter. It has the provision to carryout mutations. Government lands are categorized into 34 categories and are allotted Unique Codes.

Earlier land records in Andhra Pradesh were available in respective 1128 Tahsil Offices in a decentralized mode. Software version control was a problem. It required 1128 Oracle database licenses. There were no tools to monitor to accuracy of the data. No technical persons were available at Mandal level. No uniform Land codes were adopted by Tahsildars. Data was not reusable and not interoperable with other departments' data.

Integrated Socio-Economic Survey of Students (ISES):

As a part of the Mee-Seva, the Government took a decision to conduct a survey of all students studying in SSC (Class X) and above and create a digitally signed database of their Income, Residence and Integrated (Caste-Nativity-Date of Birth) Certificates. A web based application- ISES, for this purpose, was designed and developed by National Informatics Centre, Hyderabad, to aid the department in the preparation of the digitally signed database of student records so as to enable electronic delivery of the above mentioned certificates across the counter (Category A services) during the high demand admission period.

ISES application became operational since 1st January, 2012. Till date, 1.5 lakh Income Certificates, 1.5 lakh Integrated Certificates, and 0.30 lakh Residence Certificates have been issued to the students across the counter from various Mee-Seva centers/kiosks.

Centralized CARD Application:

Digital document repository of various registration documents was available with Registration Department in respective SRO offices in a decentralized mode since 1983. From August 2012 onwards department had put efforts to convert distributed database into centralized database, which contained 2.11 crores various registration documents till date. Centralized CARD application enabled citizens to avail most of the services across-the-Counter anywhere in a particular jurisdiction.

These progressive reforms led development of innovative business models in Government service delivery; thus removing inconsistencies in the system and enhancing efficiency of SLAs (time, cost, resources etc.). The systems were developed by optimizing, redefining and automating existing Government processes benefitting citizens and various Government departments.

iv) Innovative Features

The Project successfully tried out INNOVATIVE, NOVEL and hitherto UNKNOWN practices and thereby unraveled the mysteries and did burst the myths surrounding and hampering the country's e-Govt. space for the last ten years. In the process, Mee-Seva reduced the service delivery time and improved the customer service experience dramatically (See Exhibit 4). Some of the 'many firsts' of the project are:

- **Categorization of services**

Since the first priority was to deliver services across the counter, services were categorized into Cat. A and B. Cat. A service was to be delivered across the counter by accessing the departmental databases by pre signing them in bulk with digital signatures. More than one third of Mee-Seva transactions were category A, thus making it easier for citizens to get their tasks done in a single visit.

- **Digital signing of databases including bulk signing**

Using the newly developed web-based application, the data ported to the central databases was pre-signed digitally. For this purpose all the authorities, who were authorized to sign were provided with Class 3 digital signature certificates and trained to use them. Bulk signing was adopted to increase the pace of signing manifold. This had never been tried before at this scale and was tamper-proof allowing audit trail to be maintained for all transactions.

- **Single sign-on**

It was implemented so that the departmental user moves seamlessly between departmental and Mee-Seva application.

- **State Electronic Certificate Repository (SECR)**

All the certificates and documents issued by Mee-Seva were stored at a virtual location called SECR. SECR was placed in the public domain for verification of the certificates (issued under Mee-Seva) using the unique Application number.

- **Creation of new databases**

It was expected that during the month of June-August, there will be a huge demand from students for certificates for social benefits such as income, residence and caste certificates. This data was initially collected at School/college level for Class X and above students, and then verified and digitally signed by Tahsildars. This signed data was kept in a new database, so as to deliver this service under Category A when the need arises.

- **Secured stationery**

Secured stationery with 8 security features was used to deliver the certificates, to make duplication difficult. Online Verification, of course was possible by using the SECR.

The success of Mee-Seva also put an end to the tyranny of ink signatures. Most of the functionaries ranging from Tehsildars to Police SHOs to municipal commissioners had been using digital signatures to process Mee-Seva requests, thus making it the country's largest such system.

v) Communication and Dissemination Strategy:

IT&C department utilized the power of communication in effective implementation of Mee-Seva project and has innovatively devised an exclusive communication strategy utilizing various media platforms such as: Electronic Media, Television, Print Media, and Display Boards etc. along with established PR techniques to connect with various stakeholders of the projects. Mee-Seva communication strategy incorporates various key segments where information is required to be communicated to stakeholders such as: capacity building, awareness, stakeholder motivation & enhanced participation, feedback/grievance management, conflict resolution, developing common interactive forums etc

- **Mee-Seva Portal**

Mee-Seva Portal is an online mode of communication for Government, citizens and kiosk operators.

- **Social media tools (e.g., Facebook)**

Mee-Seva face book page was created and managed by Project Management Unit (PMU), where citizens can directly interact with PMU on various issues and participate in cohesive development of the project. Regular updates on news, events, service launch etc. is being done on the page by PMU.

- **Television Media**

IT&C Department had collaborated with MANA TV to impart Mee-Seva trainings through television.

- **Citizen Charter Boards**

Citizen Charter Boards providing details such as service name, timelines, service levels, charges etc., was placed in Mee-Seva centers. These boards helped citizens to have easy access to information by just going through the citizen charter information.

- **Mee-Seva Award Functions**

Mee-Seva Award Functions were conducted on achieving key milestones (Completion of 1 Crore and 2

Crore Mee-Seva Transactions) and IT excellence awards were distributed to government department officials and kiosk operators who had performed exceptionally well in implementation of Mee-Seva Services.

- **Discussion Forum**

Citizens and Kiosk operators can participate in the online forum by placing their queries, suggestions etc; which were recorded and redirected to Mee-Seva Project Management Unit (Mee-Seva PMU) for further processing. This forum provides an alternative and valuable mode of communication where citizens can communicate their problem in a public forum and also get a feeling of trust as the problems are immediately addressed by Mee-Seva PMU.

- **1100 (Call Centre)**

Citizens/kiosk operators can call customer care people where feedback/grievance details were registered detailing the issues and tickets were raised and redirected to concerned agency or government department for problem resolution.

- **Workshops/Trainings**

IT&C Department collaborated with Institute of e Governance (IEG), Hyderabad to organize trainings to kiosk operators and department officials on Mee-Seva services. Monthly Training calendar was prepared and communicated to government offices and kiosk operators. 14181 department officials and kiosk operators had been trained till 9th July 2013 by capacity building team of IT&C department

- **Video Conferencing**

State Secretariat to District/Mandal video conferences were conducted to communicate various developments regarding Mee-Seva project as well as to discuss various issues pertaining to effective implementation of Mee-Seva.

- vi) **Economic Sustainability:**

The project was launched with an initial seed investment of Rupees 9 Crores. But the user fee model allows ploughing back the revenues for maintenance, development and upgrading of services. User charges are fixed considering the profitability for various stake holders involved in the project without unduly burdening the citizen. With 2 Crore transactions by now, project has already made more than Rs 70 Crores in user fees and recovered the entire initial investment allowing decent returns for all the stakeholders, which are being shared amongst them. More than 28%/20% (A/B Category) is shared with respective departments (to maintain the databases, necessary infrastructure, capacity

building), 26%/14% (A/B Category) with Director, ESD (to maintain Mee-Seva Infrastructure/application maintenance), 14%/9% (A/B Category) with Authorized Service Providers (SCA, Monitoring & Infrastructure) while the majority of 32%/57% (A/B Category) is shared with the Mee-Seva center which is a cutting edge interface at the local level. This has made the project self-sustainable.

The project has already attained critical mass and with multiple stakeholders both within and outside the government, it would be virtually impossible for anybody to reverse the processes and gains achieved. The sharing pattern of User charges (in Rs.) is as shown in exhibit.

- vii) **Technical Sustainability:**

The entire ownership of the data vests with the Department itself. All the data is located in co-located Departmental servers in a highly secured environment in SDC, where all the Security policies are under implementation. Additional hardware has been provided to some Departments from IT&C on need-basis. NMS is in place and firewalls are functional.

Class-3 digital signatures have been issued to all the Departmental officers and kiosk operators for accessing Mee-Seva portal for delivery of services. All the certificates issued are being stored at the SECR for future on-line verification through the portal. SECR also serves as a repository, where certificates issued under Category B (involving Departmental work-flow and field level verification) are stored and can be re-issued second time across the Counter (Cat. A).

The Mee-Seva Portal is integrated with PKI components such as Form Signer & Form Signer Pi for authenticating the respective individual for accessing the portal as well as for processing the requests through digital signatures. Mee-Seva Portal uses standard Web technologies and techniques such as Secure Sockets Layer (SSL), HTTP redirects, cookies, JavaScript, and strong symmetric key encryption to deliver the single sign-in service. The sign-in, sign-out, and registration pages are centrally hosted in the Mee-Seva Portal.

2. **Benefits to Stake-Holders**

Mee-Seva had really made service delivery very convenient for the citizen. Prior to the launch of Mee-Seva project, applicants used to visit the respective departments to avail services, many a time, applicants were forced to visit these offices to get their certificates. After the implementation of Mee-Seva, 37% of the applicants were able to get their certificates within one visit. In other cases, applicants had to visit the Mee-Seva Center only two times to avail the services. Applicants need not visit the Mee-Seva Centers or respective department offices as efforts had been taken to closely

monitor the SLAs by the concerned authorities for the timely delivery of services to the applicants.

In the past, for issue of Caste, Residence, Income certificates of students, the application were physically submitted at Tahsildar Office. This was followed by field verification by concerned VRA/VRO and after receiving the report, Tahsildar used to issue physically ink signed certificates. During the high demand months of June-August / admission closing dates, Tahsildar office used to receive more than 1000 applications in a day, which resulted in inordinate delays or issue of certificates without verification.

Under the revised process, Mee-Seva was able to issue certificates across the counter within 15 minutes in most of the cases. This was made possible by creation of new databases for the high demand segment of 10th, 12th and Degree students. Data was collected at the school/college level, verified by field functionaries and the final verified certificates were placed in a new database called ISES database. When a student approaches Mee-Seva center, a search would be done for the student data, and if the digitally signed data is available, the certificate would be issued across the counter. If the student data is not available, application would be routed to the concerned officials to process the application. Since approximately 30 lakh students were included in the database, most of the certificates were delivered across the counter within 15 minutes. Similarly for Registration Department, Certified copies of Registration Documents were placed in the centralized database for immediate delivery.

3. Key Learning

Mee-Seva is seen as a realization of the direct and manifested will of the citizen. The political leadership channelized the demand generated by the people into the effective delivery of citizen-centric services. It also allowed a relook into age-old archaic procedures, which were no longer relevant. The reengineering of the business processes of the departments became both the prerequisite as well as the byproduct of Mee-Seva. The efficiency levels of departments have also increased as IT deployment drastically reduced their avoidable workload.

