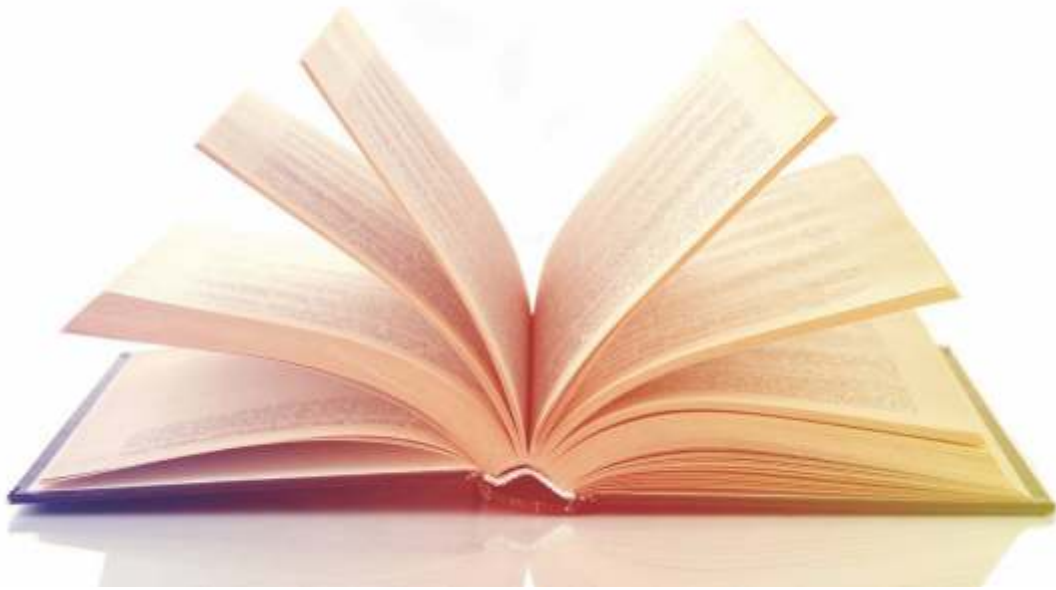




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21st National Conference
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e-Governance





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



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Hyderabad Metropolitan Development Authority

Hyderabad Metropolitan Development Authority E-governance initiatives
By T.Chiranjivulu IAS Metropolitan Commissioner HMDA and
Managing Director HGCL Administrative Block-A, HMDA Complex,
Tarnaka, Hyderabad – 500 007 Email ID: mc@hmda.gov.in
Ph.no. :040-27003313 Fax No.:040-27001880

About HMDA :

The Hyderabad Metropolitan Development Authority (HMDA) was formed by an Act (G.O.Ms.No.570 MA & UD (I1) Dept., dt.25.08.2008) of the then combined state of Andhra Pradesh Government in the year 2008, with an area of 7,257 Sq Km under its purview. HMDA jurisdiction covers (7) Districts, (70) Mandals, 1032 Villages including Greater Hyderabad Municipal Corporation consisting of 175 Villages and 12 Municipalities / Nagar Panchayats consisting of 31 villages and remaining 826 Villages under jurisdiction of the HMDA.

HMDA was set up for the purpose of planning, co-ordination, supervising, promoting and securing the planned development of the Hyderabad Metropolitan Region. It coordinates the development activities of the municipal corporations, municipalities and other local authorities, the Hyderabad Metropolitan Water Supply & Sewerage Board, the Telangana Transmission Corporation, the Telangana Industrial Infrastructure Corporation, the Telangana State Road Transport Corporation, and other such bodies.

Major e-governance Endeavours of HMDA

The goal of the HMDA is to introduce e-Governance through ICT enablement – i.e., the provision of HMDA services by electronic means. The primary focus of this goal is on increasing the efficiency and effectiveness of HMDA and thereby providing better services to citizens. Accordingly, the effective and efficient management of ICT is vital to the success.

1. Online 'Development Permissions Management System' to handle building permissions, layout permissions, Issuance of NOCS, Integration with Payment Gateway and Master Plan.
2. Online Layout Regularization Scheme (LRS) Building Regularization Scheme (BRS)

1. HMDA Online Development Permission Management System

Development Permission Management System (DPMS) is a major ICT initiative undertaken by Hyderabad Metropolitan Development Authority(HMDA) to re-engineer the business processes of development and layout permissions systems to bring about a quantum leap in transparency, the organizational turnaround time, productivity and quality ensuring hassle free IT enabled citizen centric service delivery.

In the current manual approach, scrutiny and approval process is time consuming and inefficient. Automating this process would eliminate potential delays as well as avoid inconsistencies in rules interpretation.

The proposed ICT initiative/solution integrates the critical processes such as electronic submission of applications, technical scrutiny, approval of applications/proposals online, intimations online and a comprehensive data information system.

Looking into the complexity in the implementation of the project, HMDA entrusted Administrative Staff College of India (ASCI) located at Hyderabad as the PMU (Project Management Unit / Office) to offer Technical Assistance through-out the life cycle of the project and become central repository to replicate the same.

HMDA, under this initiative, has identified the following Development Permissions that impact the citizen service delivery substantially:

- Non high rise and High rise buildings; commercial and residential buildings
- Layouts with open plots; layouts with housing and group housing
- Institutional/ Special buildings
- NOCs for Quarries, Petrol bunks, Theatres etc
- Single window Industrial applications
- Land Use Certificates
- Occupancy certificates

Background for DPMS

The Hyderabad Metropolitan Development Authority receives nearly 700 applications yearly for permission within HMDA limits for Building/Layout/Gated Community housing etc.. These applications have to be furnished along with various building plans and other property documents. The submitted documents will be subjected to scrutiny by the team of planner's, Junior Planners, Technical and Non-Technical team, which also involves on site verification of the furnished details. This processes been carried out manually and in a traditional manner.

The files were transferred from one table to another officer's table physically. The JPO read the drawings manually and map to development control rules to check compliance which is a major time consuming and error prone process. The number of stages that a file goes through in each approval process is very long thus showing down the approval process. Also there is no information displayed about the documents required for approval. These results in delay in clearances and applicants have to visit planning department officials many times to ensure that every document is in place. Applicant has to visit multiple times to know the status of the application and also locating the file and

tracking the status by the department officials is cumbersome process.

Planning Department is the nodal agency for approval of development permission of layouts, buildings etc. Based on specific guidelines and stipulated set of rules. As per relevant provisions of the Act, any person desirous of undertaking a construction activity is required to obtain prior sanctions from the HMDA before embarking on the same.

There has been a tremendous increase in the inflow of applications, which has increased workload on a small group of team, which was delayed application approval process.

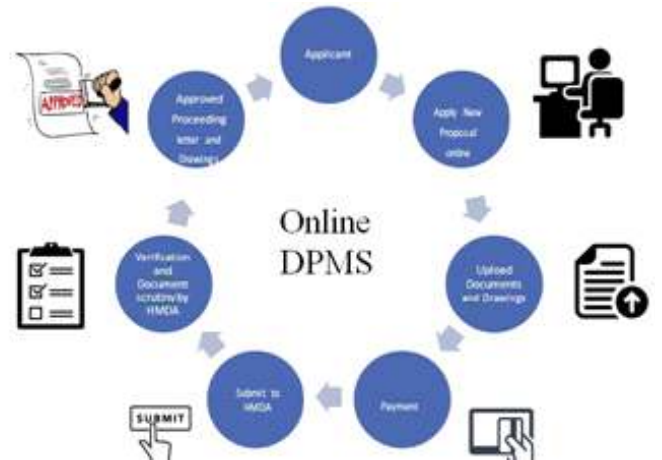
Objectives of DPMS

- DPMS Portal is a gateway for permissions of Building Plans, Change of Land Use, Layout Plans, NOC's Land Use Certificates, & Issue of Occupancy Certificate.
- Integrate the entire organizational workflows across the zones with the effective use of ICT for better service delivery to the Citizens.
- Refine and define the processes to make the service delivery simple and convenient to the citizen and to all stakeholders in the system.
- Work on the organizational processes and enable smooth transition of the current system by efficient implementation and handholding process.
- Accelerates the approval process
- Reduction of workload of Departmental personnel
- Electronic security and control of confidential data

PROJECT OVERVIEW

HMDA to enhance citizen services and facilitate quick processing and disposal of building permissions, automation of the technical scrutiny and effective monitoring of file processing.

- The main goals that the HMDA wants to achieve through the DPMS implementation are:
- To create easy access to services of HMDA for all the stakeholders
- The DPMS envisages facilitating quick processing and disposal of building plan permissions, automation of the technical scrutiny and effective monitoring of file processing
- To make existing processes more efficient by reducing the time consumed in file movement
- Easy access to information for citizens
- Online Payment Gateways, GIS, Land Revenue, Master Plan and other integrations for transparency in service and faster work flow.
- Efficient and better MIS systems for improving the internal efficiency of operations.
- M/s Softtech is the solution provider of the DPMS



- DPMS system should provide state-of-the-art technology, enabling digitization and automate into paperless office.
- It essentially involves image conversion of paper documents into electronic images on a computer
- The system should ensure that all the documents are digitized and stored in central repository in a structured manner for easy access and retrieval with proper controls.
- Work load is reduced to Officer's due to online process.
- The time bound scrutiny of the DPMS online applications has resulted in improving the efficiency in delivery of the approved Proceedings and Plans.
- Elimination of corruption and middlemen from the process.
- By providing the Online Service of DPMS at a single place has helped in saving Applicants time from trouble of running around the various departments.
- Approved Proceedings and Plan are stored in Digital repository of the HMDA Data centre and can be downloaded anywhere at any time by the applicant.

KEY PERFORMANCE

- Improved Monitoring & Tracking
- SMS Alerts, Notifications, and Proposal Flow to the users providing systematic monitoring and tracking of file progress
- AutoDCR is the unique and innovative way of automatic scrutiny of building proposal by reading CAD drawings. It is the software to automate the lengthy and cumbersome manual process of checking the development regulations, thus reducing paper work and effort of Architect and the

Authority.

- Automated Work flow, digital signature, drawing scrutiny, report generation in HMDA increased work efficiency

BENEFITS OBTAINED FROM THE DPMS ONLINE SERVICES

To Organisation

- Brings uniformity & standardization in submission drawing format. The tool will corrects some minor drafting errors and also provide list of failed entities with auto-zooming facility
- Data redundancy is eliminated from the drawing. Only minimum required entities are to be drawn in the drawing as most of the data will be auto detected by the system from existing available data.
- Accuracy in area calculations is achieved. Preparing calculation tables, showing dimensions in the drawing is not required.
- The Technical Scrutiny officers can verify the Application with Master Plan Online Data by superimposing the Application Layout plan and also with Geo referencing coordinates and can decide the Master Road affected areas and take appropriate action and inform the applicant online by raising the Shortfall.
- Data entry of the scrutiny is online, thereby speeding up the entire process.
- Online MIS Reports reduces time

To Applicant

- Hassle-free filing of the DPMS Application without any dependency.
- Online Status Tracking of the Application
- Automated SMS alerts and status can be checked
- Attending to the Shortfalls, if any by uploading the relevant documents online
- Transparency is ensured by sending the SMS to the applicant to inform about status at every step, so that applicant need not to visit the office.

Service	Total No. Of Proposals	Average of Time Taken For Approval
Type Building Permission	1147	25
Layout Open Plot	305	41.22
Layout with Housing Gated and Community	31	35
Draft Layout with Model House and Club House	13	33
NOC (Petrol Pump)	28	20
Change of Land Use	150	28.35
Occupancy Certificate	11	23.15
Total	1681	29.39

DPMS as on date :

Service Name	Launched On	Disposal Statistics				
		Received	Approved	Shortfall	Rejected	InProcess
Building Permissions	04.01.2016	1147	519	132	302	171
CLU	17.05.2016	150	52	22	36	17
Layout Open Plot (Draft)	17.05.2016	308	160	28	55	46
Layout Open Plot (Final)	30.10.2017	6	4	0	0	2
Layout Gated Community	17.05.2016	31	7	7	8	8
NOC – Petrol Pump	17.05.2016	28	10	2	10	4
Occupancy Certificate	17.05.2016	11	7	0	0	4
TOTAL		1681	759	191	411	252

IMPLEMENTATION COVERAGE

- Implementation and maintenance of standard operating procedures for maintenance of the infrastructure based on the HMDA policies.

- Implementation of projects is necessarily a joint effort between the HMDA and SEPL.
- Development team will look for the integration of various modules.

OUTCOMES IN TERMS OF EFFICIENCY, IMPROVEMENTS AND INTEGRATION

Service	Before	After
Time Effectives	>90 days	30 days

ENABLER INDICATORS

- Provides single point, integrated and holistic on-line Development permissions to the Citizens for any permission in specified time lines
- Brings a paradigm shift from Person centric to System centric service delivery with minimal manual intervention and least scope for interpretation of the regulations.
- Enables predictable governance through comprehensive information system
- Leverages ICT tools for standardizing processes and achieve quantum leap in transparency, efficiency, consistency & cost effective services through agreed upon SLAs
- Builds organizational capacity for smooth adoption of ICT enabled service delivery
- Achieves a customer-focused, fully transactional & seamless service model replicable across urban bodies in the State

Process reengineering

- Earlier the file moves manually to different departments and the applicants were not aware of their file status with automation file tracking as well scrutiny has become easy which is value addition to the Process.

Challenges faced in implementing Process changes

- Subjectivity in scrutiny of building & layout plans.
- Manual errors in scrutiny and approval processes.
- Difficulties in tracking the applications.
- Offline payments causing inconvenience and long queues.
- Dissatisfaction among applicants and common citizens.
- High workload and pressure on HMDA officials.

Change Management, Capacity Building Strategy

▶ Change Management and Capacity building –

One of the major concerns of the organization was the preparedness to adopt the technology by the staff. The typical demographics had major percentage of staff untrained and not exposed to computers and IT systems. There were multiple rounds of training and capacity build. At an average every staff member is provided with close to 20 days of class room training and followed by 6 months of operations support.

▶ Changing Belief system –

Most of the staff initially did not believe technology as a great enabler. The leadership ensured that the staff adopt the solution, notwithstanding their beliefs about the appropriateness of the solution. Change management in terms of Mind sets was a major activity taken-up by the leadership.

▶ Adapting to new technologies and acceptance of new processes

The BPR exercise done has recommended several changes in the workflows in the organization. Adopting these as the new processes meant

- ❖ Removal of discretionary powers
- ❖ Stopping of Interpretation of the rules
- ❖ Bringing-in Transparency in File tracking
- ❖ Making officers Accountable

▶ Inconsistency in processes

The processes being non-standard and person centric made the service delivery person specific and hence scope for interested party behaviour. Standardization of processes and shifting the paradigm from “person” to “process” through continuous capacity building was a major step taken.

External

▶ Architects adoption, drawing standards, learning curve

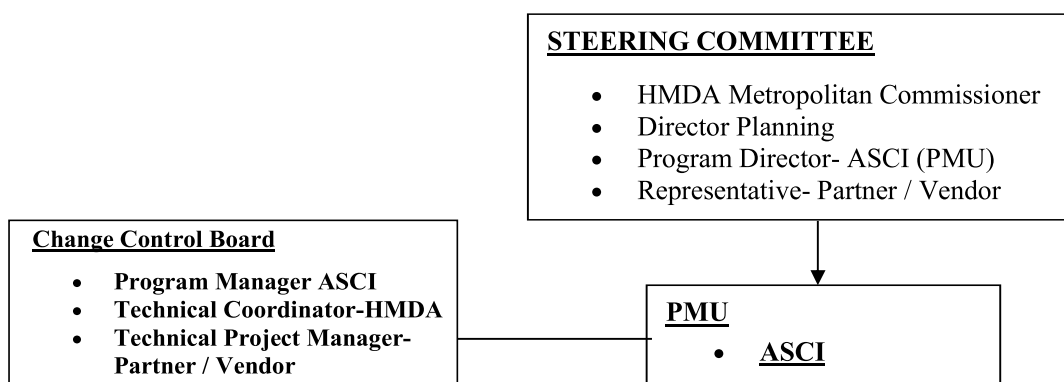
Adoption of the technology by the architects was a major issue initially. The need for the architects to provide accurate documentation was a demanding task initially. The resistance to change was also a natural behaviour demonstrated by most of them. HMDA conducted close to 14 workshops providing individual attention to over 200+ architects enrolled with HMDA

▶ Incomplete documentation by Citizens / applicants

Citizens are used to submitting incomplete, inaccurate, erroneous and incorrect documentation. Citizens would use a liaison officer to address these issues. After a continuous support and training provided the citizens have started submitting the applications on-line. Not accepting the applications manually made the citizens to use the DPMS system.

▶ Revenue and Government Land data integrations

Like any other ICT initiative of the government its always very difficult to integrate disparate systems. Integrating these into a single window was a major challenge and the current solution addresses all the integrations.

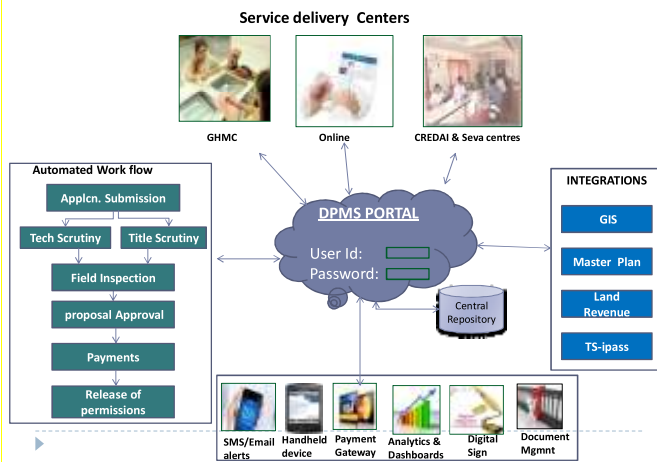


Technical Solution Adopted:

The Technology solution has the following components

- Cloud based Work Flow management
- Cloud based File tracking system
- Cloud based Building regulation Rule-base
- Auto DCR for Scrutiny
- Mobile Applications for site inspection
- Analytics based Dash Boards

DPMS Architecture



Compliance of the Technology adopted with e-Governance standards

- Adheres to IT standards laid down by the Government of Telangana and has multiple forms of integrations.
- The integrations include
 - Payment gateway
 - SMS gateways
 - Emails
 - Digital signature
 - TS-ipass
 - Master Plan, Accounts and Planning department
 - Title (Revenue), Dispute (Government land verification)
 - Mobile integrations
 - External departmental integration (Fire, Airport etc)
- The system provides Audit trails, Log trails and administration controls
- The System also ensure user authentication
- The data security is thru standard encryption methods.

The Lessons learnt from Technology choices and implementation

Detailed BPR conducted for all permissions and the following

recommendations were made:

- Single point for all citizen interactions – Portal
- Shifting the responsibility from the Administrative structure to the Technical staff
- Reducing the workflow levels from 7 to 4
- Reducing the process stages from over 14 to 4-6 stages
- Enabling Citizen Facilitation processes
- Removal of cyclical processes – where there is no value add
- Removing discretion and interpretation of rules

Best Practices adopted included the following

- Establishment of PMU for ensuring continuity when there is change in guard, Continuous documentation, evaluation of implementation process and SLA adherence by the tech-partner
- Technology adoption based on BPR recommendations
- Phased implementation – Permissions one after the other going live
- Adoption of optimized processes from other implementations
- Capacity building
- Feedback from architects while providing user interfaces and process re-design
- Replication across the state

SUSTAINABILITY:

Sustainability parameters to be considered to measure the responsiveness of this initiative are:

Institutional:

- Monitoring & Tracking:** Authorities can monitor pendency of files with the staff which made staff accountable for delays.
- Justice Delivery :**
 - RTI is made direct by publishing the permissions online.
 - Site verification is updated within 24 hours ensuring transparency.
 - All permissions are put in public domain.
- Document Management:** Significant decrease in maintenance of records and cost reduction in stationery and other items.
- Work Load Balance:** Workload on the staff decreased and enabled optimum utilization of staff thereby improving productivity.

Financial- The overall investments made into the IT solution is close to Rs. 3 crores over past 3 years. The earnings from DPMS of HMDA has improved and all the transactions got accounted for within 2 years

Social and Economic – Technology is a social equalizer and thru DPMS this was significantly achieved.

Cultural

- ▶ **Accountability:** Increased accountability among the staff on account of file monitoring system embedded in the software.
- ▶ **Confidence Building :** System has created confidence among the public that permissions are given in time hassle free
- ▶ **Transparency :** System has infused transparency and eliminated subjectivity while giving permissions in interpretation of rules and statutes.

Past experience Behind The Motivation :

There were several small ICT initiative taken and some of them were successful and some of them not so successful. The primary reason behind the failure of ICT initiatives being the consistent drive from the leadership. While the first step of this solution which signing of the agreement with the software supplier took place in 2014, the project did not take off for 2years until 2016. This is because of lack of leadership drive.

It is only after the change in leadership at HMDA in October 2015 that specific efforts were put to sustain the initiative. Until then citizens and staff were of the opinion that many such ICT initiatives have come and gone and this too will fade soon. It is under the able leadership of the current Metropolitan Commissioner whose primary motive is to make a hassle free service delivery available to all the citizens that the online development permission system was launched by Shri K.T.Rama Rao IT minister. Leadership plays an important role in driving and sustaining such huge change management oriented solutions.

Metropolitan Commissioner ensured that frequent interactions with the citizens, architects were conducted to understand the issues in the services delivered. To ensure that this initiative is not a passing phase and that which has come to stay, periodic reviews with the staff and the solution provider were held until the system stabilized. This not only brought a huge change in the service delivery mechanism of the organization but also improved the faith of the citizens on the organization and as a result number of applications improved significantly. As the system stabilized more and more services were launched.

This in turn had a positive impact and the revenues of the organization too improved as a result subsequently. Apart from this another key factor that contributed significantly is drive from the Digital India initiatives of the Central Government. This helped organization to work towards certain service delivery aspects in a focused manner.

HMDA as part of its vision to provide Good Governance to its citizens initiated various steps to harness the potential of ICT to provide integrated services to the citizens by deploying

appropriate tools of Information and Communication Technology (ICT) for citizen centric service delivery.

Suggestions That Evolve From The Implementation Experience:

1. Key ingredient for success of any such major change management initiatives is “Good Leadership”.
2. Leadership should ensure that such programs are continuously monitored and driven towards success.
3. Constant monitoring of the staff and the program to know the deviations is another key factor for success.
4. Continuous interaction with the key stakeholders like citizens and architects to know the pain points is a key point to be considered.
5. Periodic review with the service provider to ensure that the right priorities are set for development is also another key factor in the success of implementation.
6. Phase wise implementation of the applications is an important aspect of success of any new ICT initiative.

-ooOoo-

Compliance of the Technology adopted with e-Governance standards

- The site has been STQC certified by the Third party with industry standard SSL certification
- No details of the Credit and Debit Card is being stored/ captured at the portal to avoid breach in Financial credential of the Applicants.
- The Password is stored in encrypted form with a provision regenerating the password as Forgot password
- Audit Log is maintained as per standards
- Data Backup in incremental form on day-to-day basis and Full Backup weekly as per industry standards.

Strategy for Disaster

The primary DR site has been setup and the servers keep on synchronizing with each other at regular intervals.

Technology related Challenges

Immediate synchronization with DR site was a main challenge; hence to overcome the issue HMDA is planning to connect to the Govt. empanelled Cloud Service/ State Data Center.

VALUE INDICATORS

Digital Inclusion

- To assist the illiterate/uneducated people for the services has been extended through CFC/Help Desk in assisted mode.
- Awareness programmes apart from coverage of the services through local media
- FAQs have prepared and hosted on the Web Portal

Green e-Governance

With the incorporation of internet based uploading of the application and payments (Debit/Credit/Internet Banking) , no need to print receipt of various payments made to HMDA like Processing fee, Instalment fee etc., which saves printing a ton of papers.

- To promote Green e-Governance notices are put at every desk to shut down computer and turn off monitors.
- As per GOI disposal of ICT gadgets policy, the vendor who supplies new infrastructure takes the obsolete hardware and disposes as per policy.

Web Accessibility: Addressing major concerns and Government Initiatives

Rekha Grover & Dr. Santosh K. Pandey
 Ministry of Electronics and Information Technology
 Government of India
 CGO Complex, Lodhi Road, New Delhi- 110 003
 E Mail: rgrover@meity.gov.in , santosh.pandey@meity.gov.in
 Phone: 011- 24301328, 24301534

Abstract - The Constitution of India ensures justice, equality, liberty and fraternity, assures dignity of the individual and quality of status and opportunities to all its citizens including differently-abled persons. In the current era, electronic and Information and Communication Technology (ICT) products/services are used in all areas of life such as education, health, employment, entertainment, banking etc. Electronics & ICTs can mitigate the barriers faced by differently-abled persons as well as help them to participate independently in day-to-day life. Accordingly, it becomes necessary that Electronics & ICTs should be accessible to all including differently-abled persons because ICTs act as an enabler for providing equal opportunities to the differently-abled persons. Currently, web has become the most popular way to connect the entities and accordingly, differently-abled persons should also have an equal access to the websites. But contrary to this, it is found that most of the Indian websites are inaccessible. The article presents a generalized overview of the major problems faced by differently-abled persons in India. Afterwards, major issues related to inaccessibility of websites have been discussed along with their possible solutions. In addition, the key standards on accessibility and major initiatives taken by the Government and particularly, Ministry of Electronics and Information Technology (MeitY) have also been given and finally, Conclusion has been drawn along with Future Work.

Index Terms – Accessibility, Differently-abled persons, Government initiatives on accessibility.

I. INTRODUCTION

Persons with Disabilities (PwDs) are valuable human resources for the country and seek an environment that provides them equal opportunities, protection of their rights and full participation in society. In India, people with disabilities, who constitute almost 2.21% of the population as per Census Report of 2011, are still fighting to get equal access to healthcare, education, employment and inclusion in society [1]. This can be achieved by intervention of technology into their daily lives and rehabilitation. Despite the magnitude of the issue, awareness of both scientific information and ICT Tools on disability issues are lacking.

Differently-abled persons are suffering largely in India because of unsuitable accessibility tools, infrastructure and facilities, which render them helpless. There is a lack of awareness and information available in every area. The education, training and employment areas for PwDs have been developed in India in

major cities but a lot of guidance to many people and institutions is required to take this development to the next level to penetrate all sectors with help of technology. Some of the obstacles faced by disabled persons in our country are:

- Inaccessibility of websites;
- Inaccessibility of Government notifications/circulars,
- Unemployment and discrimination in the workplace,
- Poor education and access to training opportunities,
- Communication difficulties,
- Self-esteem problems, and
- Hardships of poverty.

Accordingly, it becomes necessary to overcome the abovementioned problems by knowing the root cause of each of them and offer the suitable solutions. At the same time, it is also found that many of these problems can be addressed by technology intervention and digital equalization. Due to inaccessibility at various steps, unavailability of suitable arrangements for accessing public facilities, PwDs don't enjoy law of equality given by the Constitution of India rather indirectly, they are denied this right.

II. MAJOR ACCESSIBILITY ISSUES

Accessibility refers to the design of products, devices, services, or environments for people with disabilities. The concept of accessible design ensures both "direct access" (i.e. unassisted) and "indirect access" meaning compatibility with a person's assistive technology (for example, computer screen readers) [2] [3]. Major issues related to accessibility of websites are given as follows:

- **Visual CAPTCHA:** CAPTCHA is a major bottleneck in accessing the websites by visually impaired persons. Many websites have CAPTCHA showing some alphabets and numbers to be filled by users, which is a major issue for visually-challenged persons.
- **Accessible Documents:** Another major issue in websites is scanned documents in image format, which are not readable by disabled. Hence, all the notifications/circulars available on the websites should be made accessible.
- **Keyboard Navigation:** Navigation is a big area, which is also a key issue for blinds. All the options of a website should have the facility of easy navigation through keyboard.
- **Caption for Videos:** In many cases, captions are not provided for videos, which is a major concern for differently-abled persons.
- **Text Description of Images:** It is found that for many

images placed on the websites, text descriptions are not given.

- **Text To Speech (TTS) in Regional Languages:** This is also a key issue for differently-abled persons as many of them require communication in regional languages.

III. POSSIBLE SOLUTIONS

To address all the aforementioned issues, major solutions are given as under:

- Visual CAPTCHA related issues may be solved with little efforts by adapting non-graphic solutions like asking some basic question (e.g. sum of 2 and 3) or Audio CAPTCHA or One Time Password (OTP) etc.
- To make all the notifications/circulars available on the websites accessible, Unicode Standard may be followed. For this purpose, in addition to Optical Character Recognition (OCR) based PDF, currently, EPUB (electronic publication) is the best solution, which provides all the facilities related to accessibility.
- All the options of a website should have the facility of easy navigation through keyboard in addition to mouse.
- For videos etc., caption may be provided wherever applicable to facilitate disabled persons.
- For all the images placed on the websites, text description must be there in order to facilitate blind persons.
- Text To Speech (TTS) in Regional Languages may also be used wherever required to bridge the language related gaps among differently-abled persons.