The achievement of Mee-Seva can also be measured in terms of the wider digital inclusion of the entire population of Andhra Pradesh towards development and growth. The key learning is that the Projects like Mee-Seva should avoid the deeply rooted technological determinism which assumes that the layering of ICTs in development alone will automatically solve many pre-existing constraints related to gender, caste, feudalism, privilege and traditional exercises of power, factors which limit the real potential of ICTs in citizen centric service delivery in particular and development in general.

The project also holds a lesson that thorough preparatory work is important to avoid mishaps or breakdowns in service delivery, availability and updating of accurate data, adherence to timelines indicated in Citizen Charters, monitoring the performance & dynamic evaluation from time to time. The project has been a success mainly because of the involvement of multiple stakeholders with specific motivations, all seamlessly fusing towards a common goal.

Mee-Seva is a simple, home-grown initiative which has evolved every passing day through the efforts of thousands of stake holders all across the state. The big learning is to involve all the stakeholders' right throughout the project cycle and allow the project to evolve. The push from Hon'ble Chief Minister of Andhra Pradesh, helped in getting the departmental buy-in truly exemplifying the need for political will in such changes. The mixture of success here is a noble thought, committed individuals, supporting technology and some impatience.

- **Economies of Scale, Scope and Learning:**

Mee-Seva approach to service delivery needed a complete transformation in capacity which was strategized to be achieved by bringing in Innovation in organizational and Technological Model. A complete realization that the process had to move through all the stages starting from visioning and leading to a sustainable model of service delivery was the cornerstone of the overall strategy.

Technology driven efforts were planned, assigned and implemented for various departments to increase efficiency in service delivery; department processes were re-engineered considering feasibility of implementation and participation from various stakeholders was ensured for problem solving and decision making. Resource utilization was maximized by incorporating innovative procedures and expanding domain expertise among government departments to increase their overall capacity. Mee-Seva approach also made it possible to achieve multiple economies of scale, scope and learning leading to enhanced capacities and ease of expansion.

- **Breaking the Department Silos:**

Various departments exist to facilitate and simplify the government functions. However, when a citizen has to approach different departments for a single request, it complicates his life and effort. Mee-Seva successfully addressed this concern. It facilitates the interaction between different departments thus sparing citizens from the pain of knocking the doors of different departments for a single application/request. For example, Mee-Seva facilitated communication and data transfer/file movement between Revenue and Registration department.

4. Current Status

Mee-Seva currently offers more than 311 high impact services. The project has already crossed 15 crore transactions spread across the two states of Telangana and Andhra Pradesh, and most of the government departments are on board now. The target is to ensure that Mee-Seva becomes the entry and exit point for the citizen to approach the government for any service. The project also delivers more than 20 crore transactions every year for other services like Bill Payments, thus making it the country's biggest one stop e-governance shop.

5. Road Ahead

Replicability at State level - Both vertical and lateral expansion became very easy and it has also boiled down to a matter of plug and play job. The addition of departments, districts, services, kiosks helped the state achieve scale, scope and learning economies. The expansion of Mee-Seva from 1 district/120 centers/10 services/2 departments to 23 districts/10,000 centers/311 services/27 departments in just about a year's time itself is an example of this.

Replicability at National Level: Mee-Seva has already been adopted as a National model for delivering G2C services. The eDistrict MMP was redesigned, taking Mee-Seva inputs, making it become ready for replication pan-India. The DeitY (GoI) had already sanctioned grants to AP to replicate Mee-Seva in 5 states and convert Mee-Seva into components to be placed in the National eGov app store for wider use.

In the next step, once public confidence is fully achieved, secured stationery will be removed, and these services

will be rendered through the Mee-Seva portal. PDFs of these documents will be delivered online, and may be printed by the User at his convenience. This will be followed by having a light-weight mobile version of this application, thereby bringing Mee-Seva in line with the most advanced service delivery mechanisms all across the world.

6. Conclusion

*"A chain is no stronger than its weakest link,
and life is after all a chain."*

– William James

Similarly, any technological advancement, no matter how ground breaking, is only as good as its actual reach to the grass root level. Mee-Seva is an initiative aimed at bringing about this last mile connectivity to the general populace. It aims to reach those sects of the society which generally cannot afford even the most minimal infrastructure to utilize technological advancements. It aims to bypass the traditional bureaucratic red-tape and benefit the people. It aims to reduce the time taken to conduct a transaction and avail a service, thereby improving the efficiency, reducing the hassle, and helping the people in the most transparent and fair manner.

With all the numbers at hand, it can safely be concluded, that through Mee-Seva, the Government of Andhra Pradesh, has not only achieved what it set out to do, but also set an example for all governmental agencies throughout the nation to look up to.

References

1. Jaju, S. (2013), Mee Seva: Rhetoric to Reality, *LBSNAA Case Study*.

Mobile Oriented Development Initiatives for GIS to Citizens – ‘MODI – GIS 2C’

Digital Connectivity to the Last Mile

Dr. R Balamurali Krishna

Project Associate, ITCOT Consultancy and Services Ltd, Tamil Nadu

Abstract

Today, humans are not mere social animals, advancements in technology have made them techno-socials. In the context of indigenous and local communities (rural areas), the term techno-social can be perceived in primitive fashion, by conceiving that mobile phones have now become an inevitable part of our life. This thematic paper outlines the role of Mobile Apps, ISRO’s IRNSS, Common Service Centers (CSCs), and youths in GIS, thereby targeting to provide digital connectivity to the last mile. It advocates for mobile based Participatory GIS (m-PGIS) in mapping the locations of government offices and service delivery centers by youths under the supervision of CSC. The civilian use Standard Positioning Service (SPS) provided by the Indian Regional Navigation Satellite System (IRNSS) could be utilized for this objective. Moreover, the India’s National Telecom Policy (2012) has targeted to take the rural tele-density from 39% to 70% in next five years. It also sets a target that every single Indian has a phone by 2020. In short, this paper has two manifolds. First, it discourses the methodology, socio-economic, political and epistemological relevance involved in strategy, stakeholders and technological components needed. Secondly, it discusses AMMA Mobile App (Aadhaar authenticated Mobile Mapping App) framework for mapping the locations of government offices by youths using IRNSS. Thus, the hope is to harness CSC facility and utilize the existing techno skills of youths on m-PGIS towards digital transformation of India.

Keywords-e-Sevai Center, AMMA App, IRNSS-SPS, P-GIS ICT Vs ICDT, G2C Services, Location-based Advertisement

1. Introduction

E-Governance is the pragmatic utilization of Information & Communication Technology (ICT) for rendering government services, information, communications, integration of various stand-alone systems and services between government-to-customer (G2C), government-to-business (G2B), government-to-government (G2G) as well as back office processes and interactions within the entire government system.

“E-governance is the only way to move from good governance to proactive pro-people good governance (P2G2)”

–Shri Narendra Damodardas Modi

E-governance also aims to empower people by giving them access to information through CSCs. In nutshell, it is the ICT applications in good governance, targeting efficient, effective, accountable and transparent service delivery to its citizens.

CSC is a strategic cornerstone of the Digital India program. They are the access points for delivery of various electronic services to villages in India, thereby contributing digitally and financially towards an inclusive society. In this context, mapping all the government offices would foster e-governance system. The mapping can be carried out at community level through PGIS. The Participatory GIS (Geographic Information Systems) is an umbrella term that describes the community application of a diverse range of geographic information

technologies and systems. Commonly, PGIS practice is based on using geo-spatial information management instruments to represent peoples’ local, spatial and traditional knowledge in forms of virtual or physical, two or three dimensional maps. Some of the tools and approaches used are ephemeral maps (drawn on the ground, in sand etc.); sketch maps (including drawing mental maps); scale mapping (overlay drawing of spatial information onto existing topographic base maps); and similarly adding spatial information via overlays onto aerial photographs; satellite imagery; community surveying of new information using the global positioning systems (GPS); and participatory 3-D models (P3DM). This paper targets to apply the concept of Participatory GIS in an innovative method by using mobile application via android platform. The strategy is to exploit the existing resources and techno-skills of youths for m-PGIS. They can be engaged as instruments for mapping the locations of all the G2C service delivery channels.

Furthermore, CSC is more than service delivery points in rural area. They are positioned as change agents for promoting rural entrepreneurship, building rural capacities and generating livelihoods. They are enablers of community participation and collective action for engendering social change through a bottom-up approach with key focus on the rural citizen. In this notion, this paper disseminates the strategy of MODI – GIS 2C with respect to CSC (e-Sevai) of Tamil Nadu.

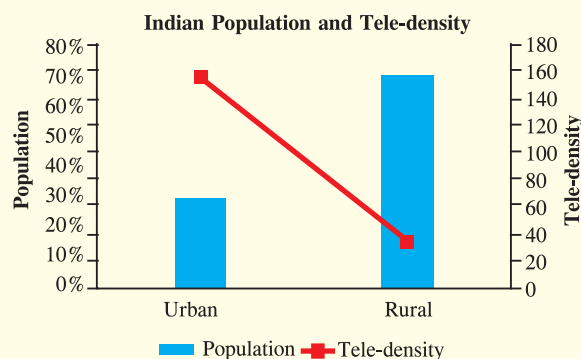
Timeline

- 2016** Indian Regional Navigation Satellite System
- 2017** Rural Tele-density @ 70%
- 2018** 250,000 villages with Optical Fibre
- 2019** Digital India: A Smartphone for every citizen
- 2020** IT (Indian Talent) + IT (Information Technology) = IT (India Tomorrow) is the objective of 'MODI – GIS 2C.

2. Themes and Perspectives

2.1 Tapping the benefits of Mobile Phone

Mobile usage, which was restricted to urban areas a few years ago, has started penetrating the rural areas of the country at a good pace. Rural tele-density has grown at an impressive rate, rising from 1.9 percent in 2005 to over 38 percent by March 2012 (TRAI - 2012). According to the Indian Census of 2011, 69 percent of the total Indian population lives in rural areas. People in these areas face several developmental challenges, such as low literacy, poor healthcare facilities, low per capita income, poverty and poor infrastructure. In recent years, the mobile phone has emerged as an important development tool. It is seen as a device that has the potential to break the rural–urban developmental gap by delivering information on a variety of economic and social issues. Mobile phones can facilitate need-based and user-centric information and services at an affordable cost to rural population, which was hitherto unreachable. The National Telecom Policy 2012 has targeted to take the rural tele-density from 39% to 70% in next five years. It also sets a target that every Indian must have a Smartphone by 2020.



Moreover, India is experiencing Telecommunication and ICT boom since last few decades, some of the game changing happenings include Smartphone for Just Rs. 251, Free Calling and Internet Access SIM Card schemes (Reliance Jio), which made mobile phone technology accessible and affordable to all the sections of society. Tools of communication including mobiles are effective medium to facilitate changes in social, cultural and development space through human engagement factor.

Mobile technology has demonstrative capacity to induce desired based change, but the choice of the technology has to be appropriate to serve the interests of indigenous and local communities. One emerging issue is how rural people arrive at consensus and create “we” from an “I” towards better plan, design, method and delivery of services using mobile application technology.

2.2 Harnessing IRNSS - SPS

The IRNSS is an independent regional navigation satellite system designed by Indian Space Research Organization to provide positioning information in the Indian region and 1500 km around the Indian mainland. As of now the IRNSS is a regional system with 7 satellites, which would be further expanded into 11 satellites in the coming years. The satellite constellation provides 2 types of services, namely, Standard Positioning Services (SPS) – provided to civilians and Restricted Services (RS) – rendered to the military and other authorised users.



Source: ISRO

The civilian use Standard Positioning Service (SPS) can be used in spheres of m-PGIS, G2C services, Location triggered advertisements, mapping, surveying, monitoring precision agriculture, disaster warning, maritime, transportation and research areas. This satellite based augmentation system will also open the door for socio economic benefits for developing countries to pursue sustainable growth.

2.3 e-Sevai Centre of Tamil Nadu

e-Sevai Center of Tamil Nadu acts as a front-end delivery point for Government, Private and Social sector services

to rural citizens. The objective of the e-Sevai centres are:

- To develop a platform that can enable various organizations to integrate their social and commercial goals for the benefit of rural population
- To deliver services in Simple, Moral, Accountable, Responsive and Transparent' (SMART) and most cost effective manner
- Provision of Citizen Centric Services
- NeGP Mission mode projects and other services
- Access to Internet- Common access e-Learning

The citizen centric (G2C) services from e-Sevai centers are delivered through various channels viz., ELCOT, TACTV, PACCs, VPRCs, IFAD and other agencies like Municipality, Corporation, Panchayat etc.

3. Methodological Framework

Concept of Aadhaar authenticated Mobile Mapping Application (AMMA App) is a theoretical vision to map all the government offices in Tamil Nadu with the help of volunteered youths using their Smartphone under the supervision of Common Service Center (e-Sevai), thereby providing enhanced G2C services. The thematic framework of AMMA App strategy is depicted in the below diagram.



Methodological framework of Tamil Nadu – AMMA App can be classified into five stages, which are as follows:

Stage – I: Registration of Volunteers

The local youths need to be invited for volunteering in this project. They will act as linchpin for success of this strategy. Aadhaar and phone number shall be used for authenticating their identity. As they are familiar with handling Smartphone, short duration training is alone sufficient for teaching P-GIS methodologies. Institute of Remote Sensing, Anna University of Chennai could play a lead role in conducting certificate courses for the volunteered/registered youths.

Stage – II Up-gradation of e-Sevai Center

The technical infrastructure of e-Sevai center should be upgraded. Its scope should be expanded from citizen centric

delivery access point to citizen centric sub-hub. In other words, the e-Sevai should have Server facility, along with technical experts and should as server sub-station for MODI GIS - 2C. Nearby, engineering college should associate themselves with this server sub-station for further technological up-gradation and value added support services.

Stage – III: Revamped Strategy (ICT Vs ICDT)

e-Sevai can revamp its envision to provide innovative ICDT enabled Government-to-Citizen (G2C) service in an efficient, transparent, reliable and affordable means. The uniqueness of this strategy lies in its innovative conceptual framework of harnessing ICDT enabled services instead of mere ICT applications. The word 'ICDT' means Information Communication and Dissemination Technology, which advocates for the dissemination component in IT enabled government services to the citizens, thereby inculcating social interaction trait in service delivery mechanism. It follows the mantra of "I teach you, you teach her and she teaches them..." and the cycle moves on. In short, when a person visits e-Sevai center for any service, she should be provided with AMMA App and briefed about the features of the App content, its benefits and encouraged to disseminate the same to her family and friends circle.

Stage – IV: Harnessing IRNSS – SPS

The 'MODI – GIS 2C' envisions to exploit the IRNSS - SPS services instead of using Global Position System (GPS) for Participatory GIS, thus making it as an indigenous state-of-the-art technology. As the commencement of IRNSS officially begins from 2017, at present the possibility of utilizing the service of ISRO's Bhuvan can be taken into consideration on pilot

basis. This may help in initial organizing, analysing the prospects and concerns of the implementation strategy.

Stage – V: Location Triggered Advertisement

Location-based advertising can be conceived as official or promotional information sent as text or multimedia message based on user geographic position. In this dimension, AMMA App would act as medium for location-based official message communication from government and other agencies. This also provides a virtual platform for private players to advertise their products, thus generating revenue to government at grass root levels. If well strategized, even a micro finance budget can be formulated for such advertisement schemes. Moreover, this scheme has the potential to make services more flexible and citizens well informed, as they can have access to information like m-health, m-edu, m-farm, etc. anywhere at any time.

Stage– VI: Expanding the Scope of Nodal Agency

Tamil Nadu e-Governance Agency (TNeGA), as a State Nodal Agency is implementing various e-Governance projects with objective of making all government services, wherever feasible and accessible to the common man in an efficient and transparent manner. However, considering the present status of demographic dividend and digital literacy in the state, there is an utmost need for expansion in its scope. The TNeGA should have an effective coordination and collaboration among the multidisciplinary stakeholders. This would ensure that MODI - GIS 2C will be user-friendly and deliver its intended benefits.

4. Critical Appraisal of MODI – GIS 2C

To conceptualize the ‘MODI – GIS 2C’ strategy, a mock exercise was conducted using ‘Avenza Maps’ mobile app with the help of NSS students in three different rural habitats viz., Puhupalayam, Achampuram and Maruvapalayam of Karur district. Critical appraisal of the mock exercise revealed:

1. Map marking using mobile aided technology facilitates motivation among the participants, as they were mobile savvy.
2. Participatory GIS using mobile application enables the participants to systematically map and update information about the places without any duplication (double entry).

Therefore, the proposed ‘AMMA App’ could harness the untapped techno skills of youths for systematically mapping the location of all government offices in the state using their Smartphone through IRNSS under the supervision of e-Sevai.

5. Significance of AMMA App

In addition to GIS Mapping, AMMA mobile app – android framework can support all the existing service being offered by e-Sevai Center. The list of services has been tabulated below:

S.No.	Department	Services
1	Revenue	Income Certificate
2		Nativity Certificate
3		Community Certificate
4		No Graduate Certificate
5		Deserted Woman Certificate
6		Agricultural Income Certificate
7		Family Migration Certificate
8		Widow Certificate
9		Unemployment Certificate
10		Print out of Birth Certificate for Revenue Villages
11		Print out of Birth Certificate for Revenue Villages
12		Online Patta/Chitta
13		Online Patta Transfer
14		Cinconvacc Day Petition
15	Social Welfare	Annai Terasa Ammaiyar Ninaivu Orphan Girl Marriage
16		EVR Maniammaiyar Ninaivu Widow Daughter Marriage
17		Dharmambal Ammaiyar Ninaivu Widow Re-mamagc
18		Moovalur Ramaniinham Ammaiyar Ninaivu Marriage
19		Dr. Muthulakshmi Reddy Ninaivu Intercaste Marriage
20		Girl Child Protection Scheme- I and II
21	Civil Supplier	Consumer complaint other than PDS
22		Consumer complaint related to PDS
23	Police Complaint	Complaint Registration and status viewing
24		Status Viewing
25		FIR Status
26		CSR Status
27		Vehicle Search
28	TN Industries	New Entrepreneur cum Enterprise Development Schemes
29	TN Transport	Learner's licence Online application
30		Reprint Learner's licence Online application
31		Booking Appointment for Driving license
32	TN Registration	Application through offline Payment
33		Print Challan for offline Payment
34		Online appointment for Marriage/ Document registration
35		Print acknowledgment for appointment
36	Corporation of	Print out of Birth Certificate
37	Chennai	Print out of Death Certificate
38	TNEB	Bill Payment

Conclusion

Participatory GIS is not something new to India, in fact it is been practised since olden days by our great kings in primitive fashion. But sadly, majority of us today assume that we have incorporated GIS technology from western nations. This article has disseminated an innovative strategy of “MODI– GIS 2C” through ‘AMMA’ Mobile App framework for mapping and rendering citizen centric service using indigenously developed IRNSS

resource. It is a path towards inclusive and sustainable development for transforming our nation. The methodology, suggestions and recommendations of the strategy mooted can be taken into consideration by the other States. Jai Hind!

Acknowledgement

Grateful thanks to Mr. J Kumaragurubaran, IAS (Director), Tamil Nadu e-Governance Agency (TNeGA) and Mr. Pandian Ranganathan, (Project Head), State e-Mission Team (SeMT) of Tamil Nadu for their valuable suggestions and comments.

Note

Author can be contacted at

☏ 50-A, Greams Road, Chennai – 600 006

☎ +91 9487370775

✉ balamurlikrishna@gmail.com

References

1. Animesh Tripathy and Prashanta Kumar Patra, “An Efficient Data Structure Layout Design for Spatial Data Organization in GIS” *International Journal of Computer Applications* (0975 – 8887) Volume 7– No.9, October 2010.
2. Chambers R. (2006) Participatory mapping and geographic information systems: Whose map? Who is empowered and who disempowered? Who gains and who loses? *Electronic Journal of Information Systems in Developing Countries* (EJISDC) 25 (1)
3. D. Gavalas and D. Economou, “Development Platforms for Mobile Apps: Status and Trends”, *Software*, (2011), p 77 – 86.
4. Dunn C.E. (2007) Participatory GIS? 31 (5) 616-637. (<http://phg.sagepub.com/cgi/content/abstract/31/5/616>)
5. Flavelle A. (2002) Mapping Our Land: A Guide to Making Your Own Maps of Communities and Traditional Lands. Edmonton, AB: Lone Pine Foundation. (204p.) (<http://www.iapad.org/flavelle.htm>)
6. Mobile based technology for monitoring and evaluation of GIS (<http://www.theclearinitiative.org/mobilebased-tech.pdf>)
7. Portal for PGIS and PPGIS literature, training materials, etc. (www.iapad.org)
8. Vajjhala S. P., (2005). Integrating GIS and Participatory Mapping in Community Planning. ESRI International User Conference, July 2006.

“SAKSHAM”:Technology led Monetary Transactions System leading to Financial Inclusion

Dr. Saurabh Gupta, Sameer Rajan

Scientist-'E' & State Informatics Officer, Scientist-'B' & District Informatics Officer

National Informatics Centre, Ministry of Electronics and I.T., Govt. of India

Uttar Pradesh State Unit, Yojana Bhawan, UP- 226001 (India)

saurabh.gupta@nic.in, sameer.rajan@nic.in

+91-0522-2238415

Abstract

Government executes various schemes to uplift the weaker section of the society. Scholarship disbursement and Fee reimbursement is one of the major schemes which assure that money is not a constraint for credible students aspiring for higher studies and professional courses. The scheme also assures the upliftment of downtrodden students and put them in main stream of society. SAKSHAM-eScholarship portal is the concept of electronic transfer of scholarship and fee reimbursements to the students directly into their bank accounts which enables and empowers students of weaker section of the society with education. This paper explores the various aspects of Government Process Reengineering Model “SAKSHAM” which has been adopted by the Government to interact, interface and transact with all the concerned stakeholders in an integrated and interoperable manner for monetary aid of scholarship and fee reimbursement in transparent, time bound, effective and efficient manner, directly into the bank account of downtrodden students. The objective of the project is not to generate revenue, even though it saves a lot of revenue indirectly by minimizing the leakage of funds, but to provide the financial inclusion benefits for socio economic growth of the weaker sections of the society.