IV. RELATED STANDARDS

Web Content Accessibility Guidelines (WCAG 2.0) is the major standard for accessibility published by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium's (W3C), the main international standards organization for the World Wide Web [3]. It covers various recommendations for making Web content more accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. It has 12 guidelines that are organized under 4 principles (POUR): Perceivable, Operable, Understandable, and Robust. For each guideline, there are testable success criteria, which are at three levels: A, AA, and AAA. The details of these levels are as under:

- *Level A:* This indicates the basic level of accessibility that any web page must have.
- *Level AA:* This indicates an intermediate level of accessibility that any web page should have.
- *Level AAA:* This indicates the highest level of accessibility that any webpage can achieve.

In India, National Informatics Centre (NIC) has developed 'Guidelines for Indian Government Websites (GIGW)', which were formally released in February, 2009 and has been included

in the Central Secretariat Manual of Office Procedures (CSMOP) by Department of Administrative Reforms and Public Grievances (DARPG), Ministry of Personnel, Public Grievance and Pensions, Govt. of India [4]. The guidelines are based on the internationally accepted standards such as ISO and Content Accessibility Guidelines (WCAG) of the World Wide Web Consortium (W3C) as adapted in the Indian context. The objective of GIGW is to ensure that Indian Government websites conform to the UUU trilogy, i.e. User-centric, User-friendly and **Universally accessible**. GIGW has total 115 requirements and out of which 28 requirements pertain to accessibility.

V. INITIATIVES TAKEN BY THE GOVERNMENT

Major initiatives taken by the Government and particularly MeitY in this regard, are given as follows:

(i) MeitY has notified the National Policy on Universal Electronic Accessibility in October, 2013, which recognizes the need to eliminate discrimination on the basis of disabilities and to facilitate equal access to electronics and ICTs [5]. This policy is notified in order to facilitate equal and unhindered access to electronics and ICTs products and services by differently-abled persons (both physically and mentally challenged) and to facilitate local language support for the same. This shall be achieved through universal access to electronics and ICT products and services to synchronize with barrier free environment.

(ii) MeitY is supporting a project titled 'Development of Content Management Framework (CMF) for Government Websites' implemented by NIC, in which, 100 Central Ministries/Departments Websites are to be made accessible as per GIGW. This project is fully funded by MeitY and it does not have cost implications on the Ministries/Departments. As on date, 78 out of 87 websites of the Central Ministries and Departments are GIGW compliant.

(iii) Regarding accessibility audit of websites, MeitY has been supporting a project titled 'Website Quality Evaluation' of 2000 Government websites as per GIGW, which is executed by Standardization Testing and Quality Certification (STQC) Directorate, an attached office under MeitY. Under this project, 144 websites have been certified by STQC so far as per GIGW.

(iv) To make the Government websites accessible, MeitY has issued an order in May 2015 regarding some accessibility guidelines viz. making Government notifications/circulars etc. accessible by putting them into ePub or OCR (Optical Character Recognition) based PDF and make procurements GIGW compliant to the Secretaries of all Central Ministries/Departments and IT Secretaries of all States/UTs.

(v) To sensitize the issue of accessibility, STQC, an attached office under MeitY has organized various training programmes of Web Information Managers (WIMs) of various Ministries/Departments and programmers/web developers of

various agencies empanelled by NICS & ERNET India for website accessibility related tasks.

(vi) Department of Persons with Disabilities (DEPWD), Ministry of Social Justice & Empowerment has also initiated a project for making 917 State Government websites accessible as per GIGW/WCAG 2.0 implemented by ERNET India under 'Accessible India Campaign'. Under this project, 100 accessible websites have been launched by Hon'ble Minister for Social Justice and Empowerment on January 19, 2018.

(vii) In addition, several other related initiatives of MeitY for differently-abled persons are also given as follows:

- MeitY has supported a project for Setting up of ICT Based Distance Education Facility for Special Educators, Parents and other Rehabilitation Professional from December 2009 to May 2013. Under this project, VSAT based network of 100 special schools to facilitate distance training to the special teachers, other rehabilitation professionals and parents of mentally retarded children was set-up. Three studios were set up to conduct live lecture to beam to 100 schools. 200 episodes of content on the different topic were created and were made available through a portal. Advance training to 800 Special Teachers and other rehabilitation professionals was given. 7500 Children with mental retardation was covered. Awareness and training was given to about 15000 Parents of the disabled children.

- MeitY has supported a project for setting up of ICT Vocational Centres in 101 Schools in the 26 States and 3 Union Territories of India from the year 2009 to 2013. In these vocational Centers, ICT infrastructure such as PC's, Server, Computer furniture, Printer, Scanner, UPS, LAN & Internet connectivity were provided along with specially designed assistive tools for different disabled sectors i.e. for Visually Impaired, Hearing Impaired, Physically Challenged, Mentally Retarded and Conscious Problem along with Internet connectivity. Instructors for teaching special children were also posted. The outcome of the project was that around 12,000 differently-abled students were benefited from this project. There was sharp increase in number of students who went for higher education from these schools. No. of differently-abled students going for professional education also increased significantly. Good numbers of teachers were trained. There was sharp increase in number of students who got job.

- Another major initiative of MeitY was to support a project titled 'Adaptable e-Learning Accessibility Model for the Disabled (e-Saadhya)'. Major achievement of this project was the development of a framework, namely 'e-Saadhya', which is an education framework for children with autism and mild mental retardation. e-Saadhya framework supports creation of education plans for individuals based on profile information of individuals and monitoring status of the individuals towards the education plans. The solution framework supports both teaching and learning for individual and associated stakeholder including educators, parents and therapists. National Institute for the

Mentally Handicapped (NIMH) has been associated with e-Saadhya project. Awareness Programmes through workshop etc. were conducted where above framework was demonstrated. The framework is deployed in 20 special schools in Bangalore, Hyderabad and Delhi and is found to be useful.

VI. CONCLUSION & FUTURE WORK

In the current ICT era, Government is also very keen to transform India through various ambitious ICT programmes viz. Digital India, which is a campaign launched by the Government of India to ensure that Government information and services are made available to citizens electronically by improved online infrastructure and by increasing Internet connectivity or by making the country digitally empowered in the field of technology. Accordingly, web accessibility has emerged as an evolving area for making all the information/ computing services delivered over the internet accessible. However, there are several issues and challenges with reference to accessibility, which require immediate attention from the related stakeholders. In this article, issues and challenges relating to web accessibility have been highlighted. Further, possible solutions to overcome these issues have also been suggested. In addition, related standards and the key initiatives taken by the Government have also been given in brief.

Future work may be to address these aforementioned issues and migrate inaccessible websites into accessible websites in order to make them fully accessible to all citizens including differently-abled people. Afterwards, these websites may be certified by agencies in the light of related standards. In addition, the issue of accessibility requires sensitization up to a great extent so that any application/service to be developed in future must be accessible to all. For this purpose, academia should also come forward and include web accessibility as a Core or Elective Course in various academic programmes. If this is done in letter and spirit, really, it will be a great work for differently-abled persons to bring them into main stream resulting inclusive growth of our country.

References

- [1] http://punarbhava.in/index.php?option=com_content&view=article&id=1463&Itemid=758
- [2] Henry, Shawn Lawton; Abou-Zahra, Shadi; Brewer, Judy (2014). "The Role of Accessibility in a Universal Web". Proceeding W4A '14: Proceedings of the 11th Web for All Conference, Retrieved 2014-12-17.
- [3] <http://www.w3.org/TR/WCAG20/>
- [4] <http://web.guidelines.gov.in/#&panel1-3>
- [5] www.meity.gov.in

Disclaimer

The views expressed in this article are the views of the authors in their personal capacities, which do not represent the views of the MeitY.

Piecing the 6Is towards Digital India with reference to National Platforms as Instrumentalities Sanjay Jaju, IAS, Director (A&F), NHIDCL NHIDCL, 3rd Floor, PTI Building, 4-Parliament Street, New Delhi – 110 001 Ph: 011-23461604, +91-9849132344 E-mail: jajus@gov.in

Abstract

Information Technology Revolution has surely transformed the standing of India in the comity of nations over the last two decades. Our progress is impressive as is visible in the latest government data that shows India has 391.50 million internet subscribers and has witnessed investments worth \$ 24 Billion in IT sector during last one and a half decades.

If IT has catapulted India to glory in the past, we can be confident that the story can be repeated in the future provided we strategize and implement the plan professionally. Government's recent pronouncement to create a Digital India is a well-intentioned step in that direction.

Ministry of Road Transport & Highways (MoRT&H) has taken various IT initiatives in developing national platforms for promoting Digital India wave in the Infrastructure industry. Having worked closely with the development of these initiatives, my attempt here is to structure a framework for identifying the various components which may guide the upcoming initiatives under Digital India.

Methodology

There is no dearth of literature and paradigms on what India needs to do to transform this vision into reality. I wish to propound my own framework, which I call as 6I framework to realize the Digital India dream over the next decade. As a practitioner and observer of our IT movement, this framework always provided me an easy approach to grasping the complex, insurmountable issues connected with it and to seek their solutions.

Let me start with the first 'I', the Digital **Infrastructure**. This entails sufficient availability of bandwidth for data movement until the last mile and an equally big virtual space for storing such data securely and strategically especially in a vast country like ours where regional disparities are significant. Opening up of the spectrum and its availability would mitigate this situation for the producer while 'Affordability' and 'Value for Money' should guide the consumer.

India's digital infrastructure has started coming to life as a result of a combination of policy and technological innovation. The next few years will be definitive for the evolution of India's digital infrastructure and the role it can play in the country's growth. As of now, India is ranked 91st among 139 countries on the Networked Readiness Index 2016, compiled by the World Economic Forum (WEF). Only 15 out of 100 households have access to the Internet, and mobile broadband remains for a privileged few, with only 5.5 subscriptions for every 100 people.

The second 'I' leads us to '**Instruments**', the Electronic Hardware eco-system. A very large requirement of hardware in our country is currently being met through imports. With increasing focus being given to the development of smart cities and IOT devices, it's essential that indigenous manufacturing capabilities get enhanced. The two main flagship programs of "Digital India" and "Make in India" would therefore have to move hand in hand. Focusing on a few stats, India's total Electronics Hardware Production in 2014-15 was estimated to be US\$ 32.46 billion This represents a share of about 1.5 percent in world electronic hardware production. The demand for electronics hardware in the country is projected to increase from USD 45 billion in 2009 to USD 400 billion by 2020.[2] This creates a unique opportunity for companies in the ESDM (Electronic System Design & Manufacturing) sector to look at India as their next destination to cater to the domestic Indian demand as well as act as an exports hub.

Indian economy to grow requires creation of new jobs for its young population and skill competency to survive in global market. Therefore, to defer imports and creating own capabilities, we require a large scale impact on manufacturing output in our country. To synergize Digital India & Make in India initiatives, focus should be directed for creating ecosystem to manufacture things using hardware and digital infrastructure and thereby increasing per head output by manifolds. It also warrants us to put a regulation system which would govern the growth of indigenous manufacturing units for supply of electronic hardware to domestic and international markets. This will not only boost the economy of the country but also render towards actualizing "Digital India" & "Make in India".

Instrumentalities occupy the third 'I'. This includes the e-Governance applications and the software that power the instruments. In order to advance the benefits, it would be essential to foster applications in areas of e-Business, e-Education and e-Medicine.

Aadhaar has emerged as one of the biggest identification systems in our country. The trinity of JAM (JanDhan accounts, Aadhaar and Mobiles) would have to be harnessed to ensure transfer of benefits directly into citizen accounts. It would also be essential to develop 'over the top applications' to magnify the gains accruing from this change. India is adding almost 110 million Smartphone users every year, and is on the verge of launching Aadhaar-compliant devices with biometric authentication built into phones and tablets. The power of the JAM trinity will come into full force when transactions are enabled using Aadhaar and biometric authentication, creating a system that is not only cashless but card-less [3].

Fostering the use of Artificial Intelligence & Block chain technology would have to be pivotal for the progress.

Besides governing transactions and direct benefits to public for efficient implementation of existing policies, e-governance applications have been developed which would provide data points/records for generations to come. Some of such applications developed recently by MoRTH & NHIDCL together for monitoring, procurement and providing platform to stakeholders for information on materials/equipment, have become operational since 2015.

All stakeholders are generating their own content on these platforms, e.g. Consultants, Govt. Officials, public, Businesses of Infrastructure Industry etc.

- Hardships of poverty.

Accordingly, it becomes necessary to overcome the abovementioned problems by knowing the root cause of each of them and offer the suitable solutions. At the same time, it is also found that many of these problems can be addressed by technology intervention and digital equalization. Due to inaccessibility at various steps, unavailability of suitable arrangements for accessing public facilities, PwDs don't enjoy law of equality given by the Constitution of India rather indirectly, they are denied this right.

MAJOR ACCESSIBILITY ISSUES

Accessibility refers to the design of products, devices, services, or environments for people with disabilities. The concept of accessible design ensures both "direct access" (i.e. unassisted) and "indirect access" meaning compatibility with a person's assistive technology (for example, computer screen readers) [2] [3]. Major issues related to accessibility of websites are given as follows:

- **Visual CAPTCHA:** CAPTCHA is a major bottleneck in accessing the websites by visually impaired persons. Many websites have CAPTCHA showing some alphabets and numbers to be filled by users, which is a major issue for visually-challenged persons.
- **Accessible Documents:** Another major issue in websites is scanned documents in image format, which are not readable by disabled. Hence, all the notifications/circulars available on the websites should be made accessible.
- **Keyboard Navigation:** Navigation is a big area, which is also a key issue for blinds. All the options of a website should have the facility of easy navigation through keyboard.
- **Caption for Videos:** In many cases, captions are not provided for videos, which is a major concern for differently-abled persons.
- **Text Description of Images:** It is found that for many images placed on the websites, text descriptions are not given.

These national platforms can be considered as major Instrumentalities and are summarized hereunder:

e-PACE

MORTH has Large number of Capital works being done by Multiple Agencies with no single platform for accumulating and integrating data. Every Report entails fresh acquisition of data thereby tiring the giver and the recipient. There also does not exist a single Central Repository for projects related documentation – papers, photos, videos. Coupled with this was the inability to track projects throughout their life cycle leading to inaccurate measurement of Physical & Financial Progress. Because of this, no project related information was in public domain.

In order to address this, there was a need to have an Integrated Information System that addresses this problem and ensures effective and real time tracking of the Projects. e-PACE (Projects Appraisal & Continuing Enhancements) (www.e-PACE.nic.in) has been designed as one such online platform.

The platform envisages Data entry at the top level for the Project Basic Data & Target Setting covering the entire life cycle right from Project Identification, Pre-Project Activities & Construction Period. The Data pertaining to physical and financial execution details could be entered at the field level resulting in a single source of truth with validation checks.

e-PACE has provision to obtain Reports in multiple formats with graphical interface for round the clock monitoring. It has also been provided with GIS interface to enable easy geo-tracking of the projects. The application has a Data export engine for feeding into other applications. The architecture of the application is Scalable & Customizable.

e-PACE therefore as a platform, is amenable to be used for monitoring projects pertaining to any ministry or state in the Country and can improve governance of such projects.

INFRACON

Ministry of Road Transport & Highways, Government of India embarks on the development and upgradation of Highways & other Infrastructure Projects. For this purpose, it procures and uses the services of Consultancy firms and other domain experts in various fields related to Highways and Engineering called Key Personnel. The key personnel are deployed both for project preparation and supervision.

In order to make the evaluation process during procurement more objective, user friendly and transparent, "INFRACON" In order to make the evaluation process during procurement more objective, user friendly and transparent, "INFRACON" (www.infracon.nic.in) has been developed as a comprehensive National Platform for Infrastructure Consultancy firms & Key Personnel. The platform has the facility to host Firms & Personnel CVs and Credentials online and has linkage to Aadhaar & Digi-locker for data validation & purity.

The Portal also enables the agencies within MORTH facility to receive technical proposals through INFRACON. In order to do so, firms & key personnel are required to register on the portal online. This has led to significant reduction in paper work during bid submission and also brought in Transparency &

Accountability in the award process. The information being captured on the portal and the input forms are so designed that it aids in automating the evaluation process and is leading to quick and effective decision-making.

INFRACON as a Common Platform for both the Service Providers and Clients has also opened a window of opportunity for professionals engaged in the Infrastructure domain to showcase their experiences and contribute to Nation Building.

INAMPRO

“INAM-PRO” has been developed as a Platform for Infrastructure and Materials Providers and is a web-based application (www.inampro.nic.in) for **Infrastructure and Materials Providers**. It acts as a common platform for Infrastructure material providers viz. Cement Companies, Infrastructure providers, Ministry of Road Transport and Highways and other stakeholders.

All Stakeholders of Infrastructure Industry are beneficiary of this portal as it serves their A-Z needs at each level. The platform provides market access to Sellers of any Infrastructure related materials starting from basic materials like Cement, Steel etc. to innovative materials for Soil Stabilization etc. The Platform with its other Principal Category such as Infrastructure Equipment and Intelligent Transport Systems covers the mechanical, electrical and electronics requirements of the Infrastructure Industry which helps the projects from planning to execution stage. The platform also allows Sellers to list their old equipments for resale and lease thereby promoting the optimal use of existing resources. The platform with its dedicated category to Safety and Protection, aims to provide access to all kinds of safety materials, equipments and techniques in order to promote safe practices among the Contractors. In addition the Service providers can also register themselves on the portal and list their services to get leads for their business.

In addition, any individual/company/society can also buy material or equipment using INAMPRO portal. The Visitors like Consultants, Researchers etc take benefits from the portal by using information in planning, cost estimations, capacity enhancement by use of latest technology etc.

Therefore, all kinds of agencies involved with development of Infrastructure can make great use of INAM-Pro which shall result into cost savings in public projects and thus benefitting the general Tax Payer.

In future, this would also be needed to develop National level ITS platforms for our country.

INTELLIGENT TRANSPORT SYSTEMS (ITS) PLATFORMS

The use of advanced technologies including information and communication technologies (ICT) or telematics, data collection and storage, navigation systems and others fall under the aegis of intelligent transport systems (ITS). The main aim of using such technologies in road, traffic and transport sector is to alleviate existing concerns including traffic congestion, air and noise

pollution by enhancing data collection for addressing the transport-related concerns.

Use of such technologies can be either at a vehicular or infrastructural level. Some broad categories of ITS technologies are as follows-

Automated Speed Enforcement

Incident Management

Electronic Toll Collection

Traveler Information

Vehicle Control Technologies

Intelligent Transport Systems are helping the authorities and citizens on various grounds. These systems are recording & processing real time data using combination of Instruments & Instrumentalities and helping the stakeholders as following:

User/Passenger/Driver Safety & Experience e.g. road safety, alerts & information, traffic congestion etc. It helps the commuters by displaying necessary information to make them aware about possible hazards, status of ongoing works, guiding the commuters to deal traffic congestions thereby increasing road safety levels and reducing commuters travel time.

Road and related Asset Operations & Maintenance for increased productivity, efficiency & environmental sustainability e.g. Road Maintenance, Highway Lighting & Digital Signboard upkeep, Air Quality etc.

Increased Revenue Streams from Road and surrounding ecosystem e.g. Toll collection, Connectivity hotspots, surrounding real estate for retail, eatery & leisure etc.

Unless the **Involvement** of citizen is ensured, the gains from Digital India would remain limited. With exponential increase in mobile phones' ownerships across the country due to introduction of local language transliteration tools, citizens are spending time on these devices for social networking, research, information etc. The use of social media has also changed the paradigm of Digital literacy in our country. Large numbers of people coming from various backgrounds have now become digitally aware. The impact of these changes would in due course be felt by our democratic system and by implication on our electoral process.

While the argument for bringing more people in emerging countries like ours online hangs on the balance, there is an equally compelling economic one. Research has shown that each additional 10 percentage points of internet penetration adds 1.2 percentage points to per capita GDP growth in emerging markets, and each additional 10 percentage points of broadband penetration adds 1.38 percentage points of per capita GDP growth [5]. Separate research by The Boston Consulting Group shows that people in emerging countries are more frequent and active users of online government services than those in developed countries and they are particularly heavy users of services with a significant impact on life and livelihood, such as those related to healthcare and education. Emerging market consumers are embracing the web as much more than a purveyor of convenience; they are using it to improve their well-being, intellect and earning ability.

Though a lot of government services have been automated using digital applications, the silo culture in e-governance should be targeted. So, many applications and their independent structure (User Interface) may create confusions in citizens' mind as there is a large number of Govt. services in India for different sectors. Therefore, initiatives of Digital India should be enhanced and integrated further with other applications so that not only data authenticity can be increased but also the citizens get involved with government service delivery mechanism with ease and comfort.

The experiences from the past good practices reveal that though champions may drive the IT initiatives, it's the **Institutions** that sustain and take such practices forward. It is also important that a Bottom-Up approach is evolved while developing such projects. District e-Governance societies headed by District Collectors can act as a good pivot. It is also important that every Government department including the offices of Chief Ministers and Prime Minister has a CIO to drive the change. A standard operating procedure, which simplifies and codifies such actions would help matters.

The digital applications put into practice in national/state/district domain are getting bigger in terms of databases. These databases require secure handling for sustainability but in due course, it is also required that information be provided automatically from one department to another. It will enrich the data with realistic trends and indicators for these institutions which require insights of various processes for their efficiency and adequacy. Institutions working on IT platforms should also take initiatives to replicate the use of their application in other relevant service providing departments so that same objective does not consume parallel efforts by agencies who may want to develop the same kind of database.

The last 'I' would surely have to be the **Investments**. There is a need to build revenue models that provide adequate gains to multiple stakeholders. There is also a need to ring-fence such investments from competing demands. Public Private Partnerships and cost effectiveness of such investments would also need to be woven into such investments.

The impact of digital services and the digital economy is such that they sometimes seem to be riding a wave of their own momentum. Multiple parties have invested trillions of dollars (and Euros and Pounds and Renminbi, among other currencies) in capital and operating expenditures and research and development to construct and maintain the infrastructure that supports the digital ecosystem that makes the digital economy possible across various parts of the globe. These parties include communications service providers, or CSPs (fixed line and wireless telecommunications companies, cable companies, and bandwidth providers), digital service and content providers (content, media and IT service companies), and hardware and software manufacturers (infrastructure equipment, device, software and component manufacturers).

Government has played a significant role in attracting investors as well as in creating a sustained ecosystem for development of

digital infrastructure in the country. The policy being implemented by Govt. in this sector paved way for such penetration of ICT in our country.

Three of the most prominent roles are as policy-makers, regulators and the owners and dispensers of spectrum for mobile networks. Non-governmental organizations (NGOs), industry associations, standards bodies, multi stakeholder associations such as the World Wide Web Consortium (W3C), the Internet Corporation for Assigned Names and Numbers (ICANN) and the International Telecommunication Union (ITU), a UN agency, are key players, too. Together, all of these participants are responsible for the fixed and mobile networks, exchange points, data centres, devices and network equipment, and platforms and protocols that make the internet work.

Importance

Breakthrough in ICTs has challenged the scales in which activities were being performed by individual/ businesses/ government. Age old concerns in service delivery by Government were never expected to see a revolution like this in such a short span of years. It is also reflected in the growth we achieved in the last decade which called for e-Governance phenomenon to be adopted nationally.

e-Governance is redeveloping Indian public administration purely because of the fact that its objectives are to enhance the quality of government services to citizens, speed up communications through the use of technology, reduce government expenditure, bring in more transparency, reduce corruption and subjectivity, reduce costs for citizens and make government more accessible and accountable. It is an imperative for economic progress in today's world.

There has also been an increased efficiency in the functioning of the government services because of computerization of services like ration cards, income certificates, building licenses, Passport/VISA, Pensions, Road Transport, Property Registration, Railway services, land records, and income tax payments etc. which has made life convenient, efficient and transparent for the citizens.

Therefore, in the largest democracy of the world, the growth of economy and achievement in life expectancy and ease of doing business is being fueled by digitization. It happened as a revolution for existing problems but time has come to define its future course which can be achieved. In this direction, identifying the growth factors for creating a framework is important while designing new applications.

Real time connectivity also plays a major role in boosting the e-governance framework. It brings public services to citizens on their schedule and their venue. Waiting in queues for paper submissions in Govt. institutions will gradually become obsolete.

This also improves the accessibility of government information to citizens allowing it become an important resource in the making the decisions that affect daily life and so it helps in empowerment of citizens.

Many a times it was found that Applications and e-gov portals only had static information to be accessed by the public. The present framework ensures interactional data and features on web portals, applications and softwares being developed for the Govt. sectors.

Red Flags

Even though the confidence in the security offered by government web sites is high, the public is still concerned over security of data, fear of spam from providing email addresses, and government retention of transaction or interaction history[5]. There has been growing concern about the privacy of data being collected as part of Aadhaar project. The security of cyber space and misuse of data is still holding back the citizens which can deter the delivery of government services.

Key Learning

Digital India should not be understood only as policy or umbrella term for e-Governance. It's a phenomenon where govt. is pushing innovation promoting ecosystems under this flagship program. Its impact is universal and being felt across the industries and different stakeholders communities.

The world of Internet and now the mobile apps is full of platforms, which through the network effect allow diverse stakeholders to aggregate and avail meaningful services. With the advent of cloud-based services, such platforms have now started to be offered as a service. It's also therefore imperative that governments play a role in developing such platforms, which can help in addressing information asymmetries and bridge the demand supply gaps and thereby help meet myriad governance challenges.

Aadhar (UIDAI) is one such National level Platform that has

changed the paradigm and grammar of service delivery in our country. Such platforms have the potential to bridge the digital divide and also help in integrating a vast country like India and bind it together through a common thread. GSTN is another recent example.

National platforms developed by MoRTH exemplifies Instrumentalities of 6I framework and are quiet promising in terms of the gaps they filled to achieve a data driven approach which would help decision makers and regular users to innovate further in years to come. For billions of people already, and for billions more to come, life without digital interaction and the services it enables is all but unthinkable.

References

1. World Economic Forum Report (http://reports.weforum.org/delivering-digital-infrastructure/emerging-markets-big-challenges-big-opportunities/?doing_wp_cron=1517482606.9849679470062255859375)
2. Indian electronics market expected to reach \$400 billion by 2020: ASSOCHAM India study Monday, June 12,2017 (<http:// ASSOCHAM.org/newsdetail.php?id=6327>)
3. All you wanted to know about: JAM Trinity (<http://www.thehindubusinessline.com/opinion/columns/all-you-wanted-to-know-about-jamtrinity/article6952071.ece>)
4. E-governance in India: Concept, Initiatives and Issues (<http://www.insightsonindia.com/2014/11/23/e-governance-india-concept-initiatives-issues/>)

e-Governance Best Practices-Study of Trend Setting Government Initiatives

Ajay Singh Chahal, Sandeep Kumar, Sanjay Kumar, Shailender Kaushal

State Informatics Officer, Technical Director, Technical Director, Technical Director
National Informatics Centre, Himachal Pradesh, HP Secretariat, Shimla-171002 (HP)
ajay.chahal@nic.in, sandeep.kr@nic.in, sanjay.kmr@nic.in, kaushal.shailender@nic.in
94182-75076, 98165-32448, 94187-00688, 94184-57724

Abstract- In the last decade both Central and State Governments have undertaken a large number of initiatives to leverage the benefits of Information and Communication Technology. All these initiatives aimed at improving the internal functions of Government Departments, ensuring smooth and better administration of its operations, speedy delivery of Government Services to the stakeholders, reduced cost of operations and improved decision making/ timely interventions based on analytics drawn from these ICT Systems. However majority of these initiatives worked in silos and failed in presenting a coherent single unified view of the Government to stakeholders. To leverage full potential of ICT Government of India launched an important and ambitious project namely “Digital India Programme”. Digital India programme envisions transforming lives of Indian populace and making India a thriving economy and a knowledge society. This paper is an attempt to showcase best practices adopted by the Government by highlighting successfully implemented/adopted technology solutions/architectures as models for success of Digital India Initiative as well as making a paradigm shift towards one government model.

Keywords- e-Governance, Best Practices, one government, citizen service, Digital India, Analytics, PRAGATI, Smart City, Video Conferencing, Network, Enterprise Architecture

I. INTRODUCTION

As per UN Survey countries world over are shifting focus from silo based e-Governance Model to a coherent, integrated one Government model. The purpose of adopting the Whole-of-Government Approach is to provide integrated and joined up services that cut across not only the economic, social and environmental dimensions but also between various sectors, sub-sectors and activities. Government of India has introduced the Digital India programme with the vision to transform India into a digitally empowered society and knowledge economy having Digital infrastructure, on demand government services and digital empowerment as key thrust areas.

The unified one-government model aims at interconnecting ministries and departments/agencies by leveraging the potential of ICT to build a single government access point service delivery channel/platform, where citizens can access majority of services online, regardless of which government authority provides such services. It also aims to explore/exploit all possible service delivery channels (e.g. web, mobile, social media, kiosks) for providing government services in order to develop a sustainable Government.

Digital Transformation is a demanding process that requires time, effort, a strong will to improve, and skilled people with transformation experience. To achieve the objective of one-Government one of the ways forward is to frame policies, adopt Enterprise Architecture Framework, ensuring inter-operability by framing and enforcing e-Gov Standards, using open Application Programming Interfaces (API's) and a cloud first approach.

Another way forward is by realising full potential of mobile technology and vast reach of mobile network. In this day and age, connecting is empowering, and without basic infrastructure financed by telecom operators, today's tech giants from Apple and Google to Uber and Facebook would not have achieved half the success that they enjoy.

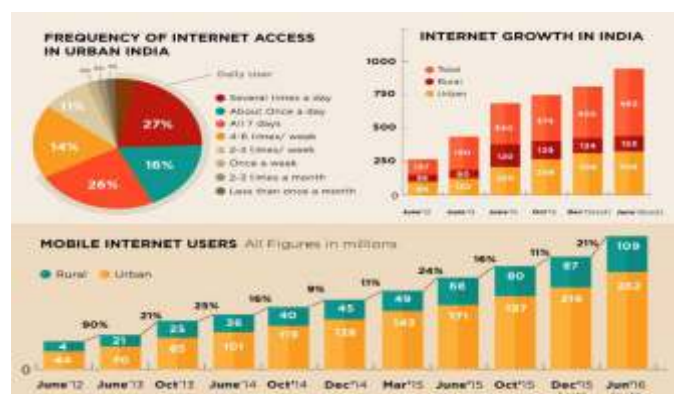


Figure-1: Mobile Internet access, growth and users

India is witnessing a very high growth of smart mobile phones all over the country and with cheaper data packs; the citizens are in a position to access Government services provided these are worth the value. The figure-1 shows the convergence of Internet Traffic through mobile and desktop during previous years.

These trends show that the mobile usage is increasing manifold. Improvements in mobile broadband will help create conditions where mHealth, m-learning, MFS (mobile financial services) could thrive

II. CASE STUDIES OF BEST PRACTICES

India Enterprise Architecture Framework - IndEA: As per 2016 data the e-Government Development Index (EGDI) of India is 0.463 which is way below the global average. In order to

¹“Internet in India 2015” by the Internet and Mobile Association of India (IMAI) and IMRB International

harness the full potential of ICT and improve EGDI, Meity, GOI decided to architect the big vision of Digital India and adopt an Enterprise Architecture Framework, tailor-made for the Indian

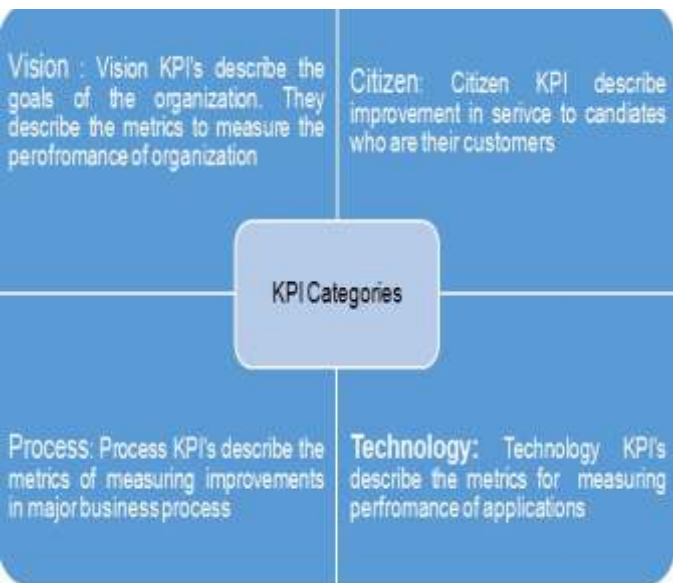
conditions, which can fulfil the aspirations of this large and diverse country. It was envisioned that such an Enterprise Architecture should be able to address the needs of both large national initiatives as well as the varied needs of the States. Working Group on National Enterprise Architecture by Ministry of IT, GOI has come up with a framework, aptly named as IndEA for India Enterprise Architecture. The vision of IndEA is to enable ONE Government – a Government that is least visible but is most effective, a Government that is not fragmented by narrow domestic walls but presents a single interface to the constituents, a Government that is citizen-centric, efficient, transparent and responsive.

The IndEA is a generic framework comprising of a set of 8 reference Models, derived from TOGAF® 9.1 and drawing from other models like the FEA. The reference models defined by INDEA are explained in brief below:

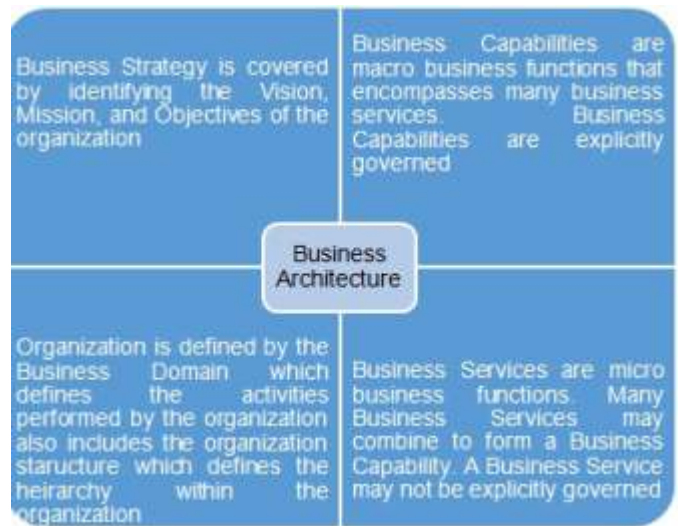
Performance Reference Model (PRM): Performance architecture provides mechanism to measure effectiveness and efficiency of the organization. Performance of the organization is measured using the Key Performance Indicators which are quantifiable measures of performance across four categories. The KPI are classified in to two types

Outcome: The measure of impact produced by an initiative like establishment of Enterprise Architecture

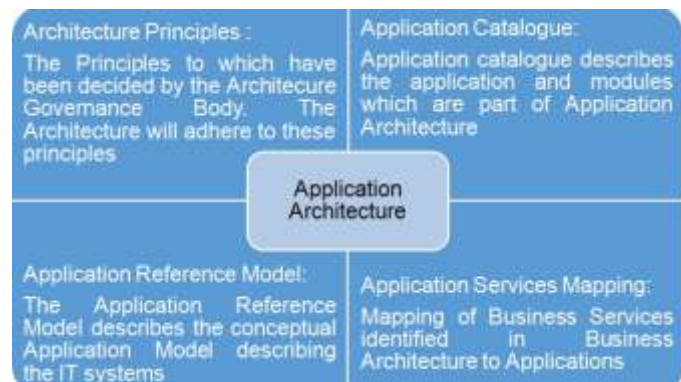
Output: Measure of service provided by organization over a period of time for e.g. Examination Management



Business Reference Model (BRM): Business Architecture defines business strategy, organization and business capabilities and services. The key entity in BRM is Service, A successful implementation of BRM requires defining or redefining the Enterprise Vision and Goals, Business Process re-engineering, building service portfolio and identification of services that are common across the Government/departments. In short BRM is about Why,WHAT, HOW MUCH,HOW FAST and WHO.



Application Reference Model (ARM): Application Architecture describes the To Be information Systems which would support the Business and Data Architecture. Application Architecture takes in to consideration the Business Requirements captured in Business Architecture and Information that needs to be processed and stored as described in the Data Architecture.



Data Reference Model (DRM): The data architecture describes the information that will be generated and processed by the applications. The data architecture describes the relationship between the information

Technology Reference Model (TRM): Technology Reference Model (TRM) defines the technology foundation of ICT-based systems to be designed. It lists all the components of the technology system.

Integration Reference Model (IRM): Enterprise Architecture enables organisations to collaborate and work together in order to provide public services in an integrated seamless manner. Integration architecture covers all the viewpoints (performance, business, data, application, technology, security).

Security Reference Model (SRM): Security Architecture prepares the organization to respond to potential threats and take preventive actions. Security architecture defines what assets need to be protected. The software assets that need to be protected are decided based on the business requirements defined in the Business Architecture and Stakeholders.



III. PRAGATI (Pro-Active Governance and Timely Implementation)

Governance Reference Model (GRM): The governance architecture would help in establishing an institutional structure for the development, management and implementation of Enterprise Architecture. Governance architecture would ensure compliance to Enterprise Architecture, meet vision and mission of the Government.

Any Government enterprise be it Ministries, States, Local Bodies or PSUs – can further extend these 8 Reference Models to create domain-specific architectures and implementation models.

Aadhaar: The project is run by the Unique Identification Authority of India (UIDAI) and was introduced in January 2009. The general idea of the program is to issue every citizen with a unique number to help identify them and provide them the benefit of schemes announced by the government. This unique identity involved the issuance of a 12 digit Aadhaar number and an Aadhaar card. The purpose of the Aadhaar was to make it simpler for people to avail government subsidies and have one number that would work as proof of address and proof of identity.

Presently, the Aadhaar number is not something that can be applied for online. Citizens can only go online to book an appointment at an Aadhaar centre. The applicant will have to go there with the appropriate document and also be asked to submit biometric data in the form of fingerprints and records of the iris.. The Unique Identification Authority of India (UIDAI) has launched Challenge drive to enroll leftover population for Aadhaar, in 22 States/UTs where Aadhaar saturation of adult population has crossed 100 per cent (as per projected population figure of 2015). The trend figures as of now are given below.

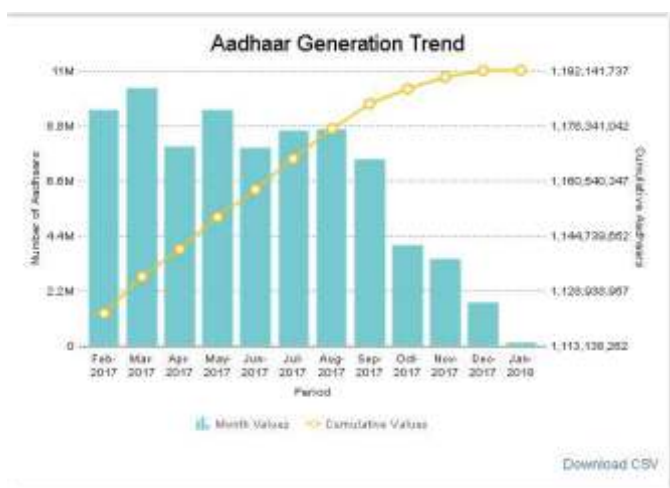


Figure-2: Aadhaar Generation trend for last 12 months.

PRAGATI is a unique integrating and interactive platform started on March 2015 with the objective to address common man's grievances, and simultaneously monitoring and reviewing important programmes and projects of national interest initiated by Government of India or State Governments.

The PRAGATI platform uniquely bundles three latest technologies: Digital data management, video-conferencing and geo-spatial technology. It also offers a unique combination in the direction of cooperative federalism since it brings on one stage the Secretaries of Government of India and the Chief Secretaries of the States. With this, the Prime Minister is able to discuss the issues with the concerned Central and State officials with full information and latest visuals of the ground level situation making it an innovative project in e-governance and good governance. The directions issued remains in the system for further follow up and review till the finality of the matter. PRAGATI is a three-tier system (PMO, Union Government Secretaries, and Chief Secretaries of the States). The Prime Minister will hold a monthly programme where he interacts with the Government of India Secretaries, and Chief Secretaries through Video-conferencing enabled by data and geo-informatics visuals.

Issues to be flagged before the PM are picked up from the available database regarding Public Grievances, on-going Programmes and pending Projects. It also takes into consideration various correspondences to PM's office by the common people or from high dignitaries of States and/or developers of public projects.

The system has been designed in-house by the PMO team with the help of National Informatics Center (NIC). As the name suggests, it is aimed at starting a culture of Pro-Active Governance and Timely Implementation. It is also a robust system for bringing e-transparency and e-accountability with real-time presence and exchange among the key stakeholders.

Government Cloud: In order to utilise and harness the benefits of Cloud Computing, Government of India has embarked upon an ambitious initiative - "GI Cloud" named 'MeghRaj'. The focus of this initiative is to accelerate delivery of e-services in the country while optimizing ICT spending of the Government. This will ensure optimum utilization of the infrastructure and speed up the development and deployment of eGov applications. The architectural vision of GI Cloud encompasses a set of discrete cloud computing environments spread across multiple locations, built on existing or new (augmented) infrastructure, following a set of common protocols, guidelines and standards issued by the Government of India.

The National Informatics Centre (NIC) is providing National

² https://uidai.gov.in/aadhaar_dashboard/

³ <https://economictimes.indiatimes.com/news/economy/policy/mandatory-use-of-pfms-to-help-monitor-fund-flow-to-schemes-finance-minister-arun-jaitley/articleshow/61278917.cms>
⁴ <http://www.nrega.nic.in/netnrega/home.aspx>

Cloud services under the initiative MeghRaj. The services offered are as follows:

Infrastructure as a Service (IaaS)

IaaS provides basic virtual compute infrastructure resources like CPU, Memory, Disk Storage attached to blank VMs allowing one to install OS using ISOs, from scratch and customization.

Platform as a Services (PaaS)

PaaS provides pre-installed web and database servers so that one can publish and run web application without worrying about server setup. The servers are pre configured ready with basic security hardening.

Software as a Services (SaaS)

This provides on demand software service. SaaS is a software delivery model where users are not responsible for supporting the application or any of the components. The server infrastructure, OS and software is being managed by cloud services

Storage as a Service (STaaS)

STaaS provides need based storage solution. It provides excellent alternative to the traditional on-site and dedicated storage systems and reduces the complexities of deploying and managing multiple storage tiers. One can use it to mitigate risks in disaster recovery, provide long-term retention for records and enhance both continuity and availability.

Public Finance Management System (PFMS): The Public Financial Management System (PFMS) is a web-based application for payment, accounting and reconciliation of Government transactions. It integrates various existing standalone financial systems. PFMS is a financial management platform for all plan schemes having a database of all recipient agencies and is integrated with banks handling plan funds and State Treasuries. It ensures efficient and effective tracking of fund flow to the lowest level of implementation for plan scheme of the Government. For the schemes sponsored by GoI, a sanction order followed by credit to the state through RBI is given by central ministries using PFMS. Earlier the process was dependent on the physical orders.

PFMS has the capability of providing real time information and tremendous potential to improve programme/financial management, reduce the float in the financial systems by enabling "just in time" releases and also the government borrowings with direct impact on interest cost. PFMS can track and monitor the flow of funds to the implementing agencies and its possible to know the actual status of utilisation of funds by the multiple implementing agencies of the central and state governments.

The PFMS provides various stakeholders with a reliable and meaningful management information system and an effective decision support system. The payment process in PFMS starts at Programme Division level. It moves further through Drawings & Disbursing Officer to Pay & Accounts Office for making payment directly to bank account of beneficiary.

Over 300 central and state government schemes are now riding

on PFMS and payment of more than Rs 2.91 lakh crore relating to various schemes under DBT has been made through PFMS since 2013. PFMS has enabled the Government in taking forward the DBT initiative with collateral benefits of plugging leakages and eliminating ghost beneficiaries. Payments to 34.19 crore beneficiaries have been made through PFMS and there are 21.72 lakh programme implementing agencies registered on PFMS.

MGNREGA: The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is the flagship programme aiming at enhancing livelihood security of rural households, by providing at least 100 days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work. One-third of the participation is by women. The MGNREGA provides wage employment, while focusing on strengthening natural resource management through works that address causes of chronic poverty like drought, deforestation and soil erosion. This programme has been implemented in the rural areas of all districts.

This programme was subject to severe criticism with a huge financial outlay being misused by middlemen. The payment disbursement involved mass corruption and there was no accountability at officer level. But with the IT initiative and online MIS for all processes such as job card creation, muster rolls enrollment, work detail, reporting mechanism, fund allotment and approval has resulted in a great success. The wages are paid directly into the accounts of the workers using DBT all over the country, covering the rural areas. The current progress of the scheme is given below in Table-1, which speaks volumes about its wide coverage and reach:

Table-1: Status for the Financial Year 2016-17 (in Crore)

Total bank accounts	8.62
Total individual bank accounts	7.5
Total joint bank accounts	1.12
Amount disbursed to bank accounts	23016.36
Total post office accounts	2.60
Total individual post office accounts	2.35
Total joint post office accounts	0.25
Amount disbursed to post office accounts	3168.45
Total households applied for job card	12.44
Total job cards issued	12.11

Mid Day Meal-Automated Reporting and Management System (MDM-ARMS): With a view to enhancing enrolment, retention and attendance and simultaneously improving nutritional levels among children, the National Programme of Nutritional Support to Primary Education (NP-NSPE) was launched as a Centrally Sponsored Scheme on 15th August 1995. The scheme underwent many changes over the years and is now known as "National Programme of Mid Day Meal in Schools". Over 10 crore eligible school children in almost 11 lakh schools

benefit from the Scheme. In order to efficiently manage the enrolment and meals being served in the Schools of various States, the MDM-ARMS software has been developed as a product so that any State Education Department can use it. The challenge here was the mode of data collection on daily basis either using SMS, IVRS, USSD or web-enabled software. These schools are mostly in areas which do not have good connectivity and majority schools don't even telephone facility. However, the teachers serving in these schools do have mobile phones but then Internet is missing at these locations. So either SMS or IVRS are the chosen modes for data collection. However, the IVRS facility costs at least one Re per call and the SMS rates vary across different mobile service providers (because teachers have mobile connections from all ISPs) as per plan opted by the subscriber, ranging from nil paise to almost Rs.3 per SMS. It would also mean extensive account keeping and re-imburement of expenditure to each and every teacher of these schools.

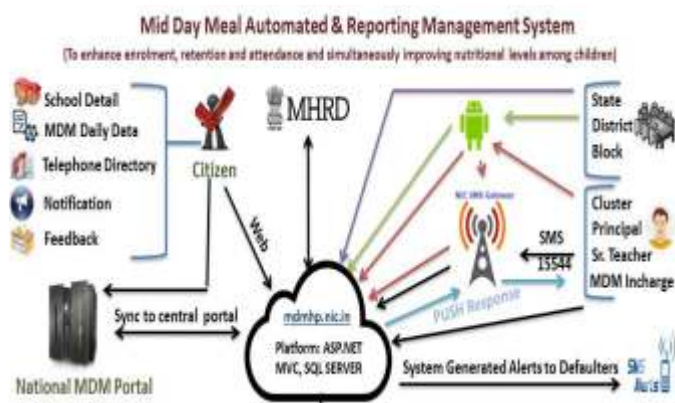


Figure-4: MDM ARMS data flow diagram.

To keep costs down and accounting simple, the MHRD, GoI got a toll free number issued from TRAI for collection of this daily meals data. A web-based solution has been developed for registering schools, teachers, their mobile numbers and to generate auto-alerts and MIS Reports. However, data for this web-based system is collected from simple mobile phones using SMS. The system is being used by many States and increasing monthly transactions data is shown below in Table-2:

Table-2: Month-wise SMS based Transactions⁵

Month, 2016	Total Transactions
March	41
April	1529
May	4961
June	5939
July	2455
August	2646156
September	3444942

⁵ MDM-ARMS portal at <http://mdmhp.nic.in>

IV. KEY FINDINGS / RECOMMENDATIONS

e-Government transformation from the silo-based model to the inter connected one government model requires the following:

- Government Ministries, departments or agencies must define a Long-term e-Government vision
- Policies and a strategic framework on the lines of India Enterprise Architecture Framework need to be framed/derived in order to deliver sustainable citizen-centric and citizen-driven services. Impact of IndEA has resulted in creation of NIC Enterprise Architecture, Public Service Commission Enterprise Framework (PSCEAF) and University Enterprise Architecture.
- There must be a better and holistic collaboration between various Government entities. All the departments needs to streamline their processes and various services should be standardised enabling ICT systems across government Ministries, Departments or Agencies to talk to each other.
- Ministries/Departments should leverage the advances in technology in order to strengthen the underlying technical infrastructure for ICT systems, with a focus on integrated service delivery gateways so as to facilitate online delivery of government services. The underlying architectures framed/adopted for various ICT systems should promote interoperability and seamlessly sharing of data across various ministries/departments.
- PRAGATI model should be replicated in states enabling Chief Ministers to monitor projects/administrative aspects with District Administration and other authorities.
- Technology per se is not the crucial factor, but connectivity is a cause of concern. Without good and reliable connectivity, no service delivery is possible. Private participation in providing connectivity is advisable. There should be optimal use of the infrastructure created earlier like NICNET, NKN, SWAN, SDC, NSDG and wherever possible this infrastructure must be expanded to panchayat level for acting as backbone for last mile connectivity.
- The Government of India needs to go in for extensive capacity building through public and private channels. The aim should be have atleast one digitally literate person per family.
- The Government must carry out process reforms and, if required, make necessary changes in the existing acts, rules, manuals to simplify the already established systems.

V. CONCLUSION

The digital transformation of the country and the vision of one government can take place with mandatory adherence to architecture principles laid down in India Enterprise Architecture Framework and a robust last mile connectivity framework for all stakeholders, including the citizens living in remotest locations of the country. There is a need to explore and

exploit all possible delivery channels be it web, mobile devices, social media, kiosks or service help desks. Adherence to e-Gov standards released by Meity, GOI will ensure and promote interoperability and seamlessly sharing of data across various ministries/departments enabling the government to deliver various services from a common point. Affordable smart phones with cheaper 4G plans from ISPs, will ensure that the online Government services are availed by the citizens, who are becoming tech-savvy. The connectivity options for Government set-up will improve as services will be offered from Central servers, automatically in most cases, being the result of process reforms. The case studies discussed in the paper clearly highlight the vast coverage area of the country in the case of Aadhaar, MGNREGS. These solutions have been successful in achieving the vision envisioned and have been devised as per ground situation of connectivity in different locations. The usage of different technologies for data collection and providing the web-enabled information systems in MDM-ARMS is another case-study focusing on specific problem based solution on a large scale. The future of digital India looks bright in this scenario with more large scale integrated applications being developed and rolled out.

REFERENCES

- [1] Wikipedia https://en.wikipedia.org/wiki/Last_mile
- [2] <http://egovstandards.gov.in/sites/default/files/India%20Enterprise%20Architecture%20Framework%20Ver.%201.1.pdf>
- [3] <https://www.pwc.in/assets/pdfs/publications/2013/smart-governance-and-technology.pdf>
- [4] <http://traf.gov.in/WriteReadData/PressRealease/Document/PR-TSDAug12.pdf>
- [5] <https://www.statista.com/statistics/467163/forecast-of-smartphone-users-in-india/>

INAMPRO - IT all adds up.

Sanjay Jaju, IAS, Director (A&F)
NHIDCL, 3rd Floor, PTI Building,
4-Parliament Street, New Delhi – 110 001
Ph: 011-23461604, +91-9849132344 E-mail: jajus@gov.in

Abstract

As electronic transmission and processing of Data ensures utmost veracity and expeditiousness, Information Technology has provided new opportunities in delivering governance.

Its recognition and acceptance by Governments in recent years shows its ever-growing size in different sectors. In Infrastructure industry, where our country is spending a huge portion of our budget, various initiatives have been taken to enhance efficiency and fast delivery of services. In highways sector alone, more than 7 lakh crores have been sanctioned for development [1]. Since these projects are executed on ground by Private Contractors at relevant market prices, Government policies were found to be lacking in facilitating Business-to-Business transactions specially in Infrastructure industry and with bulk purchases on the government side, the attempt for market price discovery and its stabilization for essentials resources like Materials, Equipment and Services lacked competitiveness and reflected non-uniformity in similar geological, political and market conditions. In order to organize the Infrastructure industry, one needed a real time information platform where resource location, its availability and prices can be obtained for fast decision making at Government and Contractors' end.

In this direction, INAM-Pro, a platform for Infrastructure and Materials suppliers have been developed by the Ministry of Road Transport and Highways. It is an Everything Store for procurement/listing of A-Z of materials/machineries, in a pronto fashion.

Keywords: e-Marketplace, Business-to-Business, Construction Materials and Equipment, e-Governance, Infrastructure.

Methodology

The methodology adopted to enhance transparency and efficiency in Infrastructure industry is based on following lines:

Baseline Study

Government's push in Infrastructure development had attracted a lot of Cement manufacturers amid downfall of real estate sector. But even after weak demand and excess production capacities, the Cement manufacturers were found to be involved in Cartelization and bid rigging by Competition Commission of India (CCI) at many instances which lead to penalizing such companies.[2]

¹ Hon'ble Minister (Road Transport & Highways, Shipping & Water Resources, River Development & Ganga Rejuvenation, GOI)

² About 10% of total domestic production.

These practices not only wasted time in Cement procurement but also pushed the industry towards oligopoly and as a result, signifying a need to regulate the Cement industry [3]. In such a market environment, Infrastructure industry which consumes about 13-15 % of total Cement annually in India [4] was deemed to be hit by this very material.

Ceiling Price Mechanism

When Hon'ble Minister of Road Transport and Highways, Shri. Nitin Gadkari acknowledged the impact; it was envisaged to book Cement prior to announcement of works so that uncertainty regarding prices can be eliminated to receive reasonable bids from Contractors for Infrastructure development works being undertaken by the Government agencies across the country. The idea later took shape of a web based platform for Infrastructure and Material providers. Ministry of Road Transport and Highways entered into contract with major Cement manufacturers in 2016 where manufacturers committed to provide 270 lakh Metric Ton of Cement of different grades as per Indian Roads Congress/ Ministry of Road Transport and Highways standards to contractors undertaking Public Works. [5].

The Sellers are mandated to honor this minimum promised quantity every year. They have the liberty to increase this quantity to any extent, any number of times. The Contract conditions were accepted by 36 Manufacturers who submitted Bank Guarantees of Rs. 10 Lakh each against their commitment. The Contract has been provisioned for increment of 10 % in prices every year. This year, only 11 out of 36 firms increased their prices.

This makes sure that a steady supply of cement to Infrastructure projects is available all the time and no artificial shortages get created.

The mechanism thus ensures that the knowledge of prices and quantities available in the market are known to not only the Cement Sellers but to the entire Infrastructure sector. This has resulted into absolute transparency in the knowledge of cement prices. Additionally, this also ensures that the new customers are not duped, as they remain aware of the prevalent industry rates that are openly available for comparison through this web based platform.

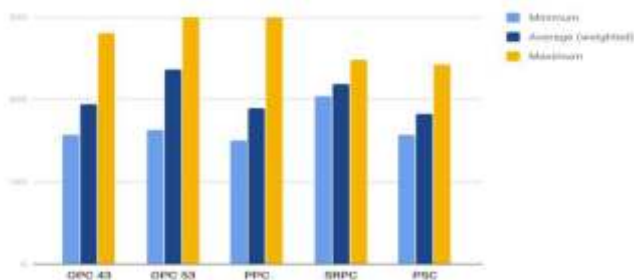


Figure 1:- Ceiling Prices during 2017-18 (w/o GST)

This price stability greatly reduces cost variation & uncertainty for one of the major construction materials, which in turn, affects the project bid estimates being submitted by Infrastructure developers in our country. With data points on real market prices and Ceiling prices made easily available through INAM-Pro, bidders can easily plan and schedule projects and ensure timely completion.

Govt. Process Re-Engineering

The cost put to the tenders by Govt. authorities is based on quantities of material, equipment and services multiplied by prices defined in Schedules of Rates (SORs) issued by State Public Works Departments and other departments. Even though being such an important factor in deciding the State Budgets, the prices in SORs are not updated annually because of tedious legwork in market surveys and lack of administrative capacity. In such scenario, a tool like INAM-Pro saves a lot of effort and time for the knowledge of correct prices.

A quick glance on comparison of prices of cement in some states is shown below:

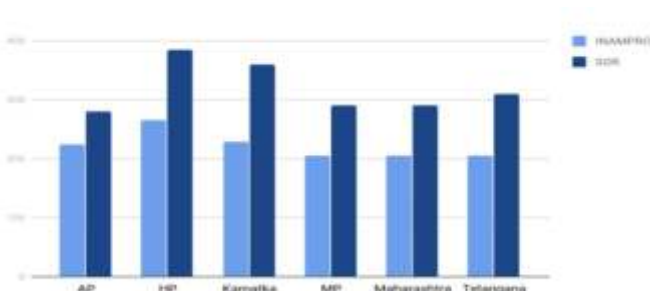


Figure 2: State wise comparison of prices in SOR vs INAM-Pro

Hence, this platform has huge potential to rectify the faulty SOR documents in any state of India thereby leading to lower Cost Estimates which would save considerable size of taxpayers' money. Therefore, it's not only Sellers who can conduct business with interested Buyers through this platform but the government agencies can also bring uniformity in their Schedule of Rates using information about the product and its prices, with minimal time based efforts. For example, Government of West Bengal has referred to Cement prices available on INAM-Pro in SOR for estimation [6].