Keywords: Digital Signature, Education, Process Reengineering, SAKSHAM, Scholarship.

1. Introduction

The scholarship schemes play a vital role in socio economic growth and empowerment of weaker section of the society. Government runs the Scholarship and Fee-Reimbursement schemes for educational empowerment of students in the society which makes them financially independent of their families along with improvement in competency and confidence. Also, the competency-based medical education movement has been adopted in several medical education systems across the world which has the potential to result in a more active involvement of residents in the educational process, and scholarship is regarded as a major area of improving competency [1].It opens the door for students to pursue higher education degrees. The Saudi Arabian students pursue their higher educational degrees in the U.S. with their government paying all of their educational expenses [2]. Such scholarships are provided by many countries to strengthen the country in terms of education and research [3]. There are various types of scholarship schemes run by Government of India for the students of Pre Matric, Post Matric and Higher Education etc. [4]. Pre Matric and Post Matric Scholarships play a crucial role to establish the foundation of education at initial level. Uttar Pradesh is most populous Indian state, with home of 204 million people or one-sixth of the country's population and its literacy rate is 69.72% [5]. The literacy rate may be increased by providing the education with

supporting environment and facilities for the education. The Government has taken number of steps to uplift the economically weaker sections of society and to reduce inequalities in income, status and opportunities for disadvantaged sections of society. The scholarship and Fee reimbursement scheme is one of the most prestigious schemes for the educational upliftment of the downtrodden students.

In past, before implementation of the SAKSHAM, the task was a hectic exercise because of the following drawbacks in the system:

- Delay in disbursement, sometime more than a complete session passed due to manual process of distributing scholarship.
- Fraudulent claims by undeserving students because there was no mechanism for verification of student at state level.
- Non- availability of a system for verification of bank accounts of claimants.
- No procedure for deduplication of claimants over state which was major source of fraudulent claims.
- Non tracking of the course for which the students availed the scholarship and fee for past year, and applying as a renewal case.
- No procedure to check the uniqueness, if a student claims scholarship for multiple courses.

- Monitoring and Control due was minimal due to the involvement of thousands of institutions and many departments.
- Huge amount of undistributed funds were lying in sundry accounts of bank due to wrong account numbers of students.
- Non- availability of the recognized institutions' data along with their courses and fee structure.
- No mechanism to fix the responsibility of institutions.
- There was lack of communication between students and government due to non- availability of central application linked with SMS gateway.

The transparent and time bound distribution of scholarship and fee reimbursement is a major step which improves quality of education, increases literacy rate and motivates the under privileged students for higher studies. The implementation of Scholarship and Fee Reimbursement scheme in Uttar Pradesh is done by Department of Social Welfare for Scheduled Caste (SC), Scheduled Tribe (ST) and General Categories while Department of Backward Classes Welfare and Department of Minority Welfare are responsible to execute this scheme for the backward classes and minority categories respectively. The scheme is to provide financial support to the students having family income up to 0.2 million rupees, along with cap of fifty thousand rupees against fee reimbursement to OBC, General and minority students while in case of SC or ST fee can be reimbursed up to any amount. The distribution and management of scholarship and fee reimbursement to more than 2.7million students is in fact herculean task for the concern departments since scheme covers students studying in 30,403 High Schools, 16,510 Intermediate colleges and 11,259 post matric institutions for graduation and above levels[4].

Before implementation of “SAKSHAM” all the concerned departments were responsible to run the scheme separately for categories related to them at district level and the State Directorates were responsible for the allotment of budget to their district level offices as per their demands. District level offices in coordination with all the heads of educational institutions of district used to calculate the requirement manually for sending the demand to concerned state directorates. Students used to submit their ink signed forms in the institution concerned along with all necessary documents related with caste, income, domicile, marks sheet and bank account detail. The head of the institution was responsible for certification, verification and category wise submission of forms in concerned district level welfare office. Social welfare, backward welfare and minority welfare departments used to provide consolidated amount of money to the institute against the scholarship claim of all the students of related category by an account payee

cheque in favour of institution. It was responsibility of the institution to pay the scholarship to the every individual from the consolidated amount received. Later this system was shifted over district level standalone client server mechanism, during those days head of institutions were provide applications physically to the concerned welfare department and concerned welfare department used to generate demand after merging all the data electronically received from various institutions of the district. An off line software was used at district level for the generation of budget demand and allotment of scholarship and fee reimbursement to the students in order to their ranks fixed according to some criteria (depend upon type of institution, family income, group etc.) against availability of budget in a particular category. Printed bank advices against student's account were generated and used for money transfer instead of distribution by institutions. The major drawback of the manual and district wise standalone client server system was that there were very little monitoring and control due to the involvement of various departments, distributing agencies and mechanisms of the Scholarship disbursement by more than 225 Drawing and Disbursing Officers (DDOs). There was none availability of state level MIS that made planning very difficult and resulted in huge losses to the government in financial terms and in its endeavor to take education to masses. Misappropriation of funds and frauds were increasing day-by-day.

It was decided that the efforts adopted in the past should be replaced by a comprehensive, online, end-to-end service-delivery-oriented and integrated solution which may result in speedy and certain of delivery of funds in the accounts of students. It was also thought to put stringent checks and rigorous scrutiny methods infused within the system for preventing frauds and identifying genuine worthy candidates, thus require a detailed process reengineering in the Scholarship and Fee reimbursement Scheme. Process Reengineering involves changes in structures and in processes within the relative environment. It allows an efficient and effective change in the manner in which work is performed with all the stakeholders by reviewing, redefining and redesigning the existing system. Process Reengineering deals with the optimization [6]. Reengineering implementation involves all activities pertaining to planning, organizing, and conducting the reengineering project. This could involve developing a vision, analyzing the organization, identifying reengineering opportunities, evaluating information technology enablers, establishing commitment, allocating resources, managing the project, and evaluating results [7].

To overcome these constraints in implementation of the scheme, a *Process Reengineered Model “SAKSHAM”* comprising integration of various departments of social sector, education, administration, banks, Public Financial Management System (PFMS) and e-District Portal,

which electronically ensures authenticity and validity of a beneficiary. PFMS is a financial management platform for all plan schemes of the government, a database of all recipient agencies, integration with core banking solution of more than 135 banks handling plan funds, integration with State Treasuries and efficient and effective tracking of fund flow to the lowest level of implementation for plan scheme of the Government [8]. The project has redesigned the way of providing the scholarship benefits to the students as it has function to approve and forward the application of a student using Digital Signature Technology which provides the authenticity and integrity for the forwarded application. The digital signature is unique to each message and key combination. It has been used in this project to verify the identity of the signer and to provide data integrity (authentication that nothing in the data has been altered since the message was signed). It can also be used to prove to a third party that the signature was, in fact, signed by the signatory (known as non-repudiation) [9]. Because of rigorous scrutiny achieved through several integrations, it has stopped misappropriation of funds, bogus claims and frauds which resulted saving of huge financial exchequer of government. Besides simplification and improvement in working, the approach has brought about a fine balance between facilitation and compliance as a blend of well-defined goals and performance metrics, benefits were directly transferred in to the accounts of 3.279 million and 2.55 million students for academic session 2014-15 and 2015-16 respectively reducing drastically transaction failure from 10% to .36% stopping a loss of more than 5.2 billion in a single year.

2. Government Process Reengineering during the Implementation of SAKSHAM

A task force of administrative and technical people was deployed for planning, monitoring and evaluating result based development and management of the online system for improving the overall performance

of the scheme. Virtual comparison of new process with existing system was done, performed observation and monitoring of factors that may influence the proposed process. Critical drawbacks, bottle necks, deficiencies and catches were clearly traced with a decision that rule book of scholarship 2013 will be amended accordingly so that new centralized system must not face any hurdle. Since a common centralized portal based solution was proposed for social welfare, backward class welfare and minority welfare departments, workshops and brain storming sessions with all stakeholders were organized to eliminate or minimize the diversities of the process among these departments. During academic session 2014-15 the “Book of Rules” (Niyamawali) for the schemes of all departments was revised to single “Book of Rules” with single Performa for scholarship and fee-reimbursement as a part of major reengineering process. The “Book of Rules” was approved by cabinet, the highest authority to use it as bible for all the departments. In view of reducing the transaction failure through banks, the drawing and disbursing officers at district level were removed and finance controller at the state level was declared drawing and disbursing officer for the entire state, however online verification of records was done at district level through Digital Signature, thus the whole financial process and events are modified to be executed from a single point at state level for each of three concerned departments, so that drawing, disbursing, financial management and accounting can be done at state level in a transparent manner. It was projected that approximately 2 to 5 million students studying in more than 25000 institutions would use the proposed solution for the benefit of the scheme, thus the prime necessity of the scheme was that an authenticated master database for all the recognized institutions must be prepared along with courses, number of approved seats and fee structure. The database should be verified and validated by the competent authorities and heads of the institutions, and in turn verified by the universities extending recognition, so that any student of unrecognized or fake institution

Table 1. year wise transaction volumes (scholarship and fee reimbursement)

Session 2014-15 (All figures in Million)					
	Application Submitted	Application Forwarded by Institutions	Found correct after scrutiny	Students got the benefit through e-Payment	Number of Financial Transactions done by PFMS to transfer the benefit
Post-Matric	6.696	5.533	3.089	2.705	4.180
Pre-Matric	1.26	0.98	0.765	0.57	0.57
Total	7.957	6.516	3.855	3.279	4.75
Session 2015-16 (All figures in Million)					
Post-Matric	5.025	3.972	2.687	2.355	3.608
Pre-Matric	0.681	0.463	0.352	0.196	0.196
Total	5.707	4.437	3.038	2.552	3.804

would not be able to participate in the scheme. It was also conceived that the system should enforce role base functionality and provide a common platform to students, all stakeholders and concerned departments (Social Welfare, Backward class Welfare, Minority Welfare, Education department, Treasuries and Institutions etc). It was decided that online applications for scholarship and fee reimbursement would be received through portal only so that scrutiny can be performed over the database of electronically received applications at state level through various integrations and authentications techniques. Authentication of the Identity and validity of the institutions and students would be done by the digital signatures of the concerned authorities. In case of mismatch between availability of budget and demand generated for a category, the selection of students for the benefit should be done in order of uniform state level criteria and benefit must be transferred directly into the accounts of beneficiary. Aadhaar number has been made mandatory for applying the scholarship from academic year 2016-17, it will add another mile stone in the way of SAKSHAM. Aadhaar authenticated data will further minimize fraudulent claims of scholarship and fee reimbursement. Students who applied for a new course without completing previous course will be made ineligible for scholarship by matching the data of previous years with current applications. The use of Public Finance Management System for account verification was proposed and made mandatory to eliminate fraudulent and ghost beneficiaries of the scheme. It was also proposed to integrate the system with e-District application, the source of all digitally signed certificates as Income, Cast, and Domicile to verify and validate the correctness of records submitted

Table 2. Depiction of fraudulent cases removal

S.No	Physical summary after stepwise scrutiny and verification Action Points	Academic session	
		2014-15	2015-16
1	Online Registration	81.36	73.91
2	Applications forwarded by educational institutions	55.33	39.73
3	Applications verified by DIOS / Regional Higher Education Officer	54.72	39.66
4	Numbers of suspected applications in State level scrutiny (on 23 parameters)	23.84	13.04
5	Verified by District Level officers	28.20	30.41
6	Total No. of students covered under scheme	26.83	23.55

by students.