Process Flow

The INAM-Pro web portal works on online data processing for product listings i.e. Material/Equipment/services. Manufacturers and Infrastructure developers can register their firms as “Sellers” and “Buyers” respectively for sending/receiving requests made online at the platform. Each registration receives a unique Username and Password on their registered Email ID for logging into the platform and conducting business. The listings are classified broadly as following:

- Construction Materials
- Haulage Vehicles
- Infrastructure Equipment
- Intelligent Transport System Equipment
- Road Furniture
- Road safety and Protection Works
- Services

These categories are again divided into main and subcategories for refining the selection by the User. This category choice is further guided by various filters like Location/ Price/ Condition/ Grade.

When the desired product is selected by the “Buyer”, he/she sends request for receiving price quotation along with transportation charges and discounts, if any. This online order request shows information on Quantity required, applicable GST, Proposed Delivery Schedule for bulk purchases to both parties.

This information is also delivered to Users at their registered Email ID and mobile number via SMS. Any party can contact directly the other one to understand the purchase request or negotiate about the prices, discuss the Delivery Schedule and Mode of Delivery/Pickup. Once finalized, Seller sends a “Quotation” to the Buyer through the platform features. The Buyers can receive as many quotes as he may like to arrive at their decision.

Once the quote is accepted and paid, the Seller makes delivery at the location marked by the buyer at the time of placing the Order. So, with few clicks, the decision is made using the platform.

User Charges

The platform does not charge any direct or indirect fee for registration, maintenance of accounts or for transactions conducted through its Payment Gateways.

Communication and Dissemination Strategy

In this Information age, communication has become multidimensional viz. Phone Call, email, SMS, Social Media etc. To cope with the diverse choices of Users of the platform, an in-house Information Center has been set up by the Support Team of INAM-Pro with Toll Free (1800 200 3399). The platform has dedicated social media handles on Facebook, Twitter and YouTube. Latest news and events are shared on all

these channels through posts and mails to Users. These channels help in updating the Users as well as for receiving grievances/suggestions from them, if any.

Besides the channels mentioned above, an in-built mechanism for receiving feedback is also there on the platform where one can raise ticket on any issue related to INAM-Pro platform. Currently a Blog page has also been initiated to deliver information regarding the platform, its features among communication channels.

For technical support to platform users, Social media handles, Video manuals, Toll Free and real time support by remote access for data entry have been adopted along with workshops to make stakeholders aware about the platform and its services. State PWDs have been requested for organizing workshops in State Capitals to disseminate information about the platform among Contractors, Vendors, Engineers and Authorities.

Features and Technologies

Payment Gateways

Free of charge online payment gateways have been integrated with portal to promote less cash economy. By providing facilities of NEFT, RTGS and Card payments, the portal aims to move major financial transactions in the material sales and purchases towards an online process. ICICI Bank's payment gateway has been successfully incorporated. Furthermore, 5 banks are in the process of integrating their payment gateways for providing the most convenient user experience. The exceptional feature of these payment gateways is conducting transactions using escrow account without charging any money from any of the party involved in the transaction.

GIS mapping of resources

GIS mapping facility has been provided by incorporating Map feature to Seller's profile for locating their factories/delivery centres. It eases the order placing process by picking the unique location marker of specific plant or yard which best suits the customer in terms of distance from their project site. The Buyer can view distance from plant location to the location where delivery is required. This information eventually becomes part of the order and helps Sellers in finalizing Transportation cost.

Quotation & Negotiation

These quotes are made by Sellers themselves where they can include transportation charges and discounts. Buyers can negotiate with Sellers for discounts in bulk purchases. Sellers can update their quote as and when required until accepted by Buyer. There is a limit to generate a quote within 7 days so that any order can be processed in a time bound manner.

Technology

INAM-Pro has been developed on SQL and .Net platforms for delivering an interactive usage, user friendly interface and swift & responsive web portal that serves the very need of transactions

being carried out in a jiffy. For fast retrieval of online data, INAM-Pro makes uses of Cloud Storage. SMS/Mail relay services of INAM-Pro ensure that the Users are instantaneously updated about the confirmation of their activities such as registration, placement of Order, order confirmation, profile updates, etc. INAM-Pro uses secure Web technologies and techniques such as Secure Sockets Layer (SSL), HTTPS, and JavaScript to provide a safe Marketplace.

Benefits to Stakeholders

All Stakeholders of Infrastructure Industry are beneficiary of this portal as it serves their A-Z needs at each level. The platform provides market access to Sellers of any Infrastructure related materials starting from basic materials like Cement, Steel etc. to innovative materials for Soil Stabilization etc. The Platform with its other Principal Category such as Infrastructure Equipment and Intelligent Transport Systems covers the mechanical, electrical and electronics requirements of the Infrastructure Industry. Such information helps the projects from planning to execution stage. The platform also allows Sellers to list their old equipments for re sale and lease thereby promoting the optimal use of existing resources within the Stakeholders community. The platform with its dedicated category to Safety and Protection, aims to provide access to all kinds of safety materials, equipments and techniques in order to promote safe practices while developing our country. In addition, the Service providers can also register themselves on the portal and list their services to get leads for their business.

The target population of Buyers comprises of the Contractors, Infrastructure Developers who are involved in the Infrastructure Development projects for the Governmental bodies including but not limited to the National Highways Authority of India (NHAI), Border Road Organizations (BRO), National Highways and Infrastructure Development Corporation of India Ltd. (NHIDCL), Central Public Works Department (CPWD), State Public Work Departments (PWD), PSUs, Municipal Corporations, Irrigation Departments, Defence organizations, Gram Panchayats among others. Not only the Contractors of such Public Departments but also the departments themselves use the portal to take price as references while making payments, updating Schedule of Rates, deciding the Cost Escalations etc. For example Nagpur Metro has taken Ceiling Price of ACC's Chandrapur plant, Maharashtra available on INAM-Pro as a reference for its payment against Cement works.[7]

The Buyers on INAM-Pro are not only Contractors, they also happen to be any individual/company/society who buys Material or Equipment using INAM-Pro portal. The online visitors like Consultants, Researchers etc take benefits from the portal by using information in planning, cost estimations, capacity enhancement by use of latest technology etc. Major benefits to the stakeholders are enlisted below:

- User friendly web-based marketplace for conducting free and fair business between infrastructure and material providers

and Buyers.

- Prevents unnecessary project delays due to material shortage by showing exactly which product is available where, in what quantity and at what price.
- Ceiling Prices Mechanism for stabilization of prices for a 3year period (2016-19)
- Committed Quantities to prevent artificial shortages and curtail hoarding practices.
- The products with their location from all across the country are now listed in public domain along with their contact details thereby making this entire process seamless and immensely user friendly.
- Buyers can negotiate for best offered price and place order to the selected Seller.
- Online Payment Gateway to facilitate free of cost, fast and secure online payments.
- Maps integration for easily locating the source of material while ordering.
- With minimum committed stock per year, as well as the real-time stock status and changes that are in public domain on INAM-Pro, the practice of hoarding and creating an artificial supply shortage has been curbed. Prospective buyers know exactly which company has which product in which stockyard, and in what quantity and at what price, thereby bringing down time/cost overruns.
- Due to online sale/purchase model, the need for middlemen has been eradicated. The buyers now buy directly from the factories, thereby enabling the seller to provide material at a much lower cost thus making the purchase more lucrative, faster, and also eventually bringing down the overall project cost and increasing the Contractor's profit.
- As the range of different materials and equipment required in efficient infrastructure development is large, INAM-Pro acts as a common platform where in all the external requirement of materials/equipment can be fulfilled through an online request only.
- The Detailed specification and condition (in case of the Used products) of the materials/equipment that are enlisted on INAM-Pro can be checked using Photos, Videos, Datasheets etcetera uploaded by the Sellers, this reduces the physical efforts by the Buyers in short listing the right material/equipment suiting their requirement for the project.

Key Learnings

CCI imposed penalties upon Cement companies and their trade associations for cartelization [2] in 2016. The same companies were earlier found in bid rigging of a tender floated by the Director, Supplies & Disposals, Haryana, in the year 2012 and therefore CCI again imposed penalties worth several crores in 2017 against this case [3]. It is quite evident that despite having mechanism to address the cartelization, the decisions come after a while only when most of the damage had happened to

infrastructure development in terms of money as well as time.

The ceiling price mechanism implemented using INAM-Pro has certainly curbed this kind of practice in the industry as no Buyer has ever complained of price rise on INAM-Pro portal. Though it has also been seen that order activity on INAM-pro rise whenever cement price in the retail market start moving upwards reflecting the relevance of the platform and ceiling price mechanism.

Based on the Figure 2 above, let's assume average savings of ₹50/bag (1000/MT),

Cement Stock on INAM-Pro (in MT)=270 lakh MT

Saving/MT in ₹ = 1000

Total Savings in ₹ = 2700 Crores

Therefore, we can say that in market economy, digital e-solution has worked better than enforcement.

Also, a common place where Buyers, Sellers and Government can meet for materials/ equipment/ services to develop Infrastructure was not available and response from the industry for the platform clearly enlightens the void it filled. The initiative thus has proved that good practices in e-governance leads to a better environment in the market as without interfering directly with any product or its price, unfair practices could be curbed by using Information Technology for policy implementation.

Current Status

INAM-Pro currently offers more than 650 unique products/services, a number which keeps increasing by every day. About 80% of the listed products are displayed with ex-factory prices. It has also been noticed through the feedbacks received that for some items prices are only custom order based and therefore cannot be declared as such. To resolve this, new feature of "Ask Price" has been integrated with the portal to enable the Sellers for receiving queries for their products if Buyer just wants to know the prices based on varying requirement.

The platform has more than 260 registered Sellers and about 900 Buyers (mainly Contractors). More than 5000 Unique Users visit the platform monthly to know about products and reaching the Sellers with their queries. Also, a User can now login into the platform by using his Google account or Facebook account. The aim is to invite each and every person of this country who can contribute their resources (materials/equipment/services) towards the development of Infrastructure in the country and its connected stakeholders.

Road Ahead

INAM-Pro has the potential to stimulate major industries like Cement, Steel, and Equipment which are the primary constituent for Infrastructure development. For the infrastructure development to be fast paced, the information on resources should be available beforehand and centralized to enhance ease

of doing business in this sector. The upgraded platform has been tested successfully and now the task is to take this initiative right from the Central Ministries to Gram Panchayats level.

In this direction, various steps are being taken to make stakeholders aware about the initiative and its benefits. One such effort is to organize “Workshops for Stakeholders” at State levels by collaborating with State Public Works Departments which are directly connected with Infrastructure developers and vendors in their states. These workshops would also educate Govt. officers as well Authorities that are responsible for preparing Schedule of Rates/Estimates for the Infrastructure projects.

The aim here is to achieve price uniformity among Schedule of Rates in a region so that estimates of Infrastructure projects become competitive and in turn promote innovation in the industry.

Conclusion

“With products and technologies getting added by the day, INAM-Pro is set to become a marketplace for A to Z for the Infrastructure sector”- Book of innovations [8].

As acknowledged in the Book of innovations “New Beginning” released by Hon'ble Prime Minister on the Civil services Day in 2017, INAM-Pro will become a comprehensive e-marketplace of Infrastructure Industry. If the initiative is shared by Stakeholders of the industry, these Users can save a lot of time and effort by automating ordering process using INAM-Pro. The versatile design of INAM-Pro can be exploited by all sub industries upto startup level helping Gram panchayats to Ministry to achieve country's Infrastructure development goals and ultimately saving money and time of taxpayers.

References

1. Most of Rs 7-lakh crore road project works to be awarded by December 2018: Nitin Gadkari (<http://indianexpress.com/article/business/economy/most-of-rs-7-lakh-crore-road-project-works-to-be-awarded-by-december-2018-nitin-gadkari-4906574/>)
2. Press Release by CCI & PIB (http://www.cci.gov.in/sites/default/files/whats_newdocument/Press%20release-%20Cement%20Orders.pdf) & (<http://pib.nic.in/newsite/PrintRelease.aspx?relid=157526>)
3. Call to form cement regulatory authority by S Sundar, The Hindu (<http://www.thehindu.com/news/cities/Madurai/cement/article17341920.ece>)
4. IBEF Website: (<https://www.ibef.org/industry/cement-india.aspx>)
5. Cement Contract Rates 2017-18, INAM-Pro (https://www.inampro.nic.in/writereaddata/Portal/Magazine/Document/1_2_1_Cement_Contract_Rates_2017-18.pdf)
6. PWD Schedule of Rates, West Bengal (<https://www.scribd.com/document/311727058/WB-Pwd-Schedule-sor-Nh-2015-16>)
7. Bid document of Nagpur Metro Rail Project (https://mahametrorail.etenders.in/tender_document/tender_87/tender_document/tender_notice_document/1492264857PARTIIIN1C09ConditionsofContract.pdf)
8. Book of innovations “New Beginning” (Pg. 150) (<https://darpg.gov.in/sites/default/files/Book-on-Innovations-released-by-Hon'ble-PM-on-CSD,2017.pdf>)

AAPLE SARKAR: Citizen Centric Governance through Right to Public Service

Ramprasad V. Pole

DSR Post Doc Fellow

Pune 411045 MS

Citizens today expect more transparent, accessible, time bound and responsive service from the public sector. As public services are funded by citizens, they have the right to expect a particular quality of service that is provided efficiently at a reasonable cost. Over the last few years, the government has prioritized the improvement of public service institutions as part of the overall public service reform agenda.

The introduction to the Maharashtra Right to Service Act 2015 needs to be seen in conjunction with a move in many Indian states. Maharashtra is the first state to launch online the RTS act. Citizen can apply for birth, death, domicile and marriage certificates online under RTS act. It would be mandatory for the departments in the Maharashtra government include municipal corporations and regional offices covered under the act. The state government had notified 224 services spread across various departments under the RTS drive. The act currently covers 156 online services and 22 departments. 'Aaple Sarkar' web portal and an App was launched with the grievance redressal module for 31 departments. The research paper is based on primary and secondary sources. The paper adopts the method of descriptive review.

Key words- Governance, Right to Service, NPM, ICT, Citizens' charter

Ever since its formation in 1960, Maharashtra State has been a pioneer state in the country in effective and citizen-centric administration. With the advent of new technology during the Seventies, rulers of the state, hand-in-hand with bureaucracy, have been striving to make governance more and more progressive. In a democratic system, politicians aim at building a strong welfare state. Bureaucracy plays vital role in achieving this goal. Maharashtra State is fortunate to have a legacy of the foundation of good governance laid by the legendary Chhatrapati Shivaji Maharaj. The world has witnessed many changes in the last century. One of the vital changes at the end of century was the insurgence of Information and Communication Technology (ICT) in every sphere of life, which gave new dimensions to the society. As a result, it became necessary for Administrations the world over to take note of this change while formulating future policies. The prime mission of any Government is to make life of a common citizen happy and prosperous. The scope of Information and Communication Technology is fast increasing. Thus, technocrats are hopeful of achieving transparency with optimum use ICT tools, both in Social as well as Government sectors. Countries in the world look forward to good governance as an important objective to accomplish. Almost all of them have taken a leap forward towards transparent governance. Horizon of the freedom of

information has been widening day by day. The information revolution that gave birth to effective use of Internet all over the world has proved to be competent tool in governance. Various types of citizen services can be delivered through Internet.

As a part of the Government machinery, consistent delivery of various services and facilities needs to be maintained. Systems always need to be dynamic, and as such we need to make suitable technological modifications and improvements to cater to the ever-changing needs of citizens. In order to achieve this goal, Government makes budgetary provisions and incurs expenditure accordingly. It raises funds for various development schemes by levying and collecting taxes from citizens. It is expected that benefits of these schemes percolate to the needy citizens. However, the factual picture is quite different. One can pose a question as to whether the rightful beneficiaries actually receive their dues. In reality, these services do not reach to the common man in the expected proportions. This is true with almost every service sector. In today's ICT era, restrictive factors such as distances and time are not of any concern any longer. Democratization of the information era has given new dimensions to the new system of e-Governance.

e-Governance

An appropriate dialogue between Government and citizens is imperative in a democratic political system. Peoples' representatives, while framing welfare state policies, establish dialogues with citizens in their respective constituencies, understand their needs and desires and the difficulties faced by them. All concerned in the Government machinery need to establish affinity with citizens in order to deliver the desired services effectively. Ultra-modern tools like Internet, Mobile Technology, Social Media and ICT tools facilitate faster and efficient delivery of these services.

Prof. Garner has defined e-Governance as "Using Information Communication Technology in Government machinery, which enables citizens to get continuous and uninterrupted quality service."

As a part of the effective implementation of e-Governance, exchange of information within various departments of the Government is now feasible with the aid of modern ICT tools. The concept of e-Governance has also offered various quality services to business sector. They can effect financial transactions, as well as apply and obtain various licences and permissions by using ICT tools effectively, safely and at a faster pace. In short, e-Governance means employing Information and Communication Technology in providing faster and effective services to citizens 24x7x365 at the place convenient to them.

Maharashtra State is enriched with abundant natural resources and leads on the fronts of education, literacy, latest enactments on land development, agriculture, and industrialisation. The state has a generation which is aware of their socio-political responsibilities and which is keen to contribute in augmenting effective e-Governance. The state has already started creating basic infrastructure for extending various types of services. Maharashtra state ranks second in India, as far as exporting ICT is concerned. As of today our exports are to the tune of Rs.1800 crores, which is 30% of the total export of the country. There is a large network of more than 1200 Companies in the state, who are engaged in ICT development. A report published by the Telecom Regularity Authority of India states that there were 9.12 million IT users up to March 2015 in rural Maharashtra. The report also states that Maharashtra has the highest number of Internet users in India.

State e-Governance Policy

Framing of policies and their implementation has importance in Public Administration. It is, therefore, necessary to formulate a framework for implementation of e-Governance policy and programmes. In 2011 the DIT laid a foundation by formulating the state's e-Governance policy. Since it is a continuous process, the DIT periodically reviews the policy in light of the changes in technology, various GRs, rules and circulars issued by the Government. This enables chalking-out future plans and extensions of the policy. Maharashtra State has established an effective administrative wing for implementation of larger e-Governance projects. The 'Change Management' component is essential in order to bring-in vital changes in implementing ICT projects. It needs a dedicated and efficient leadership for this purpose. In order to achieve this, the Government has drawn an organisational structure which includes DIT, SETU, Mahaonline, and a skill development centre for regional language computing.

“Aaple Sarkar” Portal: A step towards good governance

Maharashtra State has declared the year 2015 as “Digital Year”. With a view to ensure maximum citizen participation in e-Governance, the state has launched a Mobile App and a Web Portal named “Aaple Sarkar” (आपलेसरकार) on the auspicious occasion of Republic Day 2015. This Portal is expected to cater to the needs of citizens. It offers solutions to the problems faced by citizens. Citizens' suggestions, responses and feedbacks are recorded on this Portal for reference and further action. Government has recently enacted the Right to Services Act, 2015. Maharashtra has the distinction of being the first state in India to deliver online services related to this Act. In addition to the mobile app, the “Aaple Sarkar” Web Portal can also be accessed through desktop browsers. Citizens can now easily connect to the Government through this Mobile App. They can now avail information pertaining to various Government schemes, as also register their complaints and grievances. A large number of complaints are being lodged daily through the app as well as on the Portal. It is feasible to track your complaints after

they are lodged. There is an option of “Tracking Status of Complaint” through which citizens get details and status of the action taken on their complaints. This avoids needless personal visits of citizens to Government offices and saves their time and efforts. Complaints can be lodged on the Mantralaya departments, as well as on the District-level departments. However, presently as a part of this Pilot Project, the facility of lodging complaints on district level departments is available only for certain districts, namely Nasik, Thane, Pune, Aurangabad, Amaravati, and Nagpur. Citizens in these districts can directly lodge their complaints. Those in rest of the districts are fervently waiting for this facility to be made available to them. Following types of services are made available to citizens through the “Aaple Sarkar” Portal.



Right to Services: “We guarantee our services”

State Government has recently passed the Right to Services Act, 2015. The main objective of this Act is to deliver efficient, transparent and timely services to eligible citizens in the state. Maharashtra is the first state in the country which is offering online services to its citizens, as provided for in the said Act. There are different websites of various Administrative Departments of the State Government. However, now “Aaple Sarkar” is an integrated Web Portal which delivers online services to citizens. Presently nearly 372 online services are delivered to citizens.

The “Aaple Sarkar” Portal delivers 399 online services pertaining to various departments of the State Government. Citizens can avail of these online services through e-Governance channels. Citizens are required to register on the Portal for availing benefit of these services.

It is apparent from the chart above, that citizens have benefitted more from the Revenue, Agriculture and Education departments. It is observed that citizens are not amply aware about the services and schemes of rest of the departments, which can be availed of from this Portal. Government machinery is infamous among the public at large for the delayed delivery of citizen services. Citizens are not assured about getting their work done in time. This broadens the gap between the Government and citizens. In

this scenario, the “Aaple Sarkar” Portal assures delivery of citizen services within the prescribed time limit. Till date, 88% of the services have been delivered within the prescribed time limit.

Services delivered within the prescribed time limit

Numbers of applications received in, and disposed of by, various administrative departments of Government of Maharashtra under the Right to Service Act:

Current status of applications under Right to Service Act	
Departments	39
Services offered	399
Applications received	12318350
Application disposed of	11820782

Table 1

It is perceived that 73% of the applications received have been disposed of. However, the number or ratio of gratified applicants is not displayed on the Portal. To facilitate factual analysis and evaluation of the available information, it is necessary to turn the Portal more informative as well as user-friendly.

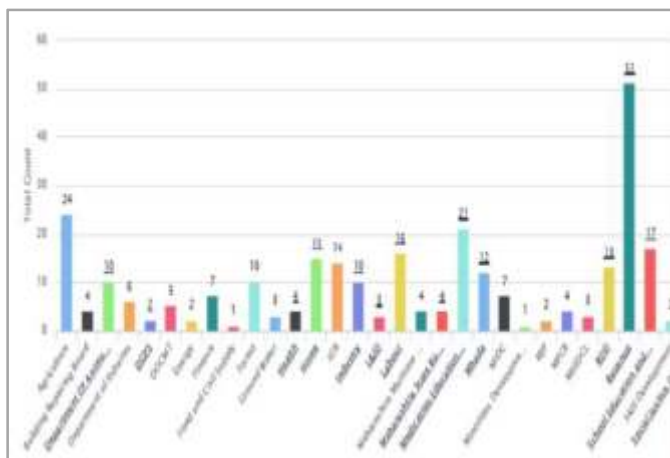


Chart-I

Grievances Redressal: “Your Grievance is Our Responsibility”

In democracy, vigilant and watchful citizens need to have a Forum to voice their grievances, issues and opinions concerning their day-to-day interaction with the Government machinery. These grievances and issues have become an integral component of the Social Media today. The Government has made available

one such platform by way of “Citizen Charter”, but citizens are unaware of its existence. The Aaple Sarkar Portal offers a single platform for citizens of Maharashtra to register their complaints and voice their grievances. It is essential that citizens register their complaints under the appropriate categories, like Mantralaya Departments, District Administration, etc. After registering their complaints, citizens can track their current status using the Tracking Number.

More complaints about basic infrastructure

Citizen can learn about the current status of their complaints through the Call Centre as well. It is seen that the number of complaints pertaining to Right to Information as also to basic infrastructures and amenities are the highest. This is followed by the number of enquiries related to the “Farm Pond Subsidy Scheme”.

Citizens now have a rightful forum in the form of the Aaple Sarkar Portal. Since that platform attempts to resolve their complaints within a span of 21 days, citizens are re-assured to voice their grievances and complaints on it. The Portal has been playing a vital role towards affording citizen-centric governance using Information and Communication Technology. Government machinery and citizens have begun complementing each other in the developmental process rather than being contemptuous of each other.

Right to Information Figure 1 RTI applicants can file their first appeal applications through the Aaple Sarkar Portal. They can pay their application fees online through the Portal's Payment Gateway using their credit cards or Net Banking. Presently, filing RTI first appeal applications is restricted to Mantralaya Departments only. It is essential that the facility be extended to regional directorates, departments and offices as well.

Mega Schemes: Our schemes, your development

Information and development are two sides of the same coin. Citizens have inadequate and improper information of various developmental programs and schemes running for their growth, and as a result remain far from the development. A part of this failure is attributable to the inappropriate and downbeat execution of these developmental programs carried-out by respective Government departments and their officials. The “MahaYojana” Portal (<https://mahaschemes.maharashtra.gov.in/>) has been developed and commissioned with an intention to make available information of various Government programs and schemes to citizens on a single platform. On this Portal citizens can view details of various programs and schemes, such as Government Resolutions, eligibility criterion, application

process, list of supporting documents, time taken for the aids to reach the beneficiary concerned, details of officers concerned, etc. In addition, names and contact details of regional offices and officers under each respective department thereunder are also displayed on the Portal. This facilitates eligible beneficiaries to make all necessary preparations to avail of the schemes' benefits and to get in touch with the officers concerned. This saves their time and efforts to a great extent. The Government intends to publish online the details of more and more such schemes on the Portal over a period of time.

Presently, information on this Portal is arranged department-wise and scheme-wise. However, it is necessary that information be arranged in a more user-friendly, citizen-centric manner, ensuring that it is easier to find. Making all available information available to the needy public, and selecting the most appropriate medium to do so, is a real challenge.

On the very day the Aaple Sarkar Portal was inaugurated, an encouraging 500 complaints were received through the Portal. This overwhelming response right on the first day underlined and highlighted the need of such a Portal. More important than the number of complaints received, is to evaluate how satisfactorily the services were delivered. One of the citizen feedbacks dated 30th September 2016 serves as a representative illustration which alerts us that the Portal has a long way to go in this direction.

Government's efforts to offer various e-Governance services to the citizens of Maharashtra through the Aaple Sarkar Web Portal are truly commendable. Going by the heartening and profound response from citizens, it is now necessary to further enrich and strengthen the platform. The Portal has a potential to bestow a new dimension to e-Governance process in the state. For this, the following suggestions are offered for improving the Portal's user experience (UX):-

1. It is essential that the Aaple Sarkar Portal is made accessible to citizens in rural areas, tribal areas, and to wandering tribes.
2. A user-friendly mobile app needs to be developed and launched for the advantage of citizens for promoting m-Governance. The existing app is required to be faster and more user-friendly. In addition to Adhar number, it will be a great help if the app can be linked via mobile numbers or Voter Identity Cards. It will have to be examined as to whether the documents available with the "Below Poverty Line" citizens or the tribal

population can be utilized for the registration process.

3. Officers, officials and subordinates from all departments are required to be adequately trained to extend the services on Web Portal to citizens within the prescribed time. Similarly, heads of departments and controlling officers need to be granted administrative controls over the computers and smart phones in their respective offices, whereby they will be able to serve faster and better.
4. It will be much more convenient to the citizens if the services available on the Aaple Sarkar Web Portal are made available in Kiosks in regional offices. It will be more beneficial to the citizens if village-level Talathis, Gramsevaks, Agricultural Assistants, and Sangram Centres educate the formers about the services available on the Portal. Government machinery will also have to resort to e-Governance, thereby delivering services faster, in paperless and transparent manner.

Maharashtra State's e-Governance has received many new magnitudes through the launch of Aaple Sarkar Portal. With the Portal, the Government of Maharashtra has a brilliant opportunity to take forward its legacy of progressive and efficient governance and to further glorify the inheritance. Services satisfactorily delivered to citizens will form an accrued treasure of accomplishments for the Government. An e-Government delivering 24x7x365 services to citizens right unto the grass-root levels will result in their development and growth, thereby prompting them to term it as "*Aaple Sarkar*"!

References

1. Narayanasamy V., The right of Citizens for Time Bound Deliver of Goods and Services and Rederessal of their Grievances Bill, Lok Sabha No. 131, 2011, http://darp.gov.in/darpgwebsite/cms/document/file/Citizens_Bill131.pdf
2. Transparency International, Corruption Perceptions Index 2014. Berlin: Transparency International, 2014. January 10, 2014. <http://workspace.unpan.org/sites/Internet/Documents/UNPAN93578.pdf>
3. "World Bank. 2003. World Development Report 2004 : Making Services Work for Poor People. World Bank. © World Bank.
4. Kauzya, John-Mary. Good Practices and Innovations in Public Governance. New York: Department of Economic and Social Affairs, United Nations. January 3, 2014.

5. "Citizens' Charter in Government of India", <http://goicharters.nic.in/>
6. Department of Administrative Reforms and Public Grievances, Citizen's Charters - A Handbook. 2014
7. Bannerji, A, Chaturvedi, Jaya. Citizens Charter in India: Formulation, Implementation and Evaluation. New Delhi: Indian Institute of Public Administration, 2008. February 5, 2014.
8. "Public Grievances Redress and Monitoring System (PGRAMS)", Directorate of Public Grievances, accessed January 18, 2014
10. Government of India, Central Ministries/ Departments. A Handbook for Designing and Implementing SEVOTTAM Complaint: Citizen's/Client's Charter & Grievance Redress Mechanism. New Delhi, Department of Administrative Reforms and Public Grievances.
11. Government of India, Second Administrative Reforms Commission. Promoting e-Governance; The Smart Way, 11th Report, New Delhi: Government of India

Rajasthan e-Governance Architecture – The way ahead to interoperability and unification

Akhil Arora

Principal secretary and commissioner, it & c,
Government Of Rajasthan

1. Introduction

In recent times, the e-Governance has emerged as the workhorse to plan, implement and deliver Governmental functions with efficiency, accountability, speed and transparency. One of a significant aim of the e-government programme is to make it easier for people to deal and benefit with multiple government departments and agencies by making good use of Information and Communications Technology (ICT), and electronic business processes.

With such a goal, various government organs assigned and charged for the desired delivery of services, hitherto, go-on as expected to pursue and establish enabling ICT resources suiting their own individual programmes and plans. On the other hand, at the same time, for an overall strategic goal of e-governance, it may be essential that a meaningful collaboration and exchange of data and information between various establishments is maintained. However, it may be easy to visualize that owing to fast changing ICT dynamics, inter and intra communication through ICT networks between various government organs may not be easy or even impossible. Here, it may be significant to mention that Government systems are generally acquired on a solution-by-solution basis, and driven by the need to acquire the best solution for a specific purpose. Consequent to this, it results in creation of a wide range of separate information / data and information islands across the Government with no easy way of unlocking the valuable information assets held collectively by the implementing government organs vital to support more useful and synergistic productive processes. From the above assertions, it may be obvious that there is an urgent need to establish an interoperability of various government agencies to be bedrock of Integrated Service Delivery cherished by the government as a transformational tool to better serve the citizens.

This article presents in brief the presently proposed framework of the Rajasthan government for the afore-said interoperability for a unified monolith governance through interoperable ICT

systems; the ICT systems that work seamlessly and coherently across the public sector to provide good quality services to citizens and businesses. The proposed strategy takes in cognizance the presently prevailing Indian scenario in respect to ICT networks mostly implemented through the legacy networks. The legacy networks/systems are well known for their difficulty to share, inflexible to dynamic needs and to interoperate. First, we describe in the section to follow, the limitations and barriers of such systems and in later sections to mitigate these. To be succinct, it calls for clearly defined policies and technical standards for interoperability and information management to ensure that new systems to be implemented possess the architecture to provide maximum interoperability, which is a pre-requisite for an integrated e-Governance.

2. Barriers to Interoperability and Collaboration

With the modern state of the art technological platforms, interoperability has an extremely vast scope of implementation. Legacy systems are the main challenges which cause difficulty as these systems are the most complex to share and interoperate. From applications to databases to solutions and platforms, integrating legacy systems is the biggest bottleneck.

In addition, several other hurdles which obstruct effective co-ordination between government agencies and other stakeholders have been observed. Several barriers to collaborate between organisations are:

- centralisation of services by some agencies to the main centres, leaving some agencies without representation at a local level
- the diversity of regional boundaries across the different departments (diversity with local authority and boundaries)
- a large number of government agencies which stakeholders have to interact with
- variation in levels of delegations within departments

- division of financial resources into a large number of fund pools
- no one agency at the centre with an overview
- the frequency of structural change, including for instance, the separation of policy from operations, which has led to a devaluing of service delivery
- overall funding pressures limiting the level of resource that is allocated to co-ordination and collaboration
- Public service culture that is risk averse rather than fostering innovation and progress.
- no government agency at the regional level with a clear mandate to lead regional initiatives
- competition for share of resources between various agencies
- outputs that focus organisations on the delivery of core business at the expense of whole-of government approaches
- differences between priorities of agencies and national policy drivers which make it complicated to identify common interests
- a tendency for some agencies to shift responsibilities to other agencies, withdraw from collaboration
- the nature of the funder/provider contracting regime

3. Raj e-Governance Architecture

eGovernance strategy as proposed by the Government of Rajasthan is driven by the Rajasthan enterprise Government Interoperability Architecture, which is designed for increased interoperability through the principles of shared infrastructure services, service oriented architecture and event driven architecture. These principles are essential ingredients for interoperability and the architecture is designed to ensure that information for government services is available anytime, anywhere, to anyone who is authorised to access it, from many available channels. The Raj eGovernance Architecture is a set of policies, technical standards, and guidelines covering ways to achieve interoperability of public sector data and information

resources, information and communications technology (ICT), and electronic business processes. It creates the ability for any Agency to join and contribute its information, ICT or processes with those of any other using a predetermined framework based on “open” (i.e.,-proprietary) international standards.

The Aim and Considerations for eGov Architecture:

The architecture aims to improve interoperability in the practical application of ICT relating specifically to the electronic systems that support government’s business processes.

The intention is to provide guidance on some of the best practices that help underpin successful e-Government programs. In reality, there are always local-specific requirements to be taken into account, as well as a recognition that technology continues to develop rapidly: technological standards can mature quickly and hence version control between different versions of the same standards or even between new and obsolete standards needs to be strategized.

Centrally imposed strict regulations and mandates can prove highly expensive brittle, reactive and inflexible and need to be well considered and anticipated. Use of standards is often best treated as a matter of guidance and as only one component to be considered in an effective and successful ICT projects. Compliance with the architecture cannot be imposed on citizens, business and foreign governments. But Government of Rajasthan intends to make the architecture its ideal method of interface.

Underlying Drivers

The underlying drivers for implementing architecture include the desire to deliver on policies such as:

- Rather than a set of separate silos delivering for a return on investment basis, enabling GoR to streamline business and technology processes and work more proficiently as a collective organization

- division of financial resources into a large number of fund pools
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- Rather than a set of separate silos delivering for a return on investment basis, enabling GoR to streamline business and technology processes and work more proficiently as a collective organization

- Interoperability between new environments and existing systems enables any migration to new platforms to be competent and evolutionary
- Ensuring the provision of improved public services and information in ways that is more beneficial to citizens operational efficiency

Benefits

Raj eGovernance architecture will lead to the following expected benefits:

- increase transparency to users and provide them with value-added information by bringing together data that currently exists across multiple silos
- increase efficiency, flexibility and the value of existing investments in systems
- Reduce costs, and single vendor lock-in
- promote open access to information and address backward compatibility issues
- facilitate electronic collaboration and exchange of information between stakeholders
- reduce the effort required to deal with government online by encouraging consistency of approach
- promote choice, competition and innovation
- support important social and policy solutions, such as accessibility, user identification, privacy and security
- reduce the reliance on additional data storage (e.g tapes and disks to exchange data between departments, since these carry their own security issues and are not scalable for the level of interoperability that many services will require in future
- make systems, knowledge and experience reusable from one department to another

Envisaged Outcomes

The architecture strives for the following outcomes:

a. **Efficiency and Integration:**

Services that are integrated, customer-centric and efficient; information and

services will be integrated, packaged, and presented to minimise cost and improve results for people, businesses, and providers. This outcome will be achieved when front-office integration is well developed, with many services redesigned and bundled together in ways that better meet customer needs; and the adoption of the architecture for back-office integration as well as progressive building of components of the service-delivery architecture.

b. **Improved Service Delivery:**

One of the aims of the e-government programme is to make it easier for people to deal with multiple departments by making good use of ICT. By making ICT systems and the processes they supported by interoperability, people will find it easier to do business with government as a whole. This does not mean that everyone has to be online to get the benefits of interoperability. If a department's ICT is interoperating effectively, people dealing with public servants face-to-face or on the phone will get better service.

c. **Common Technical Standards:**

The adoption of common technical standards for ICT means that departments can focus more businesses and task outcomes that the systems are designed to support rather than on expending energies on what may be technical choices that have little impact on service delivery. Common technical standards also mean that the collection of ICT systems across government is of more value as a whole than the sum of its parts. Disparate systems that cannot work together are only of value in and of themselves

d. **Convenience:**

Provision of services anytime, anyhow, anywhere; people will have a choice of channels to government information and services that are convenient, easy to use, and deliver what is wanted. This outcome will be achieved when many

services are fully delivered electronically (as appropriate) in an integrated fashion with traditional service delivery channels (counter, postal, telephone, etc.) continue to exist now enhanced by the use of technology.

e. Variety of Optional Channels:

By interoperating, by using the architecture, the government departments/agencies can make information available to people in ways that help them to participate in the processes of government. The channel of delivery may differ from one department to the other as long as they are interoperating

f. Participation:

People will be better informed and better able to participate in government. This outcome will be achieved when online participation becomes an increasingly important part of policy development and service delivery; and making the democratic processes electronic (e.g., e-voting in local body elections).

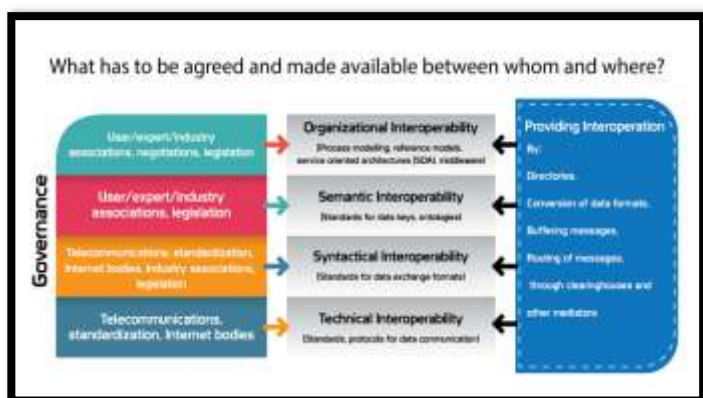
other in the first place. SOA is implemented using Web services, therefore applications are constructed as sets of re-useable, cooperating services with each being responsible for one or more clearly identified and bounded user tasks, business processes or information services.

Information Technology has provided great strides for greater efficiencies in state government. But, IT has been an impediment for the most part in providing greater flexibility and creativity in crossing other department application boundaries for common services and service reuse, which is the next step of automation delivery. Therefore, the following state-wide policies shall be followed in support of SOA implementation for efficiency and development in the state.

5. CONCLUSION

There are three dimensions of interoperability, which are as follows:

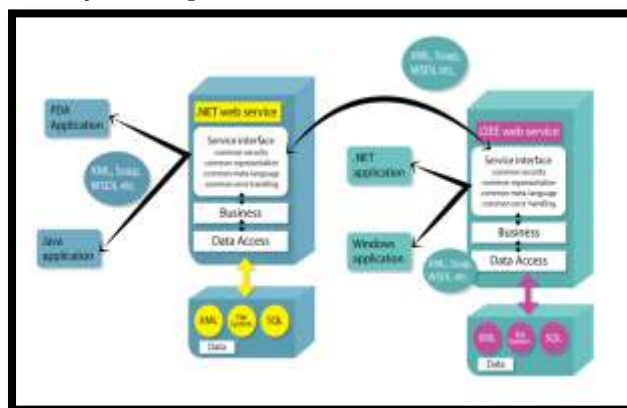
4. Service Oriented Architecture



SOA and Web Services

Service Oriented Architecture (SOA) is a recent concept in the world of interoperability. The concept of an SOA is the idea that IT systems, software, devices and services will integrate and “talk” to each other even if they were never specifically designed for each

The scenario has been changed from supplying common, non-electronic services to a more demand-driven and personalized electronic service (e-service) delivery. To foresee these developments, an integrated framework for integrated public service delivery using interoperability is explained in this paper. By means of these standards, the key concepts and relations that form the



basis for coordinating the activities necessary for integrated public service delivery can be distinguished. It can not only orchestrate events between

acquired by studying cases which search and request public services, and by studying relevant projects.

The Government of Rajasthan has ensured that the eGovernance Architecture becomes the strength of eGovernance implementation in the state. It is ensured, that all systems are built in a coherent, centralized, unified, integrated and interoperable mechanism, including integrating legacy systems and utilizing it to the maximum to achieve the true coherent eGovernance environment.

To promote sharing data across all platforms and to serve our own residents, Rajasthan is rapidly moving towards major investments in the development and implementation of Interoperable systems. We believe our continuing investments in Web services will result in the most open and interoperable solutions ever deployed. The Government of Rajasthan is interested in how the residents are leveraging and using the investments in interoperability to meet their service delivery needs and solve real-world problems. The Government constantly looks to its residents for feedback.

Implementation of IT&Geomatics in Telangana Forest Department for effective management of Forests

P. Raghuv¹, P.S.Rao², A.Rama Murthy³

Prl.Chief Conservator of Forests(IT & P)¹, Dy.Conservator of Forests(FCA)², Asst. Conservator of Forests (HRD)³

Telangana Forest Department, Aranyabhavan,

Saifabad, Hyderabad-500004

Praghuv¹@gmail.com¹, dcffca@gmail.com², murthyar@rediffmail.com³

Abstract:

Telangana is a newly formed state on 2nd June 2014 with geographical area of 112101 Km² with forest area of 26903 Sqkm around 24% of the Geographical area. The department is organized into (12) territorial Circles (3) functional circles, (31) District Forest Offices, 55 Divisions DFOs and 37 Forest Divisions along with 12 Functional Divisions. (186) territorial Ranges and (53) functional Ranges; (849) territorial Sections and (180) functional sections and (3132) territorial Beats and (475) functional Beats. The primary function of the TS Forest department is protection, conservation and management of forests, wildlife and Bio-diversity. Managing this vast resource is a herculean task. This requires strengthening the current forest planning and management systems using latest technologies and development of expertise in-house. Therefore Telangana Forest Department has started making use of modern tools of IT like RS, GIS, and GNSS & MIS in aiding the planning, execution, monitoring and evaluation of all the activities. These steps are leading to development of a robust Decision support system for the Department. The Department could best utilize the funding support from World Bank aided projects for the purpose to start with and later received extensive support from various quarters realizing its utility and cost effectiveness especially the CAMPA, Finance Commission, CSS etc..

Key words: Forest, GIS, GNSS, Remote Sensing.

Introduction:

A. Motivators for the project initiative:

Country's success in launching Indigenous Earth Observation Satellites by ISRO in 1980s fuelled by the evolution and popularization of the computers, internet etc. created new trends in Natural Resource Management, particularly forest management. The Rio Earth Summit in 1992 focused on reduction of carbon emissions, desertification stressing use of Remotely Sensed data for framing policies recognizing the need for environmentally sustainable development. An outcome –The **statement of Forest Principles** stressed the need to ensure provision of timely, reliable and accurate information on forests and forest ecosystems for public understanding and informed decision-making and Forest management to be integrated with management of adjacent areas so as to maintain ecological balance and sustainable productivity.

Forest Survey of India, MoEF, GoI, Dehradun, started monitoring forest cover using RS data since 1987. However, during implementation of IDA-World Bank forestry project in 1994, the need of GIS/MIS facility for close monitoring and

planning was needed. The services of FAO consultants were taken for this purpose in the beginning stage.

B. Purpose and Priorities of the Initiative:

The main purpose of the ICT Initiative is to scientifically monitor and bring transparency in forest management and planning, through an integrated GIS & MIS based forest management information system, in order to fulfill the needs of the department as envisaged. As the World Bank forestry Project started in 1994 based on the principles of Participatory Approaches, the local communities were formed into Vana Samrakshana Samithis (Forest Protection Committees) and Eco-development Committees (EDC) and involved in planning and implementation. The technically selected sites for conservation measures, monitoring the grounded works using GNSS etc. have minimized the scope for personal bias. The perspective and synoptic view of forest area resulted in improved perceptions and the benefits enjoyed by FPCs and EDCs could be better quantified. The impacts of the conservation measures was well received by the communities and staff as well. This required, on priority, Study and report of the adverse forest cover changes due to encroachments, epidemics, forest fires etc. and positive changes due to soil and water conservation, planting in degraded areas, cultural operations, better protection etc. The efficiency of the staff drastically improved as they got command over the conditions of forests in their territory. To identify the core staff and train them in the technology was on top priority. Lot of orientation to both the staff as well as Communities required initially and resistance to change was to be tackled. Once sensitized, the benefits were perceived and acknowledged. The ICT initiatives also, to certain extent, bridged the knowledge gap between natural resource agency personnel, researchers, developers and other land users in longer-term, sustainable use of public land through communication and interaction.

C. Date of Implementation of the Initiative:

The Initiative has been under implementation since 1994 which was started in a modest way slowly picked up momentum and grew as a **State of the Art facility** by the year 2000. In initial years staff were sent to Finland, Thailand and Australia for trainings. Later some staff were trained in Indian Institute of Remote Sensing, Dehradun and National Remote Sensing Agency (NRSC), Hyderabad. The center also started training to numerous sister departments and other state forest departments in the technology, as well as the Government of India programmes. Several significant projects were completed and publications released. The online MIS and Web GIS have been

developed and deployed during 2010 and continuously catering to the needs of the Department.

The Dept. has acquired expertise in a relatively new field and has developed a team in-house to handle all the technologies. The following are some of the Projects executed by the Department, using Remote Sensing, GIS, GPS and Web technologies:-

- Geo-Spatial Database creation (1994-2000) (Updation continuous).
- Development of Standalone SMIS (1995-2010). During the implementation of World Bank Project, it is mandatory to submit the financial details through FMIS module.
- Annual Vegetation cover Monitoring (Since 1996) (Comprehensive State of Forest Reports (SFR) published every year since 2010 and subsequently Telangana SFR Since 2014)
- Selection of Suitable Sites for Plantations. (Some key areas)(1999)
- Micro-level Watershed Planning using DGPS (Some key areas)(2001)
- Fire Risk Zonation Mapping (2002)
- Wildlife Habitat Mapping & Bio-diversity Characterization.(Some key areas)(2002)
- Selection of Suitable Sites for Eco-tourism (Some key areas)(2002)
- Selection of Suitable Sites of Water Harvesting Structures, (2003)
- Forest Inventory (2006–2008) (Report published in 2010)
- Recognition of Forest Rights under RoFR Act, (Some areas completed and remaining areas in progress) (Since 2009)
- Assessment of Trees outside Forests (2010-13) (Report in 2015-16)
- Online GIS services using Enterprise GIS Server /Skyline globe (Since 2010)
- Online modular based Telangana Forest Management Information System (TGMIS), (Since 2010)
- Providing inputs to Forest Working Plans and Management Plans (Continuous).
- The Vana Vahini mobile application (2015-16)
- Assessment of encroachments (2011-16).
- Analysis of fire alerts and fire risk zones between 2004 and 2017.

The outputs of the above initiatives have been made available to all the Officers and Staff and the communities, who have been sensitized in the use of these technologies in day to day administration and preparation of Micro Plans at the VSS level, respectively. Finally, the IT has been institutionalized in the department.

Methodology:

Strategies adopted for bringing about the transformation and positive impact

This initiative has helped the field level staff in acquainting themselves with the computer based Remote Sensing and GIS analysis and use of the output of the same through the technology. This initiative has helped in the increase of efficiency of the staff. At the same time it has ensured.

transparency, field level decentralized decision making, utilizing the available resources leading to better administrative practices. This initiative has enabled the higher authorities to effectively monitor and regulate the implementation process. The output provided by the initiative has helped the ground level staff in taking quick and effective decision which was not possible in the traditional methods.

The hand held GNSS were procured in sufficient numbers and provided to staff. This instrument, with proper training allowed them to master their area with respect to map. This has done away with laborious manual surveys and saved time which translates into efficiency. As regards protection of forests, all the changes are readily identified and coordinate given from successive years using RS data. Initially resistance to change was noticed, as these are not allowing personal interests and mischief. And for some time performance of officer was linked to the IT derived indicators of a territory making one to take it seriously. Extensive trainings were provided to use the technology. A user need assessment workshop was conducted in February 2000, to enlist all the expectations from field officers by exposing them to various technological advancements. This has also led to self-analysis of the maps as to how he used to select a site for an operation and now how a comprehensive map is guiding him. This transformed a lot.

For example, as Natural Resource Management (NRM) operations involve huge amount of money and man power the Integrated Mission for Sustainable Development (IMSD) constituted by the Govt. of India have issued centralized general guidelines in developmental activities. These guidelines involve several geographical criteria for watershed treatment etc. By keeping in view of the importance of the guidelines the department has taken an initiative to scientifically treat the forest areas on watershed basis.

The main objectives of Site Suitability of Water Harvesting Structures project include 1)to provide beat wise maps for entire state with the suitability index for construction of various structures along with the spatial locations 2) preparation of saturation plan at beat level with all the proposal in construction of water harvesting structures 3)preparation of spatial database for helping all the field executives in day to day decision making, 4)brining out consistency, accuracy and transparency and 5)training of staff in utilizing these maps for implementation of field activities, to navigate using GPS to the locations shown on the map etc.

Realizing the fact that that colossal damage is being caused by the repeated forest fires; Forest Fire Risk Zonation mapping for the entire State using ICT was carried out, for identification and Zonation of fire prone areas from lowest to highest risk. The

maps indicate the vulnerability of forest areas due to forest fire. The forests are categorized into Highest to Lowest zones, for each Administrative unit wise. These are being updated from time to time using the ancillary data like MODIS, SNPP, and field based information. The vulnerability of forest areas to fire is being communicated to various stake holders for strategic planning and preventive measures leading to State the “Fire Free”. Fire alerts received between 2004 and 2017 assessed and the fire risk zones disseminated.

The annual vegetation cover monitoring using Satellite Remote Sensing data, a sort of geo-vigilance, had ringed alarms in the field officers which resulted in curbing the encroachments and is evident from the gradual reduction in the encroachments. Similarly for other projects the objectives are met.

Role of various stake holders – most importantly, role and details of the IT&C in the initiative.

The Field Officers DFOs to FBOs level have to perambulate forest areas a lot to identify the locations of the **Water Harvesting Structures/ encroachments/ Fire Risk areas/ suitable sites for various conservation measures** etc. This consumed a lot of time, energy and resulted in most of the time selection of inappropriate location because of personal bias involved. Prioritization of sites did not have scientific basis also. Thus a DSS to the Ground level officers is made available to design their planning and process of implementation. This is useful in sensitizing the communities and involving in conservation planning.

The stake holders are fully involved in implementation processes which is an output of the DSS provided to the field staff.

The role of the **IT Wing** of the forest department is to understand the field requirements, intervene wherever possible and provide easy solutions with respect to traditional methods. The **IT Wing** is responsible for reviewing literature, attending conferences, preparing the Case studies, appraisal studies to put before the senior officers for critical evaluations of the merits and demerits. The **IT Wing** strived hard to innovate and explore the technologies and contemporary issues to keep the organization update.

Highlights/ positive features of the initiative under each of the following important dimensions

i. Transparency and stakeholder participation

Being scientifically designed on multi-criteria basis the choices of proposed sites for conservation measures (**like Water Harvesting Structures for Ex.**) or protection measures (like vegetation cover monitoring, fire risk zonation) have no personal bias. The location of the sites is best probable sites based on multiple criteria intended to give best results for the development, the impact of which can be monitored subsequently. Since the location of the sites are designed in GIS the outputs supplied can be used by ground level officers, staff and other stake-holders, to identify sites without bias leading to effective decentralized decision making. The time energy

needed to identify suitable sites is reduced considerably giving the staff much needed time for planning and execution. Thus human and economic resources are used efficiently. The outputs in form of maps and digital files have been supplied to field officers. It has saved them from perambulating tirelessly in forest area. Now with the technology adopted in the project the executives simply navigate to the site with the help of GNSS.

ii. Innovativeness of the initiative and its replicability

As these methodologies are well defined, these can be implemented elsewhere provided the site specific geographical information is substituted in relevant parameters. In Forest Department of Telangana, the study was replicated at operational level. The project can be replicated in any programme which requires **suitable sites for water harvesting structure/ watch tower** etc. Extensive trainings and ease of use made the transfer of the technology to the field easy.

iii. Increased efficiency of outputs/ processes and effectiveness of outcomes

Most of the activities of the department in the past were highly time consuming, giving very little time for proper analysis and use in the decision making. To elucidate this point, it is to inform that **identification of encroachments** in the forests was highly time consuming for the field officers, especially in the hilly terrain. Now with the deployment of RS, GIS & GNSS technologies the officers can straight away walk to the sites and take appropriate action. It saves 90% of time of the field officers.

The GIS-MIS integrated FMIS enabled online data collection and transfer of data by various Stakeholders. They can access the Maps, data from the central Application and do necessary periodic data updations and hence would help towards better management of resources. Hence, the solution would bring in rapid data communication, consistency at all levels, transparency, accuracy, reliability and ease of use.

The reports generated through various modules of TGMIS on various activities of the department at various levels are highly useful and time saving. This time is reduced to a fraction compared to the time needed in data collection compilation and use through snail mail. TGMIS removes manual and subjective errors/biases.

Initial cost of procurement of Hardware, Software appears high but in long term it will prove to be highly cost effective as the benefits in terms of empowering the officers at all levels and enabling them in taking correct and timely decisions will far outweigh the costs.

Various types of maps and vector layers of Forest areas and Reports of Forest Inventory, State of Forest Reports and various other reports are kept on the web for the use of general public. This brings in transparency in the operations and aids the Researchers in advancing their works. This serves as a sensitizer to communities with other sister organizations. The NGOs can also make use of the data for their projects.

iv. Display of leadership / Team work by the IT wing.

The officers of IT Wing are highly motivated and technically qualified. They have good patience and capability to extract the knowledge interactively and design IT projects for various purposes. The team was coherent and executed the gigantic projects for a state forest area of 26903 km² and delivered timely to field.

v. Sustainability of the initiative

As the technology is user friendly and if institutionalized in organizations, its demand in day to day functions of the organization makes it sustainable. Not only forest treatment but almost all land based developmental programmes follow certain geographic guidelines and thus it is imperative that this technology is going to stay with all such programmes and supported by them. If we compare the cost-benefit ratios with the traditional techniques these new technologies are cheaper and efficient. The feedback from field shows that, the ease of use and perceptual clarity drives the sustainability of the technology.

The methodologies have been developed using the heuristic approaches consulting the cutting edge functionaries and conducting need assessment. As there are plenty of domain experts, their knowledge together with some other guidelines such as IMSD have been captured into replicable knowledge bases. Out of the experiences gained the Geomatics center, participated in various National and International conferences and published several papers related to natural resource management, besides acquiring qualifications.

Outcomes i.e. impact/benefits resulting from the initiative

Before the Initiative	After the Initiative
Before all these were depending on snail mail	The time of executive is saved as ready map with lead coordinates in hand for implementation.
	As regards reports, The time of the executive officers and staff, regional officers and Head Office Officers as well as staff is saved as the data is received almost on real time basis and period of wait, which sometimes ranged up to 6 months, is reduced to a maximum of one week. As this data is available on the web, is available to stake-holders as well as general public. Now they need not approach various offices for supply of information.

<p>No guarantee that the area encroached deep inside forest, gets noticed during perambulations.</p> <p>Public had to personally approach office to know its location with respect to Reserve Forest for licences</p>	<p>Both, the department officials as well as common public and stakeholders are benefited. For example, even the clearance of Forests for encroachments, is identifiable to sub-Hectare level. This precise information helps the field officers in effectively and timely dealing with the Offenders. It is also leading to increase in the accountability on the part of field staff.</p> <p>The Applicants for Mining Licenses, New Sawmill Licenses etc. can easily come to know if the proposed location/s and the extent are falling inside the RF/proposed RF or a WLS or NP; by plotting it on Skyline globe /Arc GIS Server and make appropriate decision. It relieves the dependence of the public on the FD for each and every work.</p>
<p>No guarantee that the area encroached deep inside forest, gets noticed during perambulations.</p> <p>Public had to personally approach office to know its location with respect to Reserve Forest for licences</p>	<p>All the applications of TGMIS and Skyline Globe Server are online and services are available to all the Officers and Public. These are</p> <ul style="list-style-type: none"> • Plantation MIS (PMIS), • Nursery MIS (NMIS) • Forest Protection MIS (FPMIS), • BeediLeaf MIS (BLMIS) • ANR Works MIS • Forest Block Treatment MIS • Forest Canopy Cover MIS (FCCMIS) • Financial and accounting MIS (FAMIS) • Skyline globe/ GIS Server • Tree felling and transit permissions etc.
<p>No statistics available about forests, No localized details of encroachments</p>	<p>Statistics up to lowest management unit i.e. Compartment are available year wise. Changes are identified and flashed to field through www.tsfdgis.com website. The satellite pictures used shown in Fig.1. The encroachment locations between 2008-16 shown in Fig2. Comprehensive State of Forest Reports & Inventory reports published since 2010 based on above analysis. (See photo 1 &2). The analysis of past five years is as</p>

follows:

1. During the past 5 years encroachment has been detected at least once in 802 beats
2. (6) beats have seen encroachment in each of the 5 years - 5 in Kothagudem Circle and 1 in Nizamabad circle
3. Gangaram Range of Gudur WLM of Kothagudem Circle has 4 beats out of these 6
4. (9) beats have encroachment in 4 out of the past 5 years (gangaram and Kammarpally Ranges figure here also. Tadvai Range is another area of concern)
5. (60) beats have encroachment in atleast 3 of the past 5 years (50% of the beats fall in Kothagudem Circle followed by Nizamabad Circle with 17%)
6. (174) beats have reported encroachment in atleast 2 of the past 5 years (77 beats in Kothagudem Circle, 28 beats in Warangal Circle, 19 beats in Nizamabad Circle)
7. Balance 553 beats have reported encroachment atleast once in past 5 years (193 during 2016 and 107 beats during 2015)
8. Out of the 300 beats where encroachment was reported in atleast one year during 2015 and 2016, 35 beats have seen encroachment in both the years.
9. Area-wise analysis shows that 26 beats account for 2600 ha of area encroached in the past 5 years (out of 11,087 ha area encroached)
10. (35) beats account for 944 ha of encroachment during 2015 and 2016 with Kankur beat of Mancherial Range topping the list with 116 ha
11. The above analysis is based on the forest cover change detection analysis year wise, on website for easy access.
 - Skyline globe/ GIS Server
 - Tree felling and transit permissions etc.