Process Re-engineering was done to simplify the existing procedures and make them easier for general public. Various reports and statistics are made online for the decision makers for effective monitoring and management. As a result of this, the State Government saved huge amount of funds by preventing frauds and bogus scholarship claims in year 2014 and 2015. Following table depicts the removal of fraudulent cases with relevant information.

2.1 Challenges faced in implementing Process changes

Any new initiative of “SAKSHAM” kind, involving three different departments of the social welfare, faces a number of technical and Administrative challenges arising out the different objectives being pursued by every department. Some of the challenges, faced and addressed in the implementation of “SAKSHAM” are as following:

- Departmental officials were afraid because of common centralized portal and shared data.
- The number of employees to be trained on the SW was huge, which was achieved by involving National Informatics Centre (NIC) District Centers.
- Use of Digital signatures was in primitive stage in the departments and especially at institution level in districts which was overcome through multiple decentralized trainings and district level support provided by NIC.
- Identification of correct student studying in a recognized institution was achieved by creating institutional database duly digitally signed by head of institution, district level welfare officer and nodal officer of university. Thus, it established an image that portal has fraud detection mechanism and being monitored at highest level.

3. Process Flow of the SAKSHAM

The process flow of the e-Scholarship tool- SAKSHAM comprises of eight sections as below:

Section 1- Master Database Preparation/Updation

The Scholarship Master and Institute Profile have been prepared and updated. Scholarship Master covers the Bank detail, Add/Update Institutes, Add/Update Courses while Institute Profile covers Institute Information, Nodal Officers Detail, and Course Wise Fees Detail Entry.

Section 2- Student Section

Student section covers the online fresh application as well as renewal application entry done by student from any internet outlet. The student receives the SMS alert on successful submission of application and about

the further status. Then the student takes the print out and submits it in his institute with all the supporting documents. In case of the renewal, one has to submit only mark sheet of standard cleared.

Section 3- Institute Section

Institute verifies the documents and enrollment detail of the student. If everything is found correct then the application is digitally signed and forwarded to the District Education Officer/ District Social Welfare Officer, by the Institute.

Section 4- District Education Officer

District Education Officer verifies the Enrollment and Affiliation status of the institute and signs it digitally and application is forwarded to District Welfare Officer.

Section 5- Scrutiny

The scrutiny on various parameters of all the applications is performed at state level to check the invalid/duplicate roll number from Secondary Education Board and Invalid/duplicate income, cast, domicile certificates from e-District application of Board of Revenue of Uttar Pradesh. The bank account details of students are scrutinized by Public Finance Management System (PFMS). In doing so, the erroneous data is marked and converted into suspected data which is again sent to districts for field verification. In the scrutiny results of Post matric Scholarship 2014-15, only 56% data was found valid.

Section 6- District Welfare Officer

District Welfare Officer re-verifies the account details from PFMS and also re-verifies the suspicious records. He has to approve and digitally sign the records by his digital signature and the District Scholarship Approval

Committee of concerned district gives the final approval for payment.

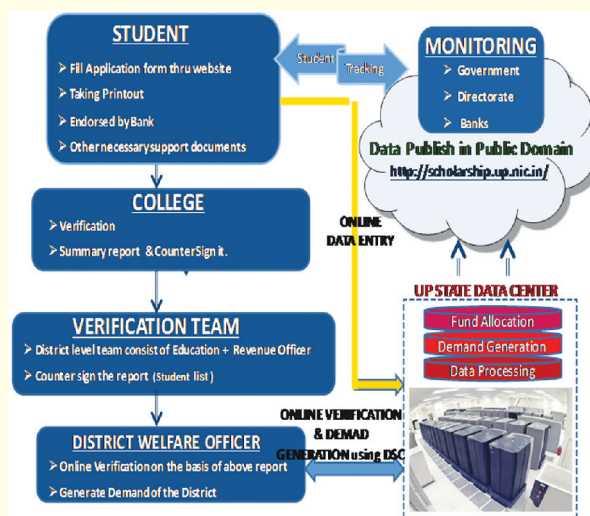


Figure 1. process flow of SAKSHAM,

Section 7- Data Processing and Demand Generation

The student wise Scholarship and Fee reimbursement amount is calculated. In view of demand and budget allocation for scholarship, the priority is computed on basis of the Group, Income and Merit as per the rules defined in the Government Orders (GOs).

Section 8- Fund Transfer through PFMS (e-Payment)

The payment bills are prepared by the Nodal Scheme Officer/ Finance Controller designated as Central Drawing and Disbursing Officer and the same are submitted to the treasury to obtain the token. After that the fund is directly transferred to the accounts of the students through PFMS.

Table 3. Major performance indicators of “SAKSHAM”

Performance Indicators	Before “SAKSHAM”	After “SAKSHAM”
Online application form for students	Not Available	Available
Authentication and verification of Master database of all institutions of state	District level master database was available which was rarely used for authentication and verification.	Digitally authenticated Master database for the entire State is available.
Minimize drawing and disbursing officers to ensure smooth financial management for state	One Drawing and disbursing officer for each of three departments at District level. (Total 225 DDOs)	One Drawing and disbursing officer at State level was designated against each department (Only 3 DDOs)
Reduction in use of paper	Attach multiple certificates with the scholarship application form every year	Required only once at the time of commencement of the course.
Tracking the Status of application form	Uncertainty about status of application	Application status can be tracked at any point of time
Reduction in visiting to Government Offices	Stroll around different offices for scholarship disbursement	Details of scholarship is available online with SMS facility

Performance Indicators	Before “SAKSHAM”	After “SAKSHAM”
Reduction in dropout rate of students	Dropout rate was not coming down due to large gap between allotment and actual benefit reaching to the beneficiary	Students get the scholarship/ fee-reimbursement in time and directly in their bank account which improved enrollment and better attendance thus reduction in dropout rate.
Reduction in unutilized money.	Huge undistributed/ undisbursed fund was laying in sundry accounts of bank due to wrong/malicious Bank accounts.	Direct e-payment in to the account of beneficiary after authentication of bank account using integration with PFMS reduced the transaction failure rate and online credit scroll was available to department.
Tracking mechanism for a particular student	No tracking mechanism of students and their academic progress	Proper tracking is done till higher education and ghost/ fraudulent students are removed from the system.
Filtering of Fraudulent, bogus and duplicate claims	No provision was available for finding Fraudulent, bogus claims and Institutions.	Checks imposed for filtering frauds and crooks, by centralized database of institutions and their linkage with their recognizing university along with integration with PFMS filtered over 1 million such claims.

4. Social Impact of SAKSHAM

The impact on the beneficiaries as well as on the Government has been tremendous. As “SAKSHAM” is an online integrated portal providing ease of availability with user-friendly interface, there is high level of satisfaction among students as they are able to apply from any geographical location having computer with internet facility along with a complete transparency in scholarship transaction throughout the state. After implementation of SAKSHAM, the really needy downtrodden students of any category (SC, ST, OBC, General) studying in either government school/ government aided school or private school are able to get scholarship due to filtering out of fraud and ghost students, due to which the grant for scholarship and fee reimbursement use to finish for only SC, ST and OBC category for only government Schools. The availability of all modules, forms and labels in Hindi language extended support to rural students, being Hindi the language of study in more than 25000 schools. The integration of all departments engaged in social welfare with treasuries, PFMS brought IT culture in the state and use of digital signature at every level gave a sense legal responsibility among the institutions, government officials in view of IT ACT-2000 [10].

The Lessons Learnt from the Process Re-engineering Exercise are:

- Coordination among stakeholders was the greatest challenge as different stakeholders had varying perception about their work. Involvement of the top leadership was required to achieve synergy.

The Niyamawali has been framed by the Cabinet for defining each process for effective system. The Government Orders (GOs) are issued and updated time to time for successful implementation of project. Roles and responsibilities of each stakeholder are clearly and strictly defined in various Government Orders.

- Capacity Building of the officers and concerned employees of universities/institutions of the state regarding work flow, operating, digital signature and their responsibilities to develop a feeling of ownership amongst employees.

5. Conclusion

This Government Process Reengineering Model of scholarship provides a common platform to all the concerned departments (Social Welfare, Backward Class Welfare, Minority Welfare, Education Department, Treasuries) and facilitates data sharing and simplification of processes amongst the stakeholders. It also helps the state government to analyze and assess the overall budget requirement against the demand, impact of implementation of process re-engineered model in extending scholarship to righteous students. It helps the decision makers to understand the problem areas and modify schemes/policies to have a better coverage and remove deficiencies.

For the Government, there have been savings both in terms of finance and manpower, less strenuous work, higher productivity and fewer errors in computation

and calculations. For the citizens, there is complete transparency in scholarship transaction throughout the state and lesser effort is required to get information which is universally accessible on Internet. The State Government was able to save more than Rs.5.2 billion by rigorous scrutiny filtering out fraudulent and bogus claims at state level.

SAKSHAM being an online end-to-end solution has helped to evolve the financial inclusion for the weaker section of the society.