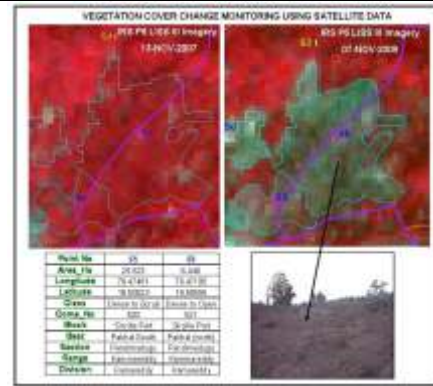


Fig.1

Map showing encroachment spots between 2008-16



Fig.2



Photo 1

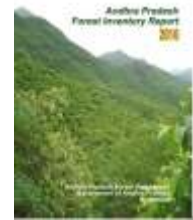


Photo 2

No growing stock details of the forest in detail and dependent on inventories made piece wise

Forest Inventory Report 2010 published with all the details. A comprehensive data of all the state inventoried in same period and comparisons more valid to make state level plans.

The ToF assessment provides the vegetation cover existing outside the notified forests, where the entire State is inventoried using high resolution Cartosat Stereo-pairs. This also helps in identification of Deemed Forests as per the orders of Hon'ble Supreme Court of India.

No localized mapping of forest fires

Forest fire mapping based on 2004 to 2017 fire occurrences data collected from MODIS/SNPP Satellites and prioritise vulnerable compartments/ Villages/roads and for targeting preventive actions. (Map shown Fig.3)

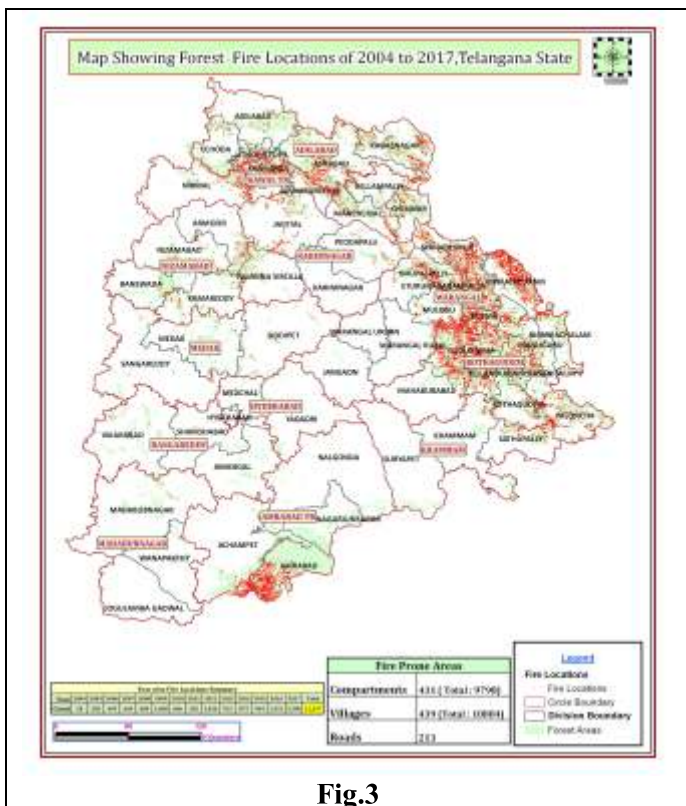


Fig.3

iii. Simplified procedures

In the past all procurements were done following the traditional method of calling for Tenders etc. by giving Paper notification.

Chain and compass surveys which require line of sight and require time and labour

The tree felling and transit permissions were manual and time taking process

Depend on manual reports via snail mail

Now it has been replaced with the system of **e-Procurement** to have greater participation and to ensure transparency and fair play.

Traditional method of surveys has given way to **GNSS/DGPS** surveys saving lot of effort and time. Around 1000 GNSS sets are available in the field. In the past each Division was provided with an Arc-View GIS and now all the required functions have been made available through web enabled Skyline globe/Arc-GIS Server.

The online Tree Felling and Transit Permission module developed in pursuance to the guidelines issued under EODB has reduced the time taking for granting permission and also minimized the personal interaction of the applicant with the authority.

Procured PDAs with GPRS connectivity and cameras to monitor most of the important activities like wildlife sightings,

Plotting of field Measurement books manually

Plotting of field Measurement books manually

seizure of forest produce in offence cases, plantation details, nursery stocks; including movement of staff and their field observations,. This will enable better monitoring by the Superiors and will provide timely guidance to the field Officers. A mobile application Vana-vahini is developed to capture part of the information in real-time.

VanaSRI – Forest Survey and Research Initiative, a web GIS tool helps plot maps and superimpose on google earth, incorporate magnetic declination Area finding etc, bridging digital divide. A tool works for whole India and NE part of globe.

8. Out of the 300 beats where encroachment was reported in atleast one year during 2015 and 2016, 35 beats have seen encroachment in both the years.

9. Area-wise analysis shows that 26 beats account for 2600 ha of area encroached in the past 5 years (out of 11,087 ha area encroached)

10. (35) beats account for 944 ha of encroachment during 2015 and 2016 with Kankur beat of Mancherial Range topping the list with 116 ha

11. The above analysis is based on the forest cover change detection analysis year wise, on website for easy access.

- Skyline globe/ GIS Server
- Tree felling and transit permissions etc.

Rewards/Awards/Collaborations

The efforts of the Dept. have been recognized by the Govt. of India in the past and have been awarded with **Silver Icon** during the year 2004 for “Fire Risk Zonation Mapping” and with **Golden Icon** for “Site Suitability of Water Harvesting Structures” during year the 2005 for excellence in the e-Governance Initiatives. During 2011, Computer Society of India (CSI) (sponsored by Nihilant technologies) has given “**Award of Appreciation**” under Department Category recognizing various ICTs implemented in the department. The department had been awarded with “Order of Merit” by **SKOTCH** during 2016 for the IC&T initiative in the department. (Photos at bottom). The

department conducted three joint workshops with the collaboration of **US National Science Foundation** supported Digital Governance Project involving academia, policy makers and executive. The Vana SRI on line Decision Support tool developed in-house (useful for whole country) was invited by CIPS-Govt. of India, for a Presentation see link below: http://www.cips.org.in/documents/2017/Ideation/Vana_SRI%20.pdf



Photo3

Photo 4

Acknowledgements:

The authors are grateful to Sri. P.K.Jha, IFS, Prl.Chief Conservator of Forests (HoFF), Telangana State for encouraging and giving priority to the implementation of IT and Geomatics in the department. Thanks to all the Officers and staff of the department for taking part at various levels from design of module to usage, data entry need assessments etc. Thanks to MIS and Geomatics team who involved in the development of IT solutions.

North Eastern District Resources Plan (NEDRP): a Geo-portal showcasing the strength of Space Technology inputs towards Governance Applications

Dibyajyoti Chutia, Nilay Nishant, Avinash Chauhan, P Subhas Singh, Victor Saikhom, Jonali Goswami, Siddhartha Bhuyan, Manoj Lokare, PL.N Raju

Scientist-SE, Scientist-SC, Scientist-SC, Scientist-SE, Scientist-SE, Scientist-SE, Research Scientist, Research Scientist, Scientist-G, North Eastern Space Applications Center, Shillong, Meghalaya -793103, India
d.chutia@nesac.gov.in, nilaynishant@gmail.com, avinash16011991@gmail.com, ss.puyam@nesac.gov.in, victor.saikhom@nesac.gov.in, siddhartha.bhuyan86@gmail.com, er.lokaremanoj@gmail.com, director@nesac.gov.in
9436100493

Abstract -- NEDRP is one of the most successful project activities of North Eastern Space Applications Centre (NESAC), Umiam of Department of Space. The major aim of the project is to strengthen the Governance policy through effective mechanism of geospatial framework. It was inducted with 36 selected districts of NE Region and later on extended to remaining districts of the region as per the directive of North Eastern Council (NEC), Government of India. Each of the districts comprised of around 30-35 geospatial layers categorized into six major modules- i) Administrative or base data, ii) Infrastructure, iii) Land and Water resources, iv) Planning inputs, v) Terrain module and Disaster management. In addition, NEDRP dashboard is populated with the Governance Applications on Election, Census, Project Monitoring, Geo-Tourism, Village Resources Information etc. The geoportal is hosted at www.nedrp.gov.in using 1Gbps NKN network. NEDRP is now becoming decision making platform for the Governance applications in many Government Departments and agencies for their planning and monitoring activity.

Index Terms -- e-Governance, NEDRP, Dashboard Project Monitoring, GIS data.

I. Introduction

Northeast India (officially called North Eastern Region, NER) is the easternmost region of India represents both a geographic and political administrative division of the country [1]. It comprises the eight states Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura [2]. It comprises an area, of 262,230 Sq. km with a total population of 4,54,86,784 as per census 2011 [3]. The area holds enormous potential in natural resources and development of the tourism industry.

NER has a unique amalgamation of geographical position, cultural and socio-economic conditions, but this region of our country has not made much progress as compared to the rest of the country due to various reasons viz., infrastructure bottlenecks, institutional weakness, technological gaps, etc. However, many a times the programs undertaken by Government institutions to address specific problems of rural masses get poorly implemented due to insufficient technical

inputs, lack of zeal and transparency in implementation and ineffective monitoring methods [4]. Over last one decade, tremendous information has been generated for natural resources management, infrastructure planning, disaster management support etc. by different stockholders, agencies and institutions. But most of the times, dissemination of information to the decision makers, planners and grass root level users is not rapid enough due to poor awareness among the people in NER. Lack of transparency in planning process, improper monitoring, data sharing as well as lack of awareness on geospatial data are few major issues. Hence, there this is a need to conceptualize an integrated data repository mechanism characterised by the Decision Support System (DSS) in order to address these issues through effective utilization, sharing, management and planning of natural resources in the region [4].

NEDRP is one of the unique initiatives to provide geospatial data, services and tools for preparation of Detailed Project Report (DPR), Master plan document and any other inputs essential for various district level developmental planning and to support various Governance activities [5].

II. Objectives

The main objectives of this programme are as follows:

- 1) Integration of available natural resources database with a proper linkage to socio-economic data.
- 2) To develop a web-based single window information system with a set of Geo-processing tools such as spatial query based on area of interest, distance & measurement, pie chart generation etc. which will enable user to view and query the database.
- 3) To develop dashboard based web applications on top of the NEDRP framework for the Government Departments to support visualization of relevant data for planning and monitoring activities.
- 4) Online decision making tools based on User's criteria for identification of forest fire vulnerable areas, expansion of horticulture and afforestation activity have been added to the top of the NEDRP.

III. Technology & Platforms

This work conveys an efficient approach (Figure-1) to customize

and integrate an open source web GIS system based on a Mapserver as a web GIS server and PostgreSQL/PostGIS as an object oriented relational database management system (ORDBMS) for effective dissemination with strong security mechanism, sharing and management of spatial information over the web [6]. The GUI framework has been developed using

formats. The tools have been customized using Mapsript APIs. This framework comprises of a set of configuration files for configuring Mapserver mapfiles and the layout and order of layers in the GUI. In our case, we use PHP to call Mapserver and mapscripts to create GIS tools such as zoom-in, zoom-out etc. Mapscripts will take geospatial data or user click instances as

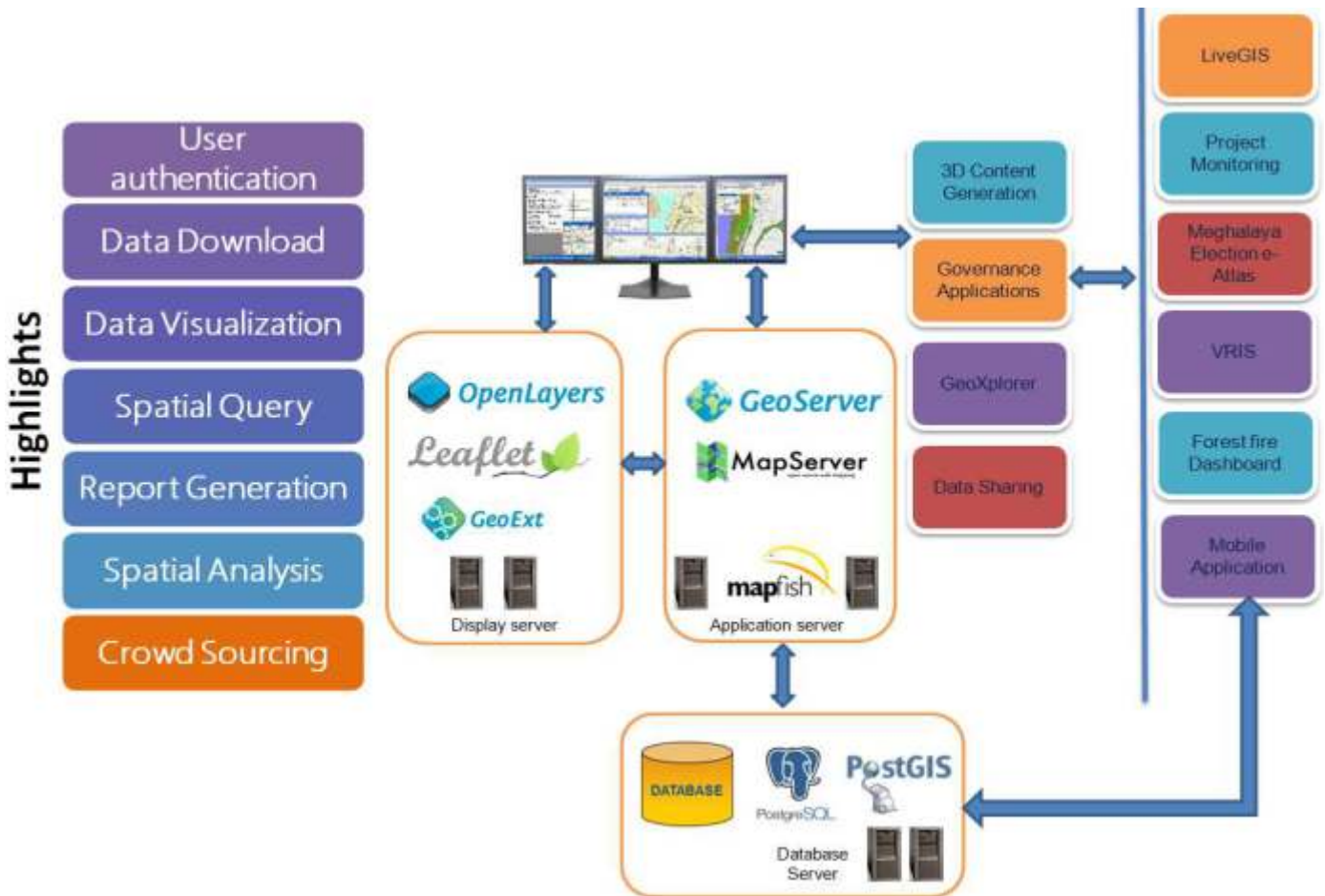


Figure-1: Architecture of NEDRP Geoportal (www.nedrp.gov.in).

various open source tools and follows OGC specifications for data interoperability. The necessary tools have been built on top of framework for basic navigation, map query, analysis, print and exporting of maps. The database schema has been designed and various data abnormalities have been properly checked before storing in the RDBMS.

The NEDRP portal is based on the client server principle where a browser sends requests for a map through HTTP. The request is processed by the Mapserver, e.g., fetching of map from the database as per extend and then map styling as per symbologies defined in the map files and the final output is sent to the web server which is then rendered in the client's browser. The Portal framework is based on Mapserver and PHP/Mapscript. Mapserver has the ability to display dynamic maps via the internet and enable map querying on raster and vector database

output as some images such as .jpeg or .png. The Mapserver mapfile defines the inter-relationships among various objects within a given layer to be drawn. It also specifies the locations from where the map data are to be fetched or connections to be established with the database storage. The definitions on how the layers are to be drawn based on layer attributes and files are explicitly described here. Mapfiles are then called within the portal framework configuration file where layer groupings, searching criteria and GIS tools to be made available on the GUI are added. The Javascripts are used to properly set the settings of each tool and their functionalities. The XMLs are used store other relevant metadata of each layer and toolset. All the layers are made accessible through the web framework. The layouts, themes and icons has been judiciously selected and tested on latest browsers for proper functionality and issues are resolved with minor

modifications.. The data can also be accessed by any remote users through desktop web applications. The databases in the portal are updated regularly.

NEDRP are made in compliance with established OGC standards and are

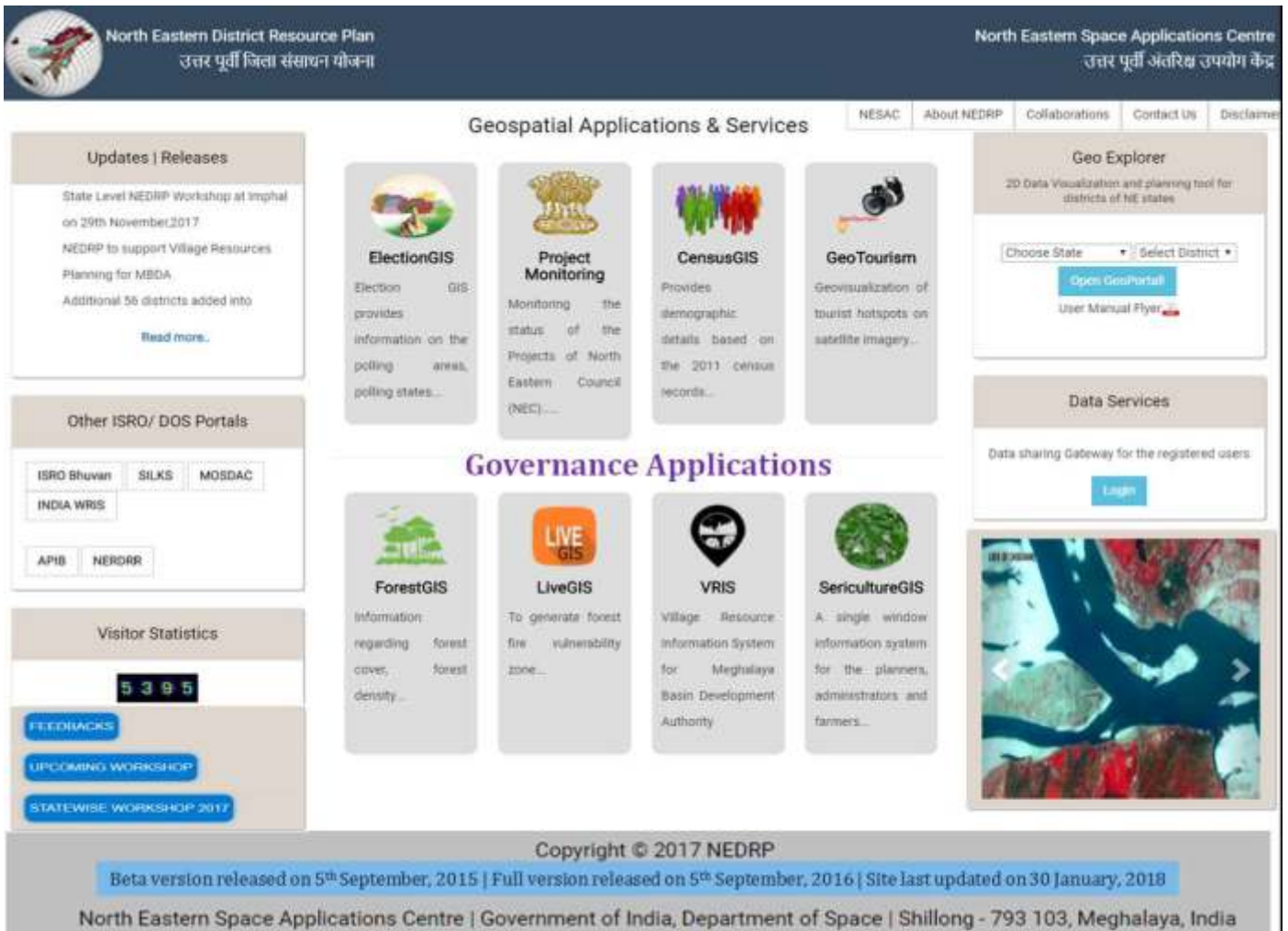


Figure-2: Homepage of www.nedrp.gov.in

The technologies such as chart.js, D3.js and leaflet etc are used for statistical visualization of the spatial data for decision making. The technology is being used in some of our NEDRP dashboard applications. GUI of NEDRP is comprised of mainly three components – i) Geo Explorer, ii) Geospatial Applications & Services for Governance applications and iii) Data Services – Secure data sharing gateway to the registered users.

III. Services

Initially, the portals were disseminated as standalone/portable systems for the wider penetration of this space based information system in the remotest local authority. Further, maximum of the places in the regions lacked internet connectivity and therefore online portals did served little purpose. Now, internet bandwidth connectivity with the likes of 2G/3G/4G has improved and expanded in the regions and therefore, all the portals have been hosted live and updated regularly. The data services under

interoperable and accessible by multiple devices irrespective of their platforms. The beta version was released for 36 districts on 5th September, 2015.

Subsequently, around 1620 layers maps via public domain and 1200 geospatial layers through Bhuvan node have been already released to the various users for their developmental planning activities. The full version of NEDRP was launched on 5th September, 2016 and around 40+ NEDRP standalone versions were installed in the offices of District Administrations and Line Departments where there was problem with high quality internet bandwidth. NEDRP data services have been effectively utilized for preparation of District Disaster Management for ASDMA (Figure-3) and Forest Resources Management plan, DPRs for Integrated Watershed management Programme (IWMP)/MBDA and Roads/Pradhan Mantri Gram Sadak Yojana (PMGSY), inputs for Election Management, inputs for development of MoSQuIT an integrated Surveillance System for Malaria, Flood Early Warning System (FLEWS) etc. Various investigation

agencies including SIB, Police etc., Line Departments like Agriculture & Horticulture, Water Resources, PWD etc., research institutes like Indian Council of Agriculture Research (ICAR), Indian Institute of Technology (IIT), Guwahti, University have been used NEDRP portal.

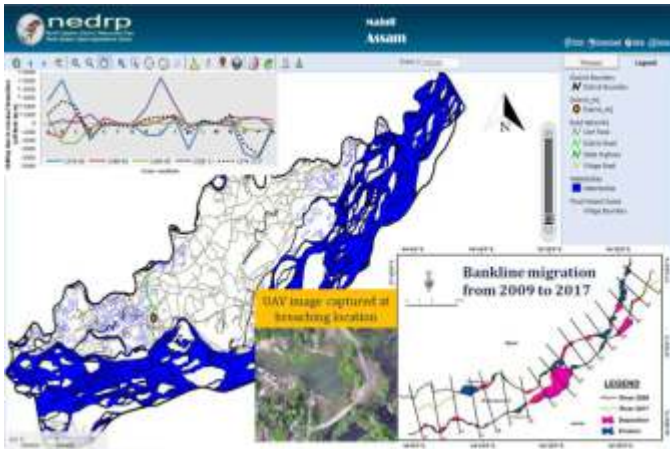


Figure 3: Flood hazard zones of Majuli with the bankline migration information

The programme was expanded to entire 101 districts of NER as per the directive of NEC, Government of India in the early phase of 2017. Around 25 number of one day workshops cum training programme have been organized during 2015-2017 for maximum utilization of NEDRP data for developmental activities. Large numbers of datasets have been downloaded by various users for preparation of their DPRs and developmental plans. Dashboard based web applications integrated with MobileApps were effectively introduced into the framework of NEDRP geo-portal to support the Governance activity. Total 8

applications have been developed for various Central/State Government Departments for planning and monitoring activities. The overall achievements and success of the project towards maximum utilization of space technology inputs by the Government Departments is given in the Figure-4.

IV. Governance Dashboard

NEDRP is now becoming decision making platform for the Governance applications in many Government Departments and agencies for their planning and monitoring activity. Dashboard based web application developed for the monitoring of the status of the projects funded by North Eastern Council in NER is one of the major achievements of NEDRP towards good governance. The monitoring dashboard integrated interactive Mobile Apps, GPS and satellite imagery to assess the status of the projects progress (nec.nedrp.gov.in, Figure-5) has been handed over to NEC and currently made operational with 95 projects of NEC running in 165 locations of NER. Election GIS module of NEDRP (election.nedrp.gov.in) is another important application accepted and is currently operated by the Office of Chief Electoral Officer, Meghalaya Election Department for online updation of electoral roll data in spatial domain and also to prepare the plan of action more effectively using NEDRP data and tools. NEDRP is also enriched with GeoTourism module (tourism.nedrp.gov.in) which was a directive from the Ministry of DoNER for better planning of NER tourism. Recently, the portal is portraying around 230 tourist spots categorized in monument, cave, peak, waterfalls, hot spring and hotels over Bhuvan base satellite imagery including the geospatial itinerary for planning the tour has been developed.

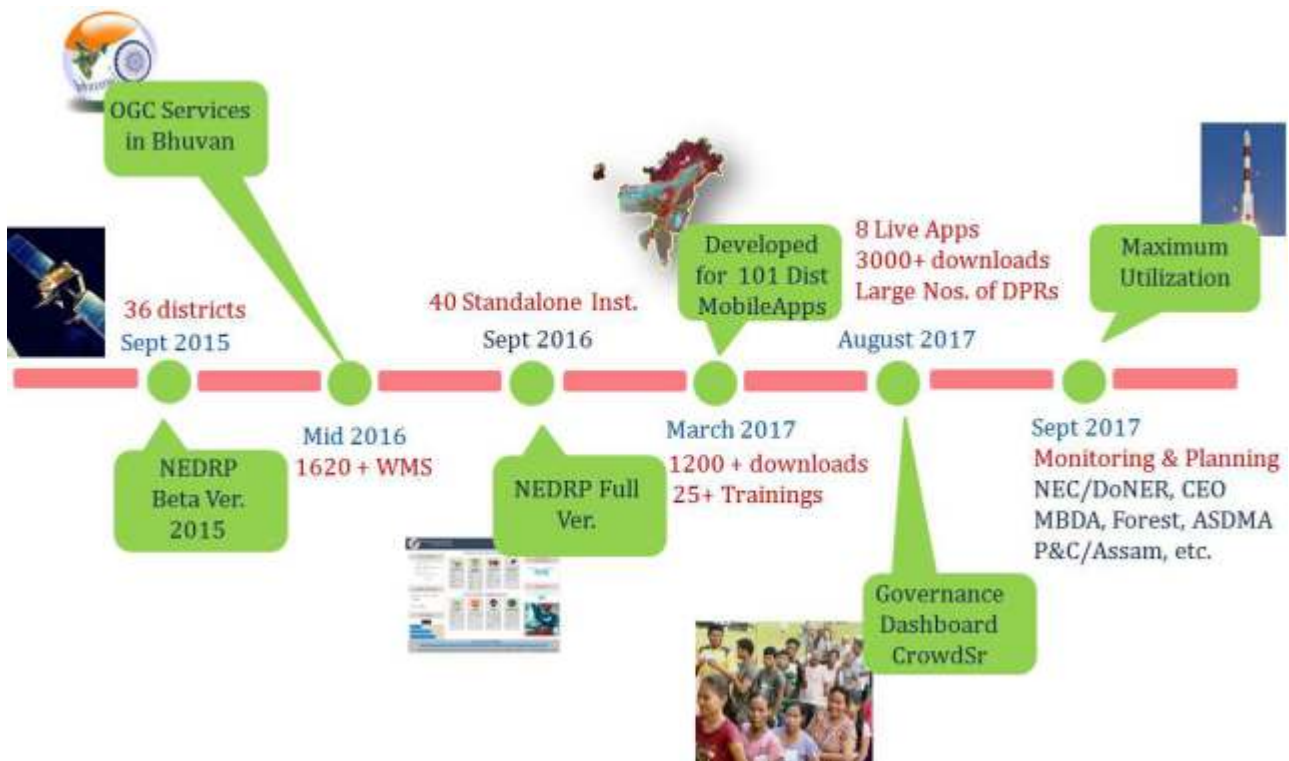


Figure-4: Overall achievements and success of NEDRP towards Governance activity

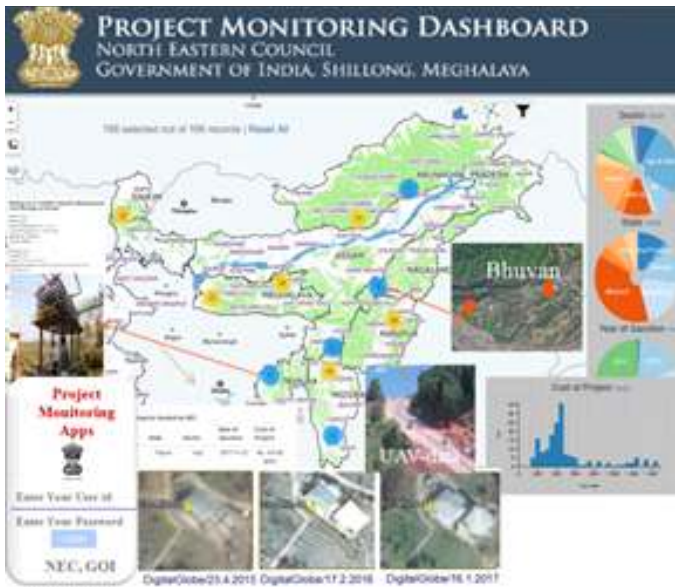


Figure 5: Project Monitoring dashboard available at nec.nedrp.gov.in

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References

1. <http://www.advancedtechnologystore.com/n/e/north-eastern-india.pdf>
2. <https://www.youtube.com/watch?v=7iplhtxhqdY>
3. https://www.ibef.org/download/NorthEastStates_171109.pdf
4. Chutia, Dibyajyoti & Singh, PS & Goswami, Chandan & Goswami, Jonali & Das, R & Sudhakar, Sunkari. (2012). A novel Geospatial Framework for providing effective Planning and Developmental inputs for District Resources Plan. 74-80.
5. <http://www.nedrp.gov.in/Updates.html>
6. Puyam S. Singh, Dibyajyoti Chutia, Singuluri Sudhakar, 2012, 'Development of a Web Based GIS Application for Spatial Natural Resources Information System Using Effective Open Source Software and Standards', Journal of Geographic Information System, vol. 04, no. 03, pp. 261-266.

Case Study of MaBhoomi: Metamorphosis of Land Record System in Telangana

Dr. Padmaja Naraharisetty *DGM, NISG*
TSIIC Zonal Office Financial District,
Nanakramguda, Hyderabad - 500032, India.
Phone : + 91 40 6654 5352 Fax :+ 91 40 6654 5300
Emailid: Padmaja@nisg.org

Raymond Peter, IAS (Retd.)
Chief Commissioner Land Administration & Spl. Chief Secretary
to Govt of Telangana (Retd).
Plot No 163, Road No 15, Prashasan Nagar, Jubilee Hills,
Hyderabad 500096 Emailid: rjpeter@gmail.com

Abstract

MaBhoomi project in Telangana State was designed as a one-stop-solution for data storage, access, and maintenance of land records with transparency and accountability. The Project attempts to bring in accountability among the Revenue and Registration Departments which is key to changes in ownership of land by way of sale, inheritance, death, transfer or gift. MaBhoomi addresses the issue of litigation of registering lands with an improper title by linking the registration server with the MaBhoomi server which is duly authenticated by the revenue department. The project brings clarity on discrepancies noticed by the registration officers and gets them resolved by authorised departments to effect changes as established by law and procedure. The project also provides a single source of truth to verify ownership of land at any given point of time. The project links SMS notifications to the owner of the land and facilitates provision to check if such changes are bonafide, bringing in extreme caution in the Revenue and Registration Departments. Land database created also provides a foundation of agriculture planning and crop loaning by banks and brings in greater accountability on the use of government subsidies. The paper attempts to present the e-Government project as a case study.

Keywords: e-Governance, government process reengineering, change management, land records

Introduction

This case study aims to analyse and present the process reengineering that the land records system of Telangana state has underwent. The process in which this was achieved resulted in the purification of the land records, i.e. the records were rectified and updated wherever necessary and with appropriate records of authenticity. The land records were completely decentralised, and avenues were opened up for integration of the system with the Department of Registration, Survey & Land Records and other related services. The main points analysed stand out to be transparent citizen centric e-service delivery, increase in the productivity and quality of the land records system, integration of related databases and managing change in terms of work disruption and additional re-learning effort of government officials involved and the impact of the project.

Research methodology

The paper is presented as a case study to depict the main themes identified. Merriam (1988) talking of case study research, defines a study case as a holistic and intensive description of a

delimited program, institution, a process, a social unit. This case study attempts to explain problem identification in the land records system, analysis of the root causes, current state assessment, process analysis, definition of future state and process implementation of the MaBhoomi project.

The data used in the case study comprises of primary and secondary data. The primary sources comprise meetings with policy level government officials involved in leading the project, meetings with the department head who supported project implementation, technical staff who were part of the project deployment. The secondary data has been sourced from the newspaper articles on the project, articles on the web and managerial records.

Background and context

Revenue Department is the custodian of title ownerships to land. The Department conducts surveys of land and prepares, maintains, updates and preserves the land records. It is the certifying authority for land ownerships, tenancies, cultivation, crop records, cultivation, soil typing etc. It is in this context that MaBhoomi was conceptualized and introduced to provide land records information directly to the public.

Initially, land records were perfect as land was seen as a source of revenue. However, administrative systems of the Revenue Department were eliminated when they exhibited vested interests in the ownership transactions, by not allowing the transactions to be made public. Over a period of time, records of land ownerships, transactions made were found to be missing, incomplete or incorrect, requiring a re-building of the records. The Revenue Department has undertaken a detailed exercise of ascertaining the ownership of land under the Record of Rights Act 1989 based on which the title to land owners was decided and published as Form 1B. Though some inaccuracies exist, IB accurately captures the title to land in respect of most owners of land. Based on the IB register Pattadar pass books are being issued. The Web Land captures the data of land in the form of 31 Columns which broadly categorises the details in the original settlement register, title to land, the enjoyment particulars, and finally the crop booking particulars. Inaccuracies in the land records are often due to subdivision of the land among the heirs of the original landowner or either due to changes due to death, gift, sale etc. While sales of lands are invariably captured through the registration department, the changes of land called mutations that have to take place because of death or gift or transfer of land do not take place promptly. The result is that lands continue to be with the original owners even long after they

are dead.

Even in the case of a sale, the data is incomplete as survey records are rarely complete. When updation entailing subdivision of the land and preparation of subdivision records are not carried out promptly, records become inaccurate and often are subjected to manipulation by unscrupulous elements over course of time often in connivance with revenue officials and data entry operators. The issues gets complicated even further when access to such records are not in the public domain.

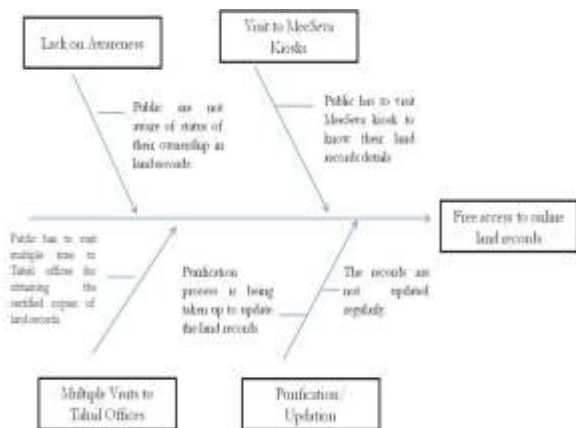
Further to such discrepancies, non – resident, non – local, residents who have been driven out by Naxalites and absentee land owners became the targets for unscrupulous elements, where the lands were taken over and sold or transferred by falsifying records or by forceful possession of the land.

Problem Statement

- Multiple visits by citizens to *Tehsildar* Offices to get any information related to land records for raising crop loans, effecting sale of land or partitioning of land
- Citizens have to visit MeeSeva centres to get their land records information on payment of user charges
- Lack of transparency in the existing system which denies public's direct access to land records

This complexity that existed in the land records necessitated a process reengineering to purify the land records and to port the land records data into a central server at SDC from which all Tehsil offices and meeseva centres can access records in a decentralized mode. The exercise also aimed at integration with other departments like Registration, Survey, Agriculture etc. to provide land records related services to public through a single portal

The changes were made to the WebLand system based on the requests/suggestions from the District Collectors/Joint Collectors/RDOs/Tahsildars with the approval of CCLA. Figure 1.0 depicts problem analysis of existing lan records system



The initiative to streamline land records management has been taken up by government of Telangana. Building a system which would record the details of land ownership such as title owner,

period of ownership, how the change of ownership came about – by inheritance, by sale, by transfer of 'Sthree Dhan' or by legal transfer; if the change of ownership was authorised, legalised was initiated after following the due process laid out by law The system is also required to automatically begin the process of 'Mutation', change of title ownership when the property is sold or transferred. By mutating a property, details of the new owner need to be updated in the revenue records in cases such as, after buying/purchasing a property, after inheriting a property through a Will or without a Will, or after acquiring a property through a Gift Deed. The time frame for mutation has been considerably compressed as a part of ease of doing business.

As-Is Process of the Existing System

Earlier the data was maintained at each Tehsil office, ensuring that the data remained in the local systems. After the decision for the initiation of WebLand, the entire land records database was ported to the State Data Centre with high end security measures, and the data was to be authenticated with Digital Signatures. The entire database was digitally signed in the year of 2011, and it has been opened up for citizen centric services through MeeSeva.

Before the MaBhoomi project, there is no system for the public / land owners to view their land records information or to verify the land records before buying the land. Citizens have to visit a MeeSeva kiosk to get certified copies of land records on payment of user charges, causing inconvenience to the public. The system of land records put into place aimed at:

1. Bringing the discretion in the Revenue Department to the barest minimum
2. Ensuring that if discretion needs to be exercised, it is exercised in accordance with law, following the due process of law
3. Providing a one stop solution to view the following land records online
 - *Pahani* of a Survey Number
 - *Pahani* of entire Village
 - ROR-1B of a *Khata* Number & Encumbrances of Registration Dept.,
 - ROR-1B of entire Village
 - Scanned *Tippons*
 - Cadastral Village Maps
 - MIS to view progress reports of various Departmental activities.
 - Grievance Corner to register complaints in agricultural land records.
 - *MaBhoomi* also available as android Mobile app to view their *Pahani* copies
 - Linking *MaBhoomi* to banks for availing crop loans by providing access to banks

Thus, conceptualized project would improve the system as depicted in Figure 1.1

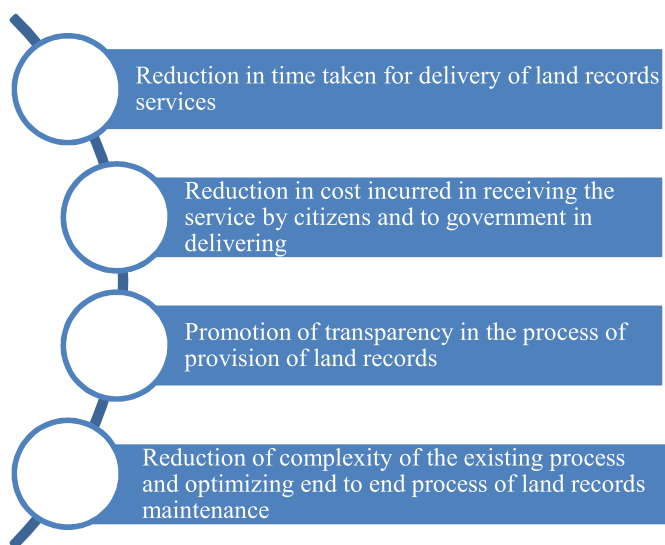


Figure 1.1 Benefits of proposed MaBhomi system.

Proposed Reform

In order to bring about the required change in the system, a complete re-engineering of the processes it was recognized that this was possible only through an IT based system, making it transparent and accountable.

The Revenue Department's Land Records system, WebLand, was developed by NIC. The digitized records were all put into the system, but in a manner too complex and convoluted that no one could understand or work on it effectively. The system too, was largely dysfunctional mainly due to the reluctance of Officials to get on the platform, primarily because of inadequate skills, insufficient knowledge of the IT system, inept and careless attitudes. This led to the growth of a new set of manipulators, in the form of data entry operators, who were modifying records on considerations.

In some cases, it was noticed that manipulation of records was done at Tehsildar level. In other, more common, instances, the digital key information (PKI, user ID and password) was shared with the data entry operators leading to manipulation with a little or no accountability for any of the changes made. The system became extremely susceptible to fraudulent changes. Further the change requests to the various modules in the WebLand system were implemented without a complete awareness of the functioning of the overall system, which were not tracked, nor were they authorized. This led to other modules malfunctioning and the entire system got affected needing constant fire-fighting and troubleshooting. Since the data was not updated in real time the WebLand system was functioning like a standalone system, hence process reengineering was proposed.

Process Re-engineering of land records system

In a discussion with all the officials involved in the project – Joint Collectors, Revenue Inspectors and so on – it emerged that the WebLand system needed a three-pronged intervention

- Need for training the officials operating/ managing the

system

- Updation of information on the *WebLand* system by all the revenue offices in the state after a diligent process of enquirer and verification of documents.
- Enabling information updation on a real time basis

The MaBhoomi project necessitated that the system needed to be designed such that the legitimacy of the records could be confirmed or verified from anywhere, by anyone, simply on the basis of the Khatha number, or the survey number or sub-division number of the land.

Over a period of eight months, all the changes and updates made in the Web Land system over the past three to four years were consolidated, correlated into a single database. Videoconferences have been conducted each week for over six months to identify the errors in land records and update the same giving due notice to farmers. The Web Land system was then ported on to a mirror server, with a sync frequency of three hours, where the main WebLand server remained with the Revenue Department's servers.

Separate modules to access information at various levels of Government were created and each official, at his level, was given an Aadhaar enabled biometric access to the contents of the database. The security of the information in the database was further enhanced where no data could be modified, updated, added or deleted unless personally certified by the MRO (Mandal Revenue Officer) with their Aadhaar based biometric authentication.

One more unique feature of the system was designed such that the entire record of land ownership in a village was openly available to the public. The discrepancies in the data of each of the records could be queried and the status of its resolution could be tracked through a Grievance Portal that was launched. Further to this, an SMS feature was added, wherein the current title owner of the land in question would receive an instant message when a change was made in the ownership information on the database.

To further increase the access and sanctity of the records, the MRO was required to conduct Grama Sabha, wherein the entire set of records was announced to the village and a copy of the same was pasted in the form of a notice at the Village Centre. Any grievances were invited for redress on the spot. In order to facilitate the redresses, Data Entry kiosks were set up. This process resulted in over one crore legitimate changes which were made to the original database.

Rectifications process of the Pahani records available online are printed village-wise and got verified physically with the base land records and then were put to Grama Sabhas to identify the mismatches in land records. Approximately 10, 74, 043 land records were updated using rectification modules. Figure 1.2 & Figure 1.3 depicts end-to-end future state process flow of MaBhoomi

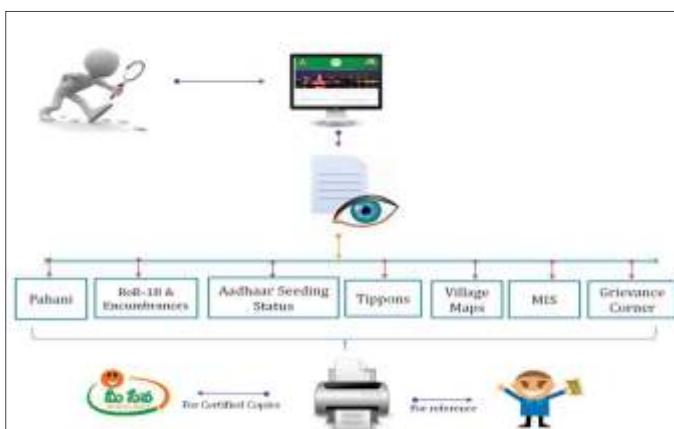


Figure 1.2 MaBhoomi System Layout.

1. Intent to make the database of the land records system open to the masses
2. On realization of the incompleteness of the database,
 - a. upload all data to the servers
 - b. take the data to the village, in the *Grama Sabha*, read out the entire database, collect all the errors and rectifications to be made

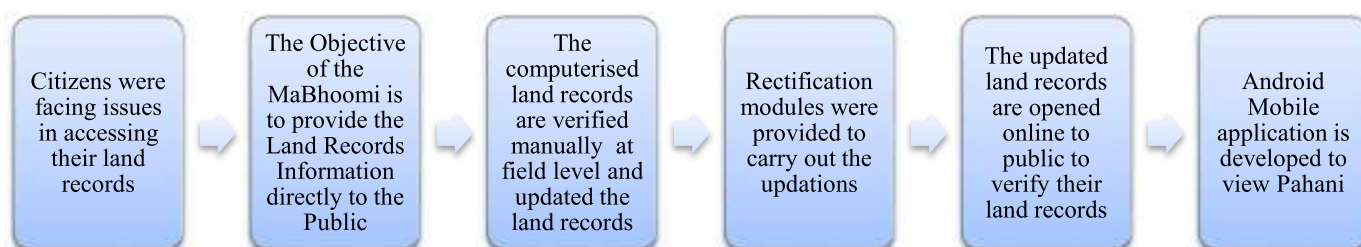


Figure 1.3: To-Be Process Flow.

register his Aadhaar and biometric for the process and made accountable. The idea behind equipping the VOs with the tablet computers and other systems was to have a photographic record of the farmer, his lands, the land type and the crops being cultivated in said land, to be mapped to the satellite images of the area for correlation of the information.

Further, the information could be used to develop the cropping pattern map of the state, or a particular area within the state, a soil map, a village map and also demographic maps which could be generated for areas cultivated by the Scheduled Castes, Scheduled Tribes, and Marginalised sections of society.

Hands on Training sessions were conducted to master trainers identified from the Districts who in turn imparted training to the Revenue Staff at District and Mandal level. The training and capacity building for this entire project was conducted over a period of six months via weekly video conferencing with the ground level operators – the MROs, the *Tahsildars* and the Village Officers. *Tahsildars*, *Naib Tahsildars*, *Girdawars*, Village Revenue Officers & Computer Operators in 584 Mandals were trained. By the time this phase was being rolled out, about 95 – 96% of the total work was successfully completed. There was no role played by a Consultant at any stage of the project process.

- c. from the MRO's office, issue notices of the changes being made to the record holders
 - d. ROR-IB extract(along with photograph and Aadhaar Number) to the concerned farmer calling for confirmation or objections if any
 - e. escalate all the issues which need further interventions and fill in the gaps
3. A complete upgrading of the entire database by approaching the villagers at their own villages, was achieved as a one-time effort. This process also facilitated grievance redress to rectify ownership of the lands in question.

At this juncture, discrepancies such as personal loans being waived off under the Crop Loan waivers schemes rolled out by the Government was noticed. In such an instance, about 500 crore rupees were used from the Finance Department to reorganize the State Revenue Department.

The MROs were equipped with computers, printers, scanners required and every Officer was mandated to register

Impact of the Project

An initiative of Government of Telangana after State formation, the impact of the project was observed as under.

1. Any individual can obtain a paper copy of a record on MaBhoomi for free, without any interaction with or intervention required from the Officers. Thus, emerged a work-flow based system in place of the previous manual system with the escalation levels going from Village Officer, to Revenue Inspector, to the Mandal Revenue Officer, on to the Rural Development Officer and finally to the Collector.
2. As on date, there have been 45, 00, 400 hits on the MaBhoomi website. MaBhoomi is the ultimate repository for land records with 1, 63, 45, 701 Survey/Sub Division numbers, 75, 24, 079 Pattadars and 1, 95, 40, 554 Occupants. The issuance of manual certified copies of Pahani and ROR-IB has been stopped. The manual mutation has been stopped in the Districts.
3. Database for identification of government lands, their usage and availability for future development has been created
4. Linking MaBhoomi database to the Registration database

- streamlined sale records.
5. Linking MaBhoomi portal to Banks to enable them access for granting crop loans to farmers. In parallel, a system of granting loan eligibility certificates to farmers who are actually cultivating the land has been put in place
 6. Payment of Registration fee to authenticate the sale, along with the stamp duty. As the Registration fee is paid, the Registrar is required to check for the data in the Record of Rights registry streamlined registration process.
 7. Web service is provided to Agriculture department to access the land records information for issuing incentives to the farmers like input subsidy, crop damage etc.

Change Management Strategy

When faced with a dictate regarding MaBhoomi, there was resistance from the Officials, who anticipated that their discretionary powers are being done away with. The hesitance and resistance was overcome by slow and consistent efforts to streamline the new processes, technology and training. It was reinforced that the employees have to comply with the changes that the project brought about. The Employee Unions, too, were roped in to support and encourage the Officers in the field. Such teething troubles were slowly but surely smoothed over the first three months of the project being launched in real time. The process was further supported and complemented with the consistent tracking and troubleshooting efforts of the higher official hand-in-hand with the Officers in the field.

Further Enhancements to the System

Post the implementation of this major exercise, the second stage of the project was initiated with the "Loan Eligibility Certificate" (LEC). This is a certificate which is enshrined in the law, but has not been put into practice. Any individual, who is not the Owner of the land, or a recognised Tenant on the land i.e. no recorded lease for the use of the land, can apply for the LEC based on the land that has been borrowed for cultivation, from a titled land owner. Here, the LEC acts as a record by itself, giving the details of the land ownership, tenancy of land by applicant and his eligibility for the loan itself in the Revenue records. This acts as the guide for the Banks and Financial Institutions for the approval and disbursal of loans as the LEC records can be accessed by them. Access has been given to bankers through loan charge module to verify the land records before issuance of loans and to create charge on revenue records. As on date 8,381 charges have been created.

The subsequent stage of this process is the digitalization of the Record of Rights, which gives how rights on land are derived for occupant or land owners, and thereafter, records the transactions made in Record of Rights from time to time. This is a village-wise register, also known as *Patta*, and is maintained by the *Tehsildar*. As a part of achieving the digitalization, an amendment was brought about in the Record of Rights, wherein it was stated that, "*a computerized WebLand Database, as obtained by the Revenue Department shall also be treated as Record of Rights. Changes made in the electronic Record of Rights shall be deemed the Record of Rights for the pertinent*

extent of land". Next, the Banks and Financial Institutions were directed not to ask for the *Cultivation Certificate* and so on. In order to bridge the gap created by the lack of *Cultivation Certificates* and such, a Crop Loan module was developed and interfaced with *MaBhoomi*, to avoid generation of falsified records or out-dated records in the form of passbooks. In turn, the passbooks too were digitalized and synchronised with the Aadhaar number of the individual account holders. This eliminated the requirement of the Bank checking and verifying the details of the loan seeker. The Banks only needed to see the survey number of the land in question and the LEC accompanying the same. Later, the loan sanction number and other details such as amount of loan sanctioned, the number and amount of instalments with the due dates, are all added on to the record to maintain the complete registry.

Conclusion and Key Learning(s)

Integration with the Banking systems, the Agricultural Department, Agricultural Marketing, Cooperative Department, Primary Agricultural Cooperative Societies, the Primary Agricultural Credit Societies, etc. with the MaBhoomi database would make the entire system seamless in terms of operations with one, single route of information

1. Clarity of purpose was the driving force for the project implementation. Here, the purpose was to create a transparent, irrefutable, verifiable application system for Land Records, Titles and Revenue, thus bringing in transparency and avoiding changes that lead to corruption.
2. The opportunity to completely update and digitize the records has been enabled based on a work flow based system, which clearly defined the process to be adopted.
3. The purification of land records is the main challenge during the implementation of MaBhoomi portal.

References

- [1] Merriam, S. B. "Case study research in education. A qualitative approach". Jossey Bass, San Francisco (CA), 1988
- [2] B.R. Dey, "Business Process Reengineering & Change Management" Dreamtech Press, 2004
- [3] R. Srinivasan, "Business Process Reengineering", New Delhi: TATA McGraw-Hill, 2011
- [4] Lynch, R. F., & Werner, T. J. "Reengineering business processes and people systems." QualTeam, 1994
- [5] Christensen, "Innovator's Dilemma: When New Technologies Cause Great Firms to Fail (Management of Innovation and Change)", Boston: Harvard Business Review Press, 2013
- [6] Manoharan, A. (Ed.). "E-Governance and Civic Engagement: Factors and Determinants of E-Democracy: Factors and Determinants of E-Democracy" IGI Global, 2011
- [7] Amit Prakash, & Rahul De, "Importance of development context in ICT4D projects- A study of computerization of land records in India, Information Technology & People, Vol 20 No.3, 2007

Governing e-Governance

Dr. Piyush Gupta

e-Governance Evangelist,

Consultant & Trainer

Mob. : 07042174466

1. Background

Today, e-Governance has become a development indicator and an aspiration in and of itself. It can clearly contribute to development. It has helped advance the delivery of basic services such as education, health, employment, finance and social welfare. It is helping small island developing states in building resilience to climate change and disaster preparedness and disaster management.

Overall, e-Governance brings an instrumental value in boosting the quality, efficiency, and effectiveness of the public sector, in fostering co-ordination and cooperation across levels of government, and thus increases citizens' trust. Improvement of governmental processes starts with improving the internal workings of the public sector by cutting processes costs, managing process performance, making strategic connections in government, and creating empowerment.

Institutions are vital to any country's long-term economic development, and they have a positive, direct impact on growth. Strengthening of institutions, bringing their transparency and accountability in line with improved internal governance are important strategic directions that need to be followed. Implementing e-Governance aims at strengthening the performance of the public sector in providing high quality public services to its citizens and businesses, and also brings more inclusiveness to societies.

e-Governance can help connect individual systems and government functions, as well as public services, into a coherent system, thus enabling enhanced Whole-of-Government (WoG) service delivery in the economic, social and environmental areas. The integration of services, enabled by WoG and e-government, also helps deliver interlinked social-economic- environmental activities together, this allows to build on synergies while avoiding trade-off and unwanted impact of measures in one area on measures in other areas (UNEP, 2009).

This integrated nature has shed new light on the need for integrated policy making. Integrated policies and WoG approaches allow governments to pursue sustainable development more effectively, by taking

into account the interrelations between economic, social and environmental dimensions as well as between the sectors and sub- sectors addressed by the goals and targets.

WoG denotes public service agencies working together across organisational portfolio boundaries in a shared response to particular issues. WoG is closely associated with “Connected” and “Joined- Up” government concepts (UNDESA, 2012; Government of Australia, 2004). WoG service delivery, enabled by e-government technology, can offer people services from various public agencies bundled together as a single, joined-up service in a one-stop-shop. For people, it means that interacting with public administration becomes much simpler. Achieving such an integrated approach to public service delivery depends on (i) the use of a common organisational and technical platform to ensure back-of ce integration, so that internal processes are coordinated and run smoothly together, (ii) robust interoperability (i.e. that each system is compatible and works with other systems), and (iii) an infrastructure that supports the use of electronic identity cards and signatures. Some countries have successfully implemented such a service. However, by and large, WoG service delivery, including interoperability does not function well in many countries yet, regardless of their level of income. Ensuring that an integrated approach is effective and sustained across ministries and agencies remains challenging.

Keeping the pace of e-Governance and Digital governance, it is important the initiatives do not remain champion driven and are embedded in the system, by establishing governance structures and thereby institutionalise the initiative.

Some of the focus area under this would include, improving the government back-end service delivery systems, developing processes around workflow, establishing requisite institutional structures, improving project and program management, strengthening internal government human competencies, and developing required tools in terms of policies, standards, guidelines. The following chapter brings out an understanding on some of these areas.

2. Capacity Building

No transformation is possible without a need of urgency in the stakeholders who are trying to push change. Keeping this critical factor in mind when designing e-Governance initiatives, it becomes utmost important that the process owners in the government understand the nitty-gritty of designing meaningful e-Governance initiatives. This leads to the importance of capacity building at all levels within the government agencies. The required competency in different phases of the project will vary at different levels in the government hierarchy. Developing the required competencies in government employees, is one of the critical factor for the successful designing and implementation of e-Governance projects. The required capacity building can build ownership and get a buy-in for these transformational projects. The challenge faced in the earlier computerization days and even today in e-Governance projects, has been to synergise the knowledge and skills of the government domain experts and IT professionals. This gap has, to a certain extent shifted the ownership and risks of e-Governance projects to the private sector and IT professionals, thereby leading to many non-sustainable initiatives.