References

1. Bourgeois A.J, Hategan A. and Azzam A.(2015),” Competency-based medical education and scholarship: Creating an active academic culture during residency”, *Perspectives on Medical Education*, Pages 254–258.
2. Taylor, C. and Albasri, W. (2014) *The Impact of Saudi Arabia King Abdullah’s Scholarship Program in the U.S.* *Open Journal of Social Sciences*, 2, 109-118.
3. Peterson E.P., Campbell E.D., West R.M. (2001), “An Evaluation of the Basic Fund Scholarship Program in the San Francisco Bay Area, California”, *Program on Education Policy and Governance*, Harvard University.
4. SAKSHAM (2016), “e-Scholarship tool: SAKSHAM Portal”, available at: <http://scholarship.nic.in/> (accessed 06 October 2016)
5. Statistical Department (2016),”Statistics of Uttar Pradesh”, available at: <http://up.gov.in/upstateglance.aspx>(accessed 06 October 2016)
6. Zigiariis, S. (2000),”Business Process Reengineering”, INNOREGIO:dissemination of innovation and knowledge management techniques, Report produced for the EC funded project.
7. Grover V., Jeong R.S. and Teng C.T.J. (1998),”Survey of Reengineering Challenges, *Information Systems Management*”, 15:2, 52-58
8. PFMS (2016), “Public Financial Management System”, available at: <https://cpsms.nic.in/Static/Implementation.aspx> (accessed 06 October 2016)
9. Nunno M.R. (2000), “Electronic Signatures: Technology Developments and Legislative Issues”, *Government Information Quarterly*, Vol. 17/No 4, Pages 395-401
10. IT Act (2000), “The Information Technology Act-2000”, available at: http://www.dot.gov.in/sites/default/files/itbill2000_0.pdf(accessed 06 October 2016)

The Role of Intermediaries in e-Government adoption in India: Bridging the Digital Divide

Rajiv Kumar, Dr. Amit Sachan

Indian Institute of Management Ranchi, Suchana Bhawan,
5th Floor, Audrey House Campus, Meur's Road, Ranchi –834 008, India
rajiv.kumar13fpm@iimranchi.ac.in, amitsachan@iimranchi.ac.in
8292613938

Abstract

Despite the transparency and benefits of e-government, and its potential to serve citizens better, there is low diffusion and adoption of e-Government services in India. Limited access to computer and internet, lack of computer and internet skills, low trust in technology, and risk associated in using e-government services are major hindrances in e-Government adoption in India. Despite a large number of citizens belonging to the non-adopter category, government has made some services mandatory to be accessed online where citizens have no other choice. Also despite the digital divide, a large number of citizens prefer online access to government services. In such cases intermediaries like common service centers, internet café and services agents' roles are significant for accessing e-Government services. Hence research is needed to explore this. The study aims to investigate the role of intermediaries in online access to public services by citizens. Qualitative research methodology using semi-structured interview was used. The results show that intermediaries play an important role in bridging the digital divide. The study also highlights on what circumstances citizens are taking help of these intermediaries. The study then highlights its limitations and discusses scope for future study.

Keywords: Digital Divide, E-government, Adoption, Intermediaries

1. Introduction

In a vibrant Indian economy, e-government is seen as a sign of being more transparent and providing a better service delivery to its citizens by government. Despite the increasing penetration of the Internet and amount of online government services, there are significant barriers that limit its widespread adoption in India. One major reason is the “digital divide,” with people of higher socio-economic position demonstrating greater access and usage compared to those from lower socioeconomic groups. Lack of availability of resources, less-internet access and low technological skills are the main hindrances in e-government adoption in India. Despite the hindrances discussed, citizens access public services online due to its benefits and convenience. Making certain government services mandatory to be accessed online forces citizens to access them without any other choice. Needy people have to access mandatory e-government services and somehow use it. In such a scenario, intermediaries play important roles by providing computer and internet to access government services. Intermediaries also help citizens by accessing government services online on their behalf. Intermediary is defined as “any public or private organization facilitating the coordination between public services providers and their users”[1]. Researchers have shown concern regarding elimination of and bypassing the roles of intermediaries due to intervention of technologies (e.g. establishing web sites via www)[2]. However, there is a lack of empirical

evidence to support this argument [3]. Other studies that contradict this view suggest that while the internet and associated information and communication technologies (ICTs) may reduce the roles of traditional intermediaries, they may also result in increasing their roles in some cases where factors such as trust may influence their position[4], [5]. Research findings showed that numbers of roles for traditional intermediaries emerged in the context of electronic markets which cannot be easily eliminated by direct interactions via the internet[4]. The three types of intermediaries facilitating citizens to avail government services online are described below.

Common Service Centers (CSCs): These centers are intended to serve as front-end delivery points for government, private and social sector services in an integrated manner to rural citizens of India[6]. As on 31st August 2013, about one hundred and twenty seven thousand CSCs were established under the National e-government program in India and became operational and started delivering services[7]. One CSC for every six census villages forms a cluster and are placed in such a way that it is supposed to follow a ‘honey comb’ structure so that the services provided by it are easily accessible to the rural population residing in the cluster. The Scheme is being implemented as a Public-Private Partnership (PPP). The CSCs are also referred as “Pragya Kendra” in some states and are designed as ICT-enabled Kiosks having a PC along with basic support equipment like printer, scanner and UPS[6].

Internet Cafe: An Internet cafe, also known as a cybercafé provides Internet access to the public. They charge fee usually on time-based rate to use computer and internet. In developing countries like India, Internet cafés are the primary form of Internet access for citizens and is more affordable than personal ownership of computer, internet, software and other relevant equipments.

E-government service agents: In India, many service agents, both on individual basis or in the form of an organization, act as intermediaries to facilitate citizens to access various e-government services like train ticket booking, visa application, tax filing, filling application forms etc. A large number of citizens are dependent on these service agents to access e-government services.

Intermediaries have been widely used for years for successfully delivery of government services online [8]. While there are a number of studies in e-government context including adoption [9]–[12], there are limited studies exploring the role of intermediaries in e-government context [3], [8]. Comparatively, little attention has been paid to issues pertaining to usability, accessibility, and the availability of public electronic services from a citizen's perspective [3]. The rationale for undertaking this study is to explore how citizens are getting benefited from the intermediaries in accessing e-government services. This is particularly important in the case of users who may not have the technical skills, experience, or social connections that could help them to use e-government services. The focus of this research is to investigate the role of e-government service facilitators (intermediaries) in improving the adoption of e-government services. The study also focuses on exploring the circumstances in which citizens prefer to adopt e-government services.

2. Literature Review

Indian Context: India is the largest democracy in the world and its citizens are highly enthusiastic to be a part of good governance [13]. There have been persistent efforts to embrace ICT enabled e-government systems in India. There are 34.8% of total population in India are internet users. In 2014, central government of India has approved the Digital India programme comprising various projects worth over INR 1 lakh crore (Approx. US\$15 billion) which includes projects to ensure availability of government services to citizens digitally [14]. National e-Governance plan (NeGP) [7] was formulated on May 18, 2006 which takes a holistic view of e-Governance initiatives across the country [15]. Government of India has classified e-government projects with a potential scale up and put them on the mission mode [16]. The National e-Governance Plan (NeGP) of Government of India seeks to lay the foundation and provide the motivation for the long-term

growth of e-governance within the country. The NeGP takes a complete view of e-governance initiatives across the country, integrating them into a cooperative vision and a shared cause [7]. The Digital India is transformational in nature and would make sure that government services are accessible to citizens through electronic mediums. The CSCs promote rural entrepreneurship, build rural capacities and livelihoods, enable community participation and influence the overall action for social change.

E-government adoption: Information systems research for long, has studied about adoption of new information technologies. Researchers have proposed various technology adoption models. There are researches also, in e-government adoption, but they are narrow in their scope. In 1989, Fred Davis proposed TAM to describe the potential user's behavioral intention to use the IT innovations [17]. The TAM identified perceived ease of use and perceived usefulness are determinants to adopt information technology. TAM was further extended to TAM 2 and TAM 3. Unified theory of acceptance and use of technology (UTAUT) was postulated in 2003 by a systematic review and consolidation of constructs from previous eight adoption models [18]. Gilbert, Balestrini, and Littleboy have proposed an e-government adoption model that combines attitude-based constructs from DOI theory and TRA theory with aspects of service quality-based TAM theory [19]. In 2005, Carter & Belanger developed a comprehensive e-government adoption model that combines constructs from DOI theory, TAM, and web trust theory [20]. The model identifies factors that affect the adoption of online government services by citizens and can be applied to a wide range of e-government initiatives at local, state, and federal levels.

3. Research Methodology

The study aims to examine the role of intermediaries in adoption of e-government services in India. The study develops a theory rather than testing specified theory. Hence qualitative research methodology is used for the purpose of the study [21]. Individuals without or limited computer and Internet experience and its access were recruited through a snowball sampling [22]. The participants are dependent on intermediaries like CSCs, internet café and service agents to avail e-government services. Total 17 individuals have taken participated in the study. There were 6 females and 11 males aged between 18 to 60. In-depth semistructured interview was conducted for the study. Interviews were approximately 40 minutes in length. The interviews were held in the participants' homes and were tape recorded for accuracy. Based on the transcripts from the 16 interviews, we have conducted qualitative analysis using crystallization/immersion method.

4. Findings and Discussions

The analysis of citizens' responses revealed the importance of intermediaries to facilitate e-government adoption in India. The participants mentioned three circumstances where intermediaries play important role in accessing e-government services. These circumstances are - i) mandatory e-government services, ii) when citizens find e-government services convenient and economical than conventional government services, and iii) complex and risky e-government services. This section describes how intermediaries help in availing e-government services in the three circumstances.

i) Mandatory e-government services:

Government of India has made many government services mandatory to access online. E-filing, Passport application, Visa application, online application in many cases like applying for exam and job are the popular mandatory e-government services. Mandatory nature of certain e-government services leads individuals with lack of resources or computer and internet skill to solely dependent on such intermediaries. They have expressed internet cafes as a medium to access e-government services.

A respondent (#4, male, 29 years old) stated: "I don't have computer to access government services and also don't know how to operate computer. Generally I use conventional way to access government services. But for the services that government has made mandatory to access through online, I visit nearest internet café where their staffs help me in accessing e-government services".

Another respondent (#11, female, 59 years old) stated: "I prefer conventional way to access government services. Computer and internet is not my cup of tea to use. Even I don't want to take headache in this age of retirement to learn all these technology things. I am happy with the way I am. As internet café are taking care of accessing government services, I solely rely on them to access mandatory e-government services".

Apart from internet café, CSCs also give services to citizens to access e-government services.

Another respondent (#16, female, 51 years old) stated: "Pragya Kendra provides the services for certain government services that are made mandatory. These computer centers setup by government is quite helpful in accessing e-government services".

ii) When citizens find e-government services convenient and economical than conventional government services:

Convenience is an important factor revealed by various study to adopt e-government services [23]. Distance often hinders citizens from traveling to government departments to access required services;

traveling to a capital city to access the services offered by a central government department from a another region is time consuming and costly. Compared to conventional way of accessing government services, citizens find e-government service convenient to use, it saves time and also economical [11]. Some participants have expressed that although they don't have resources or the necessary skills to access e-government services, still they prefer to visit intermediaries to avail non-mandatory government service online.

A respondent (#13, male, 51 years old) stated: "Train booking counter is far from my home. To book train ticket I prefer to visit internet café which is in walking distance from home, where I can book my ticket online by paying reasonable charge for internet access. It is convenient and also saves time and cost".

Participants have also expressed that buying computer and having internet facilities is costly and don't find worthwhile. Hence, instead of owning a computer and internet connection, they prefer to take services of intermediaries to access e-government services.

A respondent (#6, female, 47 years old) stated: "Buying computer and availing internet connection is expensive. We don't require to access e-government services frequently. So I don't find having a computer and internet connection is worthwhile. When I need to access any government service online, I visit any internet café".

The citizens who are travelling, intermediaries facilitate them to access e-government services. Generally government services of a particular state or district is not available from other state and district. Under such circumstances citizens find intermediaries like internet cafes helpful to access government services.

A respondent (#1, male, 37 years old) stated: "I am a frequent traveler and most of the time I am out of station. Hence it is difficult for me to visit government offices to access public services. Internet cafés are available across the country that help me in accessing public services remotely".

There is an increased convenience for both citizens and businesses in using the intermediaries as a multi-service vending facility [4]. This also saves time and certain cases cost saving that motivates citizens to take help of intermediaries.

iii) Complex and risky e-government services

Literature of e-government adoption reveals, governments worldwide face long-term challenges, in which adoption factors such as trust play a major influencing role [4]. The role of the electronic intermediaries reduce the perceived risks of e-services and produce a trusting environment [5]. The participants expressed that the government services with high risk associated, they

prefer service agents to facilitate in accessing those government services. Also intermediaries have expertise in such work and have experience; citizens feel that intermediaries can handle those risks. Also in some complex services where some particular expertise and knowledge are required, intermediaries' facilitation is valuable. Under such circumstances, citizens feel more comfortable in availing government services online with the help of intermediaries. Intermediaries are also a main source of information that builds trust in citizens in adopting e-government services. Hence intermediaries also act as knowledge centers.

A respondent (#7, male, 31 years old) stated: "Tax filing is a tedious job and has risks associated with it. It requires both knowledge and tax filing expertise. Any mistakes may result in great loss. Although I have little internet skill, but avoid online tax filing by myself. I take help of tax filing agents by paying charges. Tax filing agents file return on my behalf".

Similarly respondent (#3, male, 27 years old) stated: "We have to be very careful while applying for visa. A little mistake may result in its rejection. Hence I prefer agents having expertise to apply for visa on my behalf".

5. Conclusion

The study found that intermediaries play an important role in bridging the digital divide by facilitating citizens' access to e-government services in India. The Study also explored into the types of intermediaries aiding in adoption of e-government services and found that apart from government established CSCs, internet café and service agents also contribute significantly to e-government adoption. Despite the establishment of CSCs across the country, a large number of citizens are still dependent on private intermediaries like internet cafés and service agents due to limited number of CSCs, their limited functionalities and access to government services. This study has identified important challenges being faced by Indian government in providing e-government services. These are accessibility, trust, associated risk including security and privacy issues.

The results show that there are a number of reasons why citizens prefer to access government services from an intermediary rather than directly from their PC and internet. Firstly, the limitation in citizens' capability toward e-government adoption and the low rate of computer and internet access in India. Secondly, lack of trust and its associated risk are issues in a non-physical environment like internet. Since, citizens usually perceive internet not as safe place to communicate and a small mistake may result in large losses therefore, uncertainty situations force citizens toward intermediaries. Citizens also perceive intermediaries are experts in accessing e-government services and they will take right approach to tackle any associated risk or

losses. Thirdly, in some cases cost and convenience is a driving force to use intermediaries in accessing online government services. Citizens prefer online access of government services because government offices are far from their home, expensive to reach, and also non-convenient. The study reveals mandatory to access some government services online is an important driving force that leads citizens to approach intermediaries. In such scenario, due to lack of computer accessibility or lack in technical skills, citizens find intermediaries as the best option to access e-government services. The statement is also supported by literature [3], [8]. The previous works [3], [8] argued that intermediaries facilitate citizens in accessing e-government services by eliminating the hindrances in e-government adoptions like digital divide and poor infrastructure to conduct payment (secure transaction). Thus, the concept of intermediary helps in reducing the digital divide by facilitating citizens' access to e-government services. Intermediaries also facilitate in giving information and act as knowledge centers. For many citizens intermediaries are the prime source to get information about e-government services.

The study contributes to the e-government literature highlighting the importance of intermediaries as a silent feature in e-government adoption. This may give a direction to researchers to move ahead from this point. The findings of this study may give important insight to government and associated agencies in realizing the importance of intermediaries in e-government context. Furthermore, this paper significantly contributes to the knowledge and practice of e-government adoption and diffusion and provides sufficient support to decision makers in expediting e-government adoption and diffusion.

The findings of this study have a number of important implications for future practices. Bridging the digital divide will enhance diffusion of e-government services in society and government should take this initiative. Government may use new technologies, such as media (newspaper, television, government websites, mobile text messages, social media etc.) or other ways to educate people to use online services. Government may also use these mediums to spread awareness about e-government services and its benefits that will help in bridging digital divide. Government may encourage private intermediaries to enhance e-government adoption.

Although this study contributes to literature, it is not free of limitations. The sample used in this study was sufficient for the purpose of this study and it has allowed reasonable conclusions to be drawn, but it cannot be considered a representative of the whole population in a diverse country like India having more than 1.25 billion population. Larger and more representative samples within India can be included in the new study to strengthen the current findings. In addition, quantitative research may help in validating the findings of this study.

References

1. M. Janssen and B. Klievink, "The role of intermediaries in multi-channel service delivery strategies," *Int. J. Electron. Gov. Res.*, vol. 5, no. 3, pp. 36–46, 2009.
2. R. Gellman, "Disintermediation and the Internet," *Gov. Inf. Q.*, vol. 13, no. 1, pp. 1–8, 1996.
3. F. Al-sobhi, W. Vishanth, and M. Mustafa, Kamal, "An exploratory study on the role of intermediaries in delivering public services in Madinah City Case of Saudi Arabia," *Transform. Gov. People, Process Policy*, vol. 4, no. 1, pp. 14–36, 2010.
4. J. P. Bailey and Y. Bakos, "An Exploratory Study of the Emerging Role of Electronic Intermediaries of Electronic Intermediaries," *Int. J. Electron. Commer.*, vol. 1, no. 3, pp. 7–20, 1997.
5. M. Sarkar and B. Butler, "Cybermediaries in Electronic Marketplace: Toward Theory Building," *J. Bus. Res.*, vol. 41, no. 3, pp. 215–221, 1998.
6. "Second Administrative Reforms Commission, Promoting e-Governanc," 2008.
7. "National E-Governance Plan." [Online]. Available: <https://negp.gov.in/>. [Accessed: 09-Jun-2016].
8. F. Al-sobhi and V. Weerakkody, "The Role of Intermediaries in Facilitating E-government Diffusion in Saudi Arabia," in *European and Mediterranean Conference on Information Systems*, 2010.
9. L. Carter and F. Belanger, "The Influence of Perceived Characteristics of Innovating on e-Government Adoption," *Electron. J. E-Government*, vol. 2, no. 1, pp. 11–20, 2004.
10. L. Carter, "E-government diffusion : a comparison of adoption constructs," *People, Process Policy*, vol. 2, no. 3, pp. 147–161, 2008.
11. M. A. Shareef, V. Kumar, U. Kumar, and Y. K. Dwivedi, "e-Government Adoption Model (GAM): Differing service maturity levels," *Gov. Inf. Q.*, vol. 28, no. 1, pp. 17–35, 2011.
12. H. Patel and D. Jacobson, "Factors Influencing Citizen Adoption of E- Government : A Review and Critical Assessment," in *European Conference on Information Systems*, 2008.
13. N. P. Rana, Y. K. Dwivedi, M. D. Williams, and V. Weerakkody, "Adoption of online public grievance redressal system in India: Toward developing a unified view," *Comput. Human Behav.*, vol. 59, pp. 265–282, 2016.
14. "Digital India week to bring investment worth billions of dollars," Jun-2015.
15. "National Portal of India." [Online]. Available: <https://india.gov.in/e-governance/national-e-governance-plan>. [Accessed: 09-Jun-2016].
16. T. Kumar and H. Misra, "Decentralization and E-governance in Indian Context : A Case based Study in Gujarat," *Adopt. E-Governance*, 2007.
17. F. D. Davis, "Perceived usefulness, perceived ease of use and user acceptance of information technology," *MIS Q.*, vol. 13, no. 3, pp. 319–340, 1989.
18. V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User Acceptance of Information Technology : Toward a Unified View," *MIS Q.*, vol. 27, no. 3, pp. 425–478, 2003.
19. D. Gilbert, P. Balestrini, and D. Littleboy, "Barriers and benefits in the adoption of e-government," *Int. J. Public Sect. Manag.*, vol. 17, no. 4, pp. 286–301, 2004.
20. L. Carter and F. Belanger, "The utilization of e-government services: Citizen trust innovation and acceptance factors," *Inf. Syst. J.*, vol. 15, no. 1, pp. 5–25, 2005.
21. N. Denzin and Y. Lincoln, "Landscape of Qualitative Research: Theories and Issues," N. Denzin and Y. Lincoln, Eds. Thousand Oaks, CA: Sage, 1998, pp. 1–34.
22. A. M. Miller and P. J. Chandler, "Acculturation, resilience, and depression in midlife women from the former Soviet Union," *Nurs. Res.*, vol. 51, no. 1, pp. 26–32, 2002.
23. J. M. Curran and M. L. Meuter, "Self-service technology adoption: comparing three technologies," *J. Serv. Mark.*, vol. 19, no. 2, pp. 103–113, 2005.

Unique Property Identification Number

Dr Vasanthakumar

N, IAS, Ex MD, Geo-Spatial Delhi Limited
VikasBhawan – II, Delhi
drvasanthkumarias@gmail.com

Santulan Chaubey

Director
Delhi eGovernance Society
9th Level, B-Wing, Delhi Secretariat, New Delhi
santulan@gov.in
+91-9818180683

1. Abstract

Rapid growth of cities has resulted in large number of constructions (residential and commercial) in both planned and unplanned manner. Space constraint in cities resulted in multistory buildings (Apartment) culture peculiar to urban areas. Rapid, unplanned expansion of cities (horizontal and vertical) by conversion of rural areas, made it difficult for authorities to evolve a numbering system suitable in urban areas to identify a property (both land and building). In rural areas, the task of assigning number to a property is done generally by the revenue department. But in cities, revenue records have not been updated regularly and the task of assigning unique identification number to a property has been mandated to the concerned local bodies, primarily with an intention to collect property tax.

This paper analyses the existing frameworks to provide unique property identification numbers to all properties in Delhi. It also intends to provide a new framework based on emerging technologies like Geographical Information System (GIS) enabling an eco-system to assign unique property identification number in urban areas like Delhi.

Index Terms: Aadhaar number; GIS, Urban Planning, Local Bodies, Unique Property Identification.

2. Introduction

Aadhaar Number has been able to provide Unique Identification for each individual resident of India. Likewise, there is a compulsive requirement to provide Unique Identification Number (UIN) to each property in the country particularly in metropolitan cities like Delhi, Hyderabad, Mumbai, etc. For the purpose of this paper 'property' means both building and land. Many states have attempted to assign unique number to urban properties but with mixed results. This may be due to the general thought process that there should be continuity with the past, which in this case means the revenue records. The present paper tries to look at the issue de novo but at the same time ensuring all the purposes for which the numbering was assigned in the past is catered to along with certain new purposes.

It can be argued that a postman reaches a property based on the address written on a letter, which is unique to each property. What is the need for unique number

if postal address itself is unique? There is no standard way to write a postal address. For example 'Rama Krishna Puram' 'RK Puram' 'R.K Puram' etc. means the same. The converse 'Gandhi Street' may be present in more than one place within a specified area. The postal addresses are unstructured and non-standardized. The delivery of letter also depends on the local knowledge of postman, where as a unique number should enable many other stake holders to identify the property in an easy way. Hence even though postal addresses are unique it is longer, non-standardized and cannot be located without human help on ground.

In Delhi, as per the revenue records at certain places where consolidation has taken place unique numbered uniform sized rectangular polygons called 'khasras' have been assigned and at other places the field maps are irregular in shape. The village tri-junction pillars and other fixed points have not been preserved making it difficult to identify the property. The revenue system does not take assign number to urban buildings. Even within the khasra numbers the actual piece of land belonging to individual property owners has not been delineated. Hence this system also cannot be used as a framework to assign number to property.

3. Need for Unique Number of properties

Apart from the requirement to assign unique number for collection of property taxes, there is a need to have a Unique Identification Number for properties for other purposes also:-

1. Planning for cities including infrastructure
2. Ownership details in Urban areas
3. Titling of Urban Property
4. Emergency response, Disaster management
5. Land usage data
6. Census
7. Digital Address, etc.

4. Existing Frameworks for giving property number in Delhi

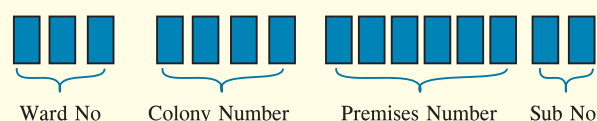
MCD framework: The Municipal Corporation of Delhi (MCD) Act deals with the assignment of Identification code numbers and manner of its notification (Property

Identification Code Number) under sub-section (1) and (2) of section 125.

As per the sub-section 1 of Section 125, “the property identification code number by which any processes in any area within the jurisdiction of the Corporation may be known shall be fixed in the following manner

- a) The first three digits shall indicate the ward number in numeric form,
- b) The next four digits shall indicate the colony number in numeric form
- c) The next six digits shall indicate the premises number alphanumerical form, and
- d) The next two digits shall indicate the sub-number of premises numerical form.

All colonies in Delhi shall be serially numbered”.



However, the three MCDs have not yet provided unique property identification numbers as per the above parameters. North MCD has started the process but is in its initial stages.

The following are the major constraints in using MCD framework of assigning unique numbers to properties -

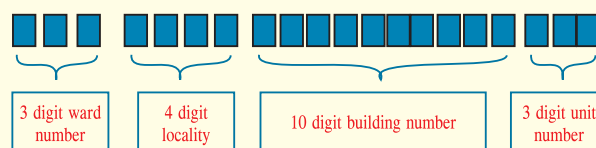
- a) The ward boundaries of MCD change at least once in 5 to 10 years, based on census data, to equalize population. This means the first 03 digits change once in 10 years at least.
- b) While 6 digits have been allotted to premises number, there is no separate mechanism to capture the number of floors in a premise, which is an important parameter in multi-story buildings.
- c) Even if 2 out of the 6 digits can be used for numbering the floors, it will leave only 4 digits for the number of premises, which means that a maximum of 9999 premises only can be captured in a ward/ colony.
- d) The last two digits are being used to capture “unit” details by MCD even though it is mentioned as sub number premises. ‘Unit’ here means the ownership within a premise.

Since ward boundary can change and the details of the floors are not captured specifically in this method, the “Uniqueness” cannot be ensured by this framework. Therefore this approach may not be the best approach.

DSSDI framework: Government of NCT of Delhi (GNCTD) had initiated a flagship project “Delhi State Spatial Data Infrastructure (DSSDI) to map entire Delhi covering 1,464 Sq. Km on a 2000:1 scale. Under this project, around 350+ GIS layers including properties and

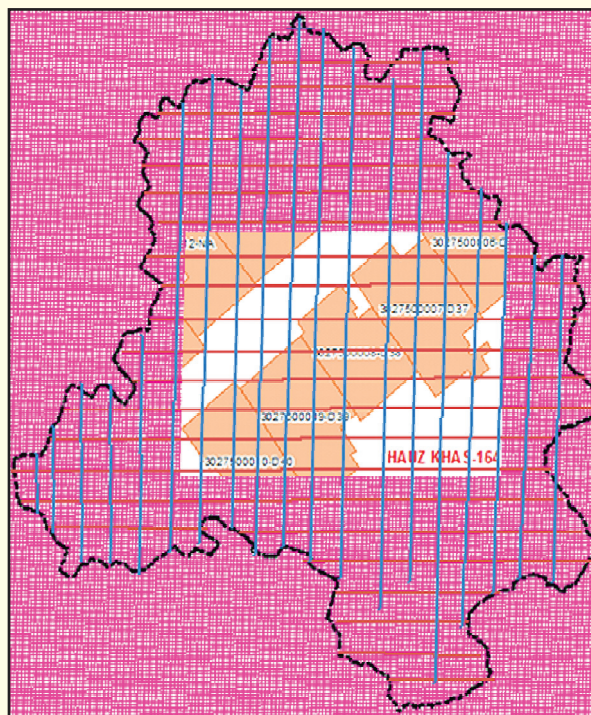
vacant land has been created. These layers form a strong base for designing GIS based applications and Decision Support Systems and the building vector can be updated with the latest satellite imagery.

- a) Government of Delhi through its DSSDI project (2007 data) has also provided Unique Number to all properties. DSSDI framework was also influenced by the MCD Act with minor deviation.
- b) The logic for providing property number by DSSDI (GSDL) is given below -



The following are the major constraints in using DSSDI framework of assigning unique numbers to properties.

- a) Apart from the issue of first 3 digits indicating ward number which can change once in 5 to 10 years, there are other shortcomings as well.
- b) The locality boundary (next 4 digits) is not an administrative (or) legal boundary and hence this polygon is variable and cannot be validated by any government agency.



- c) The subsequent 10 digits are derived as follows. Entire Delhi has been overlaid by a uniform sized grid (250 X 250 meters). The first 5 digits stand for the grid number. The next 5 digits capture the buildings within a grid. But the grid can itself be shifted up or down or sideways being an imaginary object.

- d) The locality boundary is ill defined, the grid is imaginary polygons that can be shifted and imaginary polygons cannot be visualized on ground making it difficult for any person to identify the property based on the DSSDI framework.

5. Proposed framework to uniquely identify a building/property?

Any framework to assign unique number should be able to do the following-

- i) Uniquely identify the building.
- ii) Uniquely identify the vacant land
- iii) Enable property tax collection to be more efficient
- iv) Simplify capture of Ownership details and its changes
- v) Prevent fraudulent practices in transaction of property
- vi) Bring transparency in urban property settlements
- vii) Accommodate future changes in property landscape

Apart from the above, the framework should make the process of assigning numbers as easy as possible to a large extent by a desk exercise, once assigned not required to change except for specific purposes, capture floor details, unit (ownership). The framework should also cater to the frequent changes that occur in the footprint of buildings in cities and also enable identification of vacant land from a building and the conversion of vacant land (full/partial) into buildings later.

Using Global Positioning System (GPS), we can uniquely identify any point on earth providing its Latitude and Longitude (x and y coordinates) in two dimension plane. As in a Cartesian plane each point in GIS on Delhi is 'unique'.

Delhi in DSSDI project and using subsequent satellite imageries has the footprint of each building in the form a polygon. The projection system of those polygons is on an international standard known as World Geodetic System 1984 (WGS-84). For each polygon a 'centroid' can be derived automatically. The centroid will be expressed as 12 - 15 digit latitude and longitude. It is also clarified that when a standard projection system like WGS - 84 is used to derive centroid, the values will remain the same.

The 12 - 15 digits centroid unique latitude and longitude value can be converted in to a unique 6 digit (alpha numeric) value by a simple application software in an automated way (Illustrated below). Different logic can be used in the application software to derive 6 digit code for building and vacant land, thereby enabling

easy identification by looking at the code as building or vacant land.

9	B	4	C	3	A
---	---	---	---	---	---

After the 6 digits, 2 digit code can be used for capturing the floor details. 100 floors can be captured using numeric form 01 to 99&00. If a building has more than 100 floors in future, alpha numeric like OA -----OZ, AA-----AZ,-----ZA up to ZZ can be used.

Another 2 digit can be used capture the 'unit' detail - the ownership details within a floor which can also be numeric, alphanumeric as in para above.

There may be properties particularly in un-planned colonies which may be difficult to be delineated automatically by the system in to separate entities and instead a larger polygon (combined footprint) may be assigned a centroid based 6 digit value. A 2 digit (alphabetical) code can be added in front of the 6 digit unique number. Alphabets from A up to ZZ can be added in case during field visit if the 6 digit number has been generated considering a larger building unit but on the ground there are more than one building units.

The above framework will assign 12 digits unique property identification number. (Illustrated below).

A	A	9	B	4	C	3	A	0	3	2	3
Status		Geo Code				Floor		Unit No			

This Unique 12 digit number will enable –

- a) A computer enabled system to easily (re)translate the code into a complete address system and pin point the said property on a map.
- b) An individual would be able to decipher using the 6 digit geo code whether it denotes a building or a vacant land.
- c) Whenever a person applies for building permission, he/she should denote the 12 digit unique number of the vacant land or the previous building on which the proposed building will come up. A new number can be assigned by the same logic for the new building subsequently. The remaining parcel of vacant land if any, can retain the unique number of the vacant land.

6. Constraints in implementation of the proposed framework:

While the '6' digit unique code can be generated through software, it require of field survey to capture the floor details, unit number and for unplanned area properties. Apart from this for agencies specific requirements like floor area, owner details, land usage etc. also needs to be collected during field survey.

7. Steps required

Initiating process for providing unique id to a property will require various systems in place. An indicative listing of those systems is given below –

1. Enabling Act / Rules
2. Generation of Geo Codes, area wise
3. Development of application
4. Door to door survey to identify the Unit No
5. Issuance of number and linking with property

The issuance of a unique number to the property requires a nodal department like Revenue or Urban Development who can involve all concerned agencies, get the survey and frame up enabling Acts and Rules.

References:

1. <http://www.movable-type.co.uk/scripts/latlong-gridref.html>
2. Centroid of irregular shapes - <http://mathworld.wolfram.com/GeometricCentroid.html>
3. World Geodetic System 1984 (WGS84) - <http://earth-info.nga.mil/GandG/wgs84/index.html>



Department of Administrative Reforms & Public Grievances
Ministry of Personnel, Public Grievances & Pensions
Government of India