2.1 HR Policy for e-Governance

Capacity Building is one of the critical and challenging pillars of e-Governance. Typically capacity building in context to e-Governance involves building and developing requisite capacities, competencies, policies and institutional structures for the smooth transition and sustenance of the initiative. In January 2013, an expert committee setup Government of India made its recommendations under the “HR policy for e-Governance”. The Committee has a made a number of wide ranging recommendations which, it is expected, would aid the setting up of appropriate HR structures and mechanisms for e-Governance and fast track the successful implementation of the NeGP, contributing to the realisation of good governance in the country. Some of the more important recommendations are:

1. Institutional structures of e-Governance: The Committee has recognised that the existing structures in most of the Ministries and States are inadequate to support the implementation of the MMPs and other key initiatives. It has further observed that inter-linkages between various entities are weak and accountability is diffused. Having regard to the need for appropriate organizational structures that are required to be

put in place both at the Centre & States for programme and project management of e-Governance, the Committee among its various recommendations has proposed putting in place CIO structures in Central Line Ministries, EDS Directorate in States/UTs and Dedicated Project Teams for managing projects. The enhancement of NIC's role as a Technology Advisor to the Government and its strategic role in MeitY, Line Ministries & States has also been emphasized. Other entities that require strengthening & continuity are the National eGovernance Division at the Centre and SeMTs in the States

2. Developing Human Resources within the Government for e-Governance: In regard to the HR policies for e-Governance, the Committee has deliberated on the need for growing the resource pool in the Government and various policy interventions that are required to build internal competencies. Its recommendations in this regard include putting in place a competency framework, tenure for project teams and various monetary and non-monetary incentives including performance linked incentives.
3. Inducting External Talent into Government: The Committee has taken into consideration the realization that competencies outside the Government ought to be leveraged and an enabling framework for attracting, retaining & optimally utilizing such skilled persons needs to be put in place. It has accordingly included in its recommendations the appointment of open market personnel on stable contracts, delegation of powers, accountability & competitive 'near-market' salaries and enabling provisions in the Recruitment Rules for inducting external talent for undertaking e-Governance initiatives.
4. Training and Capacity Building: The Committee in its report has recorded its firm view that the existing training initiatives need to be strengthened and a comprehensive training framework needs to be put in place so that Government employees are able to conceptualize and implement all projects using technology enabled platform. The Committee has discussed the need for training & implementation plans for all levels in the Government, from the highest political and administrative leadership and officers requiring specialized skills to those providing mediated access. The recommendations of the Committee in this regard include,

among others, mandating ICT skills and embedding eGovernance training at all levels, CIO training and other specialized training programmes, linking training with monetary and non-monetary incentives & disincentives & setting up of an eGovernance Academy as a Centre of Excellence and think tank in this area.

5. Other Recommendations: To meet the increased demand of eGovernance, the Committee has observed that there is a need for a large pool of academically qualified resources. To meet this requirement, the Committee, has made recommendations regarding changes in the college curriculum for building a pipeline of knowledgeable pool of candidates for the Government as well as the private sector. Other recommendations relate to a Knowledge Portal with a Centralized Document Repository, Collaboration Portal & Knowledge Management System.
6. Funding: The implementation of various recommendations made by the Committee will require funding to a limited extent. The Committee has accordingly recommended that provision of funds should be made for implementing the recommendations made by it.

Further, it has also been rightfully established that it is

necessary to meet the critical gap of resources in the Government for taking NeGP forward. The task also included strengthening the presence of IT personnel in the Ministries/Departments and State Governments and harnessing the IT talent that exists outside the Government.

2.2 e-Governance Training

Over many years, the NeGD, GoI has initiated various training programs across all levels of government. These training programs address internal stake holders in government, covering political leaders, bureaucrats, and other senior and middle level officers who may be associated with the e-Governance projects. The training content primarily focused to develop requisite knowledge, skills and attitude for the e-Governance transformational initiatives. And these training have delivered good results, bringing better understanding and coordination amongst the government and external consultants engaged in different phases of the project.

In December 2014, the National e-Governance Division (NeGD) developed “ e-Governance Competency Framework for Digital India (e-GCF)”. The framework identifies and defines competencies that are essential and critical to job performance in an e-Government environment.



Figure 1: e-Governance Competency framework (e-GCF)

The e-GCF identifies a list of 19 provisional roles needed in a project team across the life cycle of an e-Government project. Eight of these are managerial/administrative roles and the remaining eleven are technical roles. The e-GCF also identifies certain end-user knowledge required for all government employees. The framework can be applied to structure a PMU team in any e-Governance project.

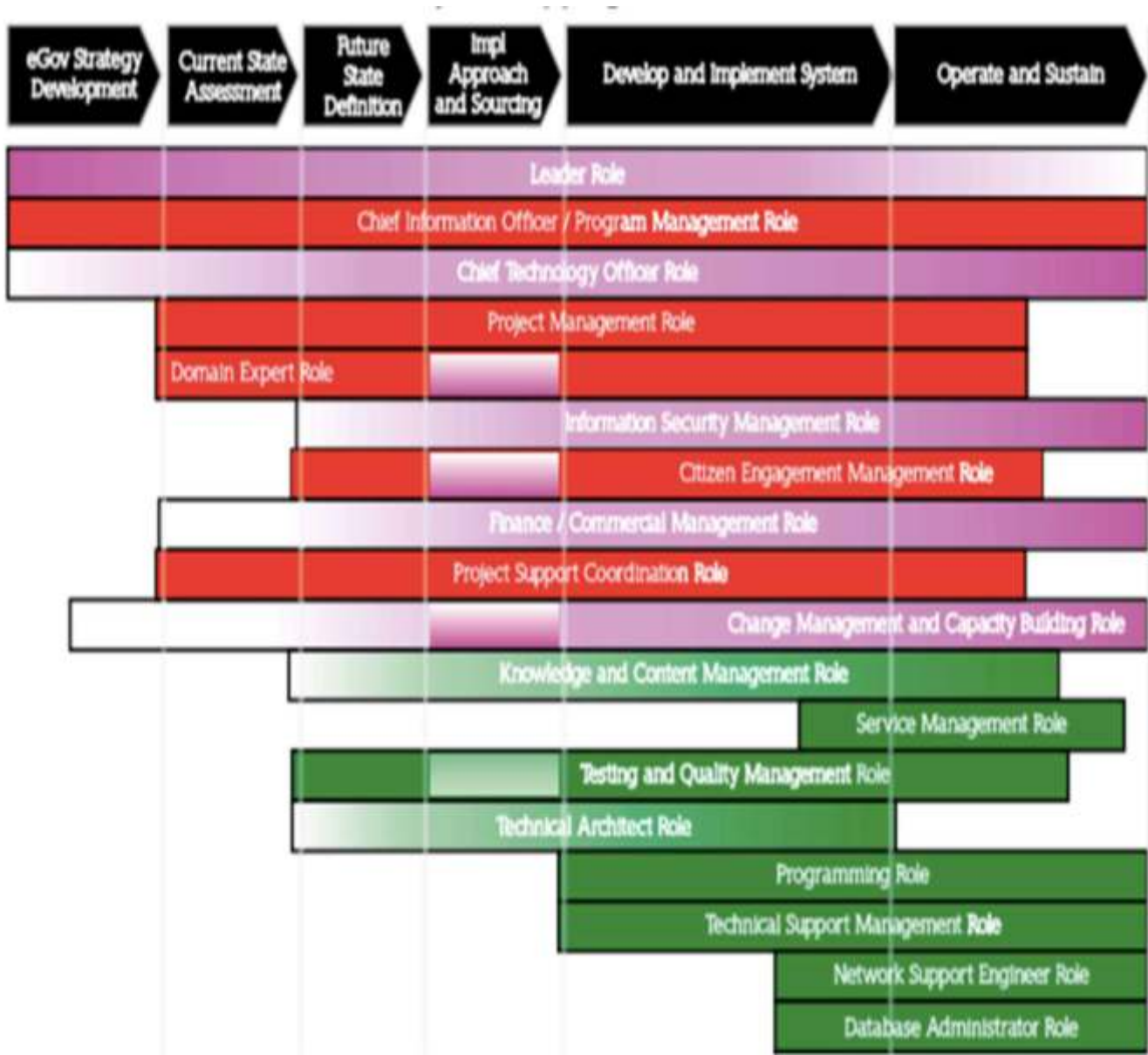


Figure 2: e-Governance mapping with competency roles

In spite of the various initiatives of the Government of India, the challenges in building the human capacities with government remains a challenge. Firstly, even today training in government is largely looked upon as an additional work, with less focussed efforts on identifying the employees to be sent for training. Quite a few of the government agencies are able to do a planned exercise on the training needs in e-Governance for its employees. Generally, it is experienced that employees who are required to be trained, are not spared, and employees who do not have much role in e-Governance projects post training are deputed for training. Many a times, even if interested employees are sent for training, then after training they are not used by giving required roles in the project. Another, thought to this can be that build as much capacity with the government as possible. However, prioritization of employees for training is still important.

Secondly, the classroom sessions take quite a lot of time of the participants for giving an understanding on the basic conceptual understanding of e-Governance, processes, frameworks and techniques. It may be the understanding on government process re-engineering, methodology for As-Is process mapping or analysing processes. In addition, there are group assignments on applying the techniques to live cases, case discussions, etc. Today most of the training being taken up related to e-Governance would take around more than 60% time on explaining this aspect of training content. This increases the duration of the training, also makes it a dry subject to generate participant interest. Most of the time this becomes a constraint when selecting the employees to be sent for training.

The government, today is required to work towards building a learning environment on e-Governance, rather than only focusing on training in specific set of knowledge and skills



Figure 3: The New Norm

When we talk of experiential learning, we need a paradigm shift from our existing content and move to case study based learning. Case studies coming from the e-Governance implementations happening across domains/sectors, central or state governments. One of the approach to develop this important learning content is through the process of e-Government project assessment studies.



2.3 Project and Program Management Unit

Project and program management should be understood along a continuum of increasing scale and complexity. The continuum begins with small projects and moves to projects of increasing size and complexity. As the scale and complexity of these projects increases the work must be broken into multiple projects that should be managed in a coordinated way as programs. Project and program management are distinct disciplines, but they are inextricably linked. Effective program management depends on effective project management, which itself depends on a cadre of professionals including not only project managers, but also an array of technical specialties and disciplines within the project and program management profession, such as requirements development, cost and schedule estimation, and risk management.

Perhaps the most important barrier to the development of program management capabilities in the government is the simple failure of many senior government leaders to recognize its value and champion its development. In the absence of consistent, senior-level support, efforts to institutionalize the discipline in agencies are likely to flounder. Program management is considered an administrative or technical specialty concerned with

2.4 Monitoring & Evaluation/Assessment

e-Governance projects are modelled involving investments from Government and private sector. These investments demand a reasonable means of assessment whether the projects are able to achieve (or have achieved) the objectives for which they have been taken up. With the increasing expectation level of citizens and technology advancements, there is an increasing demand at which these e-Governance projects should be implemented. The implementation speed requires shorter learning times with safeguards on failures.

Given the nature of impact, scope, and the large reach that e-Governance projects have, they cannot be bracketed like a majority of the IT projects undertaken in the Private sector. Return on investment is not the primary objective when e-Government projects are conceived. They are mostly driven to achieve efficiency and effectiveness in service delivery. Governments run with tight budgets, hence there is an increasing demand to re-examine their spending priorities. In order to know the actual results as compared to the desired results of e-Governance, outcome based assessment for these initiatives become a crucial part of e-Government project life cycle.

Today, most of the e-Governance projects are focussed on monitoring and not evaluation. Monitoring focuses on Service Levels (SLA) or project management aspects which are primarily operational performance of the project and not Outcomes. Whereas, evaluation is focused to assess holistically, the achievement of the project objectives, project outcomes, project intended benefits set for various stakeholders.

It is crucial today for the political and policy levels to illustrate the use of ICT in the State to address the 17 SDGs – ranging from poverty elimination, ending hunger and malnutrition, health and well-being, education, gender equality, water and sanitation, energy, growth, resilient infrastructure, inequality reduction, sustainable production and consumption,

urbanisation and habitat, climate change, life on land, life below water, peace and justice and global partnerships. The Sustainable Development Goals (SDG) announced in 2015, has become a major focus by the Global community, that identifies three core objectives for human development – economic growth, social inclusion and environmental sustainability. At the state level the 17 SDG and 169 defined targets can be considered as critical indicators for assessing the state development. These are important areas that require urgent and extensive attention at present and in the future. Digital India initiatives at the national and state level has a critical role in the achievement of SDGs, for which the States have made significant progress that directly impacts the lives of our citizens in urban and rural geographies.

Monitoring uses three indicators to measure different aspects of program performance – Input, Process & Output.

Evaluation uses two indicators to measure different aspects of program performance – Outcome & Impact.

In the past Ministry of Electronics & Information Technology (GoI) initiated assessment of select projects with the help of third party (IIM Ahmedabad and other Research) agencies. The Assessment Framework primarily focused on some broad parameters, e.g. assessing impact on outreach, cost of accessing services, quality of services and overall governance. In 2007-08, three national level projects (MCA21, Passport and Income Tax and three state-level projects (Land Records, Property Registration & Transport) were assessed. The studies included both the control and the treatment groups i.e. the users who have experienced manual system and users who have experienced the computerised system.

Subsequent round of assessment during 2009-10, was carried out for mature projects which have been delivering citizen services for 1-2 years. This included JnNURM e-Governance Reforms, & Computerization of Commercial Taxes. Apart from these, e-District project was also assessed for baseline with the

implementation rather than an integral part of accomplishing the agency's mission. A symptom of this attitude is that program management staff is not consistently involved in the planning for policy and transformation initiatives. They may be brought in once major decisions are made, when it is too late to address the requirements—people, processes, and technology—of initiatives, leading to troubled implementation efforts—e.g., costly scope changes, cost and schedule overruns. Furthermore, program management it is not always seen as a promising career by those who wish to rise in the agency. This hinders the development of a strong and valued program management capability within agencies.

In the Indian context, most of the central government initiatives e.g. Passport Seva (Ministry of External Affairs), MCA21 (Ministry of Corporate Affairs), eBiz (Department of Industrial Policy and Promotion) have a dedicated Project Management Unit (PMU) primarily driven by engaging experts from the open market. At the state level also, there are various PMU setup to drive the projects along with the private sector implementing agencies.

The discipline of program management is a body of principles, practices, and techniques that continues to evolve over time to provide a rigorous, repeatable approach to managing large, complex change initiatives effectively and efficiently. It provides a framework for integrating and aligning the diverse functions and stakeholders within and across organizations around the common end of managing change. In the absence of this discipline, successful program management depends largely on luck and the heroic efforts of individuals.

2.4 Policies, Standards and Guidelines

Policies form an important component of the initiative sustenance. To better understand this role, policymaking can be disaggregated into stages and sub-stages, which make up a “policy cycle” (see Figure below). The phases of policymaking begin with agenda setting (i.e., consideration of a problem or issue that requires government attention). It moves to the policy formulation phase (i.e. consideration of options to address the problem), and then to decision-

making (i.e. prescription of a particular course of action). In the policy implementation phase (i.e. translation into action), the selected direction and approach translates into action on the ground. Finally, policy outcomes are monitored and evaluated in the policy monitoring and evaluation phase, often leading to setting a new agenda.



The e-Governance related policy, standards and guidelines have been issued over a period of time by various government agencies under Government of India. One of the main agency has been the National Centre for e-Governance Standards and Technology (NeST) initiative led by STQC under the Ministry of Electronics & Information Technology, Government of India. NeST has published number of standards and guidelines with respect to core technology and processes (www.egovstandards.gov.in).

The action plan for NeST includes formulation of e-Governance Standards, Support to Open Technology and Open Hardware, Think Tank for evolution of e-Governance standards in sync with R&D, Conformity Assessment to verify implementation of e-Governance standards and support to STQC/ITTL laboratories towards the same, Organization of seminars, professional training (class-room, e-learning and blended) for advocacy and awareness of Standards in various states, Sharing and Collaboration (International Standards Organizations, Repository of standards, best practices and case studies, Industry and Academia collaboration) and Support services (Facilitate adoption of Standards and Open Technologies, Help-desk, Test-bed facility and the like).

cation listed under the common applications primarily form the key ingredients for improving the internal efficiencies and communications within the government agencies.

Since many years governments in India have been putting in efforts to improve internal efficiencies across processes to address the front-end and back-end. One of the key challenge, that still remains is to improve and bring efficiency in dealing with government internal file movement processes. It was way back in 2000 when the government of Andhra Pradesh implemented a workflow based application to address the file movement and creating the central digital repository.

1.1 e-Office Implementation

As per the NeGP, DAR&PG is the Line Department for e-office Mission Mode Project(MMP). NIC was selected as the technology partner in December 2009. NIC has made the investment both in the development of the various modules of office automation solutions now packaged as e-Office and in the infrastructure for the deployment including the Disaster Recovery and require to further invest to cover all central government ministries/departments.

The product is built as single reusable system by bringing together independent functions and systems under a single framework to enhance transparency, increase accountability and transform the government work culture and ethics.

e-Office aims at creating an office environment that minimizes the use of paper documents and files, and by streamlining office workflow helps reduce process delays. Its main objectives are:

- a. To improve efficiency, consistency and effectiveness of government responses
- b. To reduce turnaround time and to meet the demands of the citizens charter
- c. To provide for effective resource management to improve the quality of administration
- d. To establish transparency and accountability
- e. To provide cost effective e-storage facility
- f. To make office environment friendly and eco-friendly

e-Office product developed by NIC presently consists of the following modules:

- a. File Management System(eFile) - automates the processing of files and receipts. This includes creation of files (electronic and physical both kind of files), movement of files in the workflow, tracking of files and their management.
- b. Knowledge Management System (KMS) - Acts as a centralized repository of various documents such as acts, policies and guidelines.
- c. Leave Management System (eLeave) - Automates the leave application and approval process.
- d. Tour Management System (eTour) - Automates employee tour Programmes.
- e. Personnel Information System (PIS) - Manages employee records.
- f. Property Return Information System Management (PRISM) for electronic filing of Asset and Liability Declaration, in accordance with the Lokayukt Act-2013 of Government of India.
- g. Smart Performance Appraisal Report Recording Online Window (SPARROW) application for electronic filing of Performance Appraisal Report (PAR) as per the defined channel of submission.
- h. Collaboration and Messaging Services (CAMS) for internal collaboration & messaging.

Since August 2016, the Department of Administrative Reforms & Public Grievances, DARPG is regularly monitoring implementation of e-office in all central Ministries/ Departments.

Key Challenges observed by the DARPG and NIC team during implementations:

1. Resistance for Change:

- This has been observed as the biggest hurdle in a smooth implementation process with users in the organization being reluctant to

purpose to understand existing status of G2C Service delivery, understand reasons for the variation in impact as well reasons for their success/failure, sustainability, potential for replication, etc.

At the State government levels there has not been a visible formal process on this front to assess project outcomes or map as enabling initiatives for achieving the Sustainable Development Goals. At the same time many states and individual agencies have attempted to put in stakeholder feedback processes. These processes have not illustrated achievement of the relevant project Outcomes or the enabling initiatives for sustainability of the project. At the same time most of the State governments and the agencies have not been able to look at this as a tremendous learning opportunity and to align the initiatives with the State and National development agenda.

There are many assessment frameworks available as reference models as a starting point. It is crucial to move to holistic assessment that not only looks at outcomes for all stakeholders, in addition looks at the enablers that make the projects sustainable.

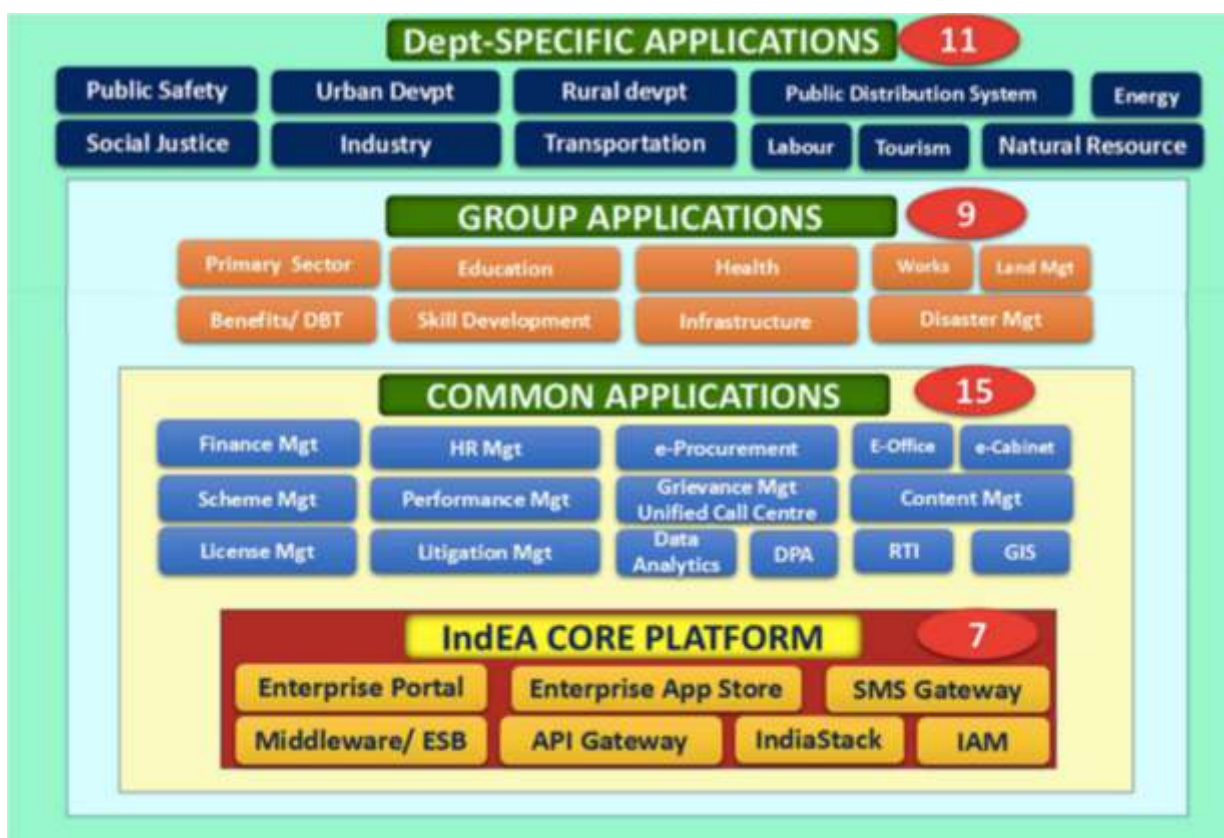
It would be prudent to scale up these efforts to have an integrated perspective all the State e-Governance

projects, covering macro to micro issues. The departments can be assessed on a scorecard, enabling the state to exercise for the state, thereby also creating a sense of competitiveness amongst government agencies. In addition individual project assessment shall help to understand the successes and failures to further improve these initiatives focus on improvements. This can become an annual exercise in the state.

1. Inter & intra department communications

Government has been putting great emphasis on improving productivity and its internal processes, increased transparency in the decision making and bring in citizen participation as part of the inclusive governance in the country. Governance processes are based around creation of files, noting in the file, decision at various levels, and finally issuing decisions as letters and notifications. Any request to the Government goes through an elaborate processing of different stages called workflow. Most of these processes are handled in the form of files which move forward and backward for decisions. An automation of these files can play a very crucial role both in improving the efficiency of decision making and also in building transparency in governance.

A typical application portfolio is illustrated under the India Enterprise Architecture framework (IndEA).



change from the traditional way of working over partly due to trust & fear of acceptance to something new.

- Change management plays a vital role during the implementation life-cycle of the product, as gradually after department gets comfortable with the use of the application, they starts looking for additional features in the application which at-times are very exclusive (specific) in nature, and are not generic.
- One of the most common mistakes made during eOffice implementations is to assume that eOffice can be used to run office end to end, where as eOffice works towards optimizing value chain instead of providing end to end solution. Rather in the form of eOffice generic modules were decoupled from core business functions specific to a department.

2. Requisite infrastructure/Network bandwidth:

- This is another practical issues in various government organizations where the employees do not have proper client-machines with negligible maintenance (regular PC-cleaning activity) with some of them using outdated computer systems.
- Network Band width/Network Configuration issues can lead to slowness and sometimes even disruption in service also.

3. Standardization and Simplification of processes:

- There is always reluctance in changing the existing processes which are being used in the manual environment, however, this is the most important aspect for a successful & smooth implementation.
- As various features in the electronic environment are optimized for use over computers with facilitation of easy electronic delivery & it should never be compared with how they were used in the traditional manual way. Rather forcing of manual mechanism will be retrograde step.

4. Need for mandating eFile:

- This is an extremely important aspect as eOffice is a top driven application.
- In the absence of mandate and clear instructions from the top management, it is not possible to implement.
- Sometimes as the top management changes, the implementation/usage also slows down.

5. Changes in Governance Structure:

- To ensure an effective implementation of eOffice, it must be driven and monitored by a well-defined Governance Structure. However, over a period of time, it has been observed that changes in Governance structure slackens the pace of implementation.
- One of the prime cause of delay is on account of not having the right people on the team, be it the Governance Structure, or EMD Managers or the System Administrators in case of local deployments.

6. Strengthening of Central Registry Unit (CRU):

- This is another practical issues in various government organizations where the employees deputed at CRU do not have the basic knowledge of computer, email and internet browsing.
- Setting up of an eOffice Support Team / Local

7. Helpdesk Unit:

- It has been observed over a period of time that after withdrawing on-site manpower support (on completion of six months implementation period), the eOffice implementation project at the user department collapses.

8. Identification of Linux and Database Administrators for managing local deployments:

- It has been observed that some of the user departments who have locally implemented eOffice Product do not have Linux and Database Administrators who can deploy new patch updates / latest releases in their test / production servers.

9. Technical Challenges

- As the entire environment is changing (Hardware and Software in terms of OS, Browsers, Java Platform, APIs from vendors, it is huge task to keep up with the pace of this development apart from the demands CRs, which may be conflicting also.

2. Data & Privacy

Data Protection Framework for India

The Government of India has set up our Committee of Experts to study various issues relating to data protection in India, make specific suggestions on principles underlying a data protection bill and draft such a bill. The objective is to —ensure growth of the digital economy while keeping personal data of citizens secure and protected.

The issue of data protection is important both intrinsically and instrumentally. Intrinsically, a regime for data protection is synonymous with protection of informational privacy. As the Supreme Court observed - Informational privacy is a facet of the right to privacy. The dangers to privacy in an age of information can originate not only from the state but from non-state actors as well. We commend to the Union Government the need to examine and put into place a robust regime for data protection. The creation of such a regime requires a careful and sensitive balance between individual interests and legitimate concerns of the state.

The White Paper outlines the issues that a majority of the members of the Committee feel require incorporation in a law, relevant experiences from other countries and concerns regarding their incorporation, certain provisional views based on an evaluation of the issues vis-à-vis the objectives of the exercise, and specific questions for the public.

Drafting a data protection law for India is not a greenfield exercise. Though piecemeal, several legislative developments and judicial pronouncements are relevant for determining the contours of such a law.

Since technologies such as Big Data, the Internet of Things and Artificial Intelligence are here to stay and

hold out the promise of welfare and innovation, India will have to develop a data protection law which can successfully address the issues relating to these technologies, so as to ensure a balance between innovation and privacy.

The white paper brings out specific questions for public responses:

- What are your views on what the territorial scope and the extra-territorial application of a data protection law in India should be?
- To what extent should the law be applicable outside the territory of India in cases where data of Indian residents is processed by entities who do not have any presence in India?
- While providing such protection, what kind of link or parameters or business activities should be considered?
- What measures should be incorporated in the law to ensure effective compliance by foreign entities inter alia when adverse orders (civil or criminal) are issued against them?
- Should the law seek to protect data relating to juristic persons in addition to protecting personal data relating to individuals?
- Should the law be applicable to government/public and private entities processing data equally? If not, should there be a separate law to regulate government/public entities collecting data?

One important challenge to the definition of personal data arises from modern technologies which collect newer forms of data from newer sources. While reviewing the OECD Guidelines, this was one of the main issues identified by the expert body for further research. It was observed that the current definition views personal data in terms of a binary, i.e. identifiable data and non-identifiable data. The workability of this definition has been called into question. On the one hand, there are doubts whether the definition is under- inclusive when it excludes anonymised data entirely as the —robustness of some of these techniques have been questioned.

The advent of the Internet of Things also poses a challenge to the degree of anonymity that can be achieved. New devices capture data in forms which are unique. An example is that of a person's gait being uniquely identified by a wearable activity tracker. Such data can perhaps never be completely de-identified. The current methods of using aggregated anonymised data might not be secure enough when applied to such data.

European Union General data Protection Regulation

The EU Charter of Fundamental Rights stipulates that EU citizens have the right to protection of their personal data. Regulation (EU) 2016/679¹, the European Union's ('EU') new General Data Protection Regulation ('GDPR'), regulates the processing by an **individual, a company or an organisation** of **personal data** relating to **individuals** in the EU. It doesn't apply to the processing of personal data of deceased persons or of legal entities.

The rules don't apply to data processed by an individual for purely personal reasons or for activities carried out in one's home, provided there is no connection to a professional or commercial activity. When an individual uses personal data outside the personal sphere, for socio-cultural or financial activities, for example, then the data protection law has to be respected.

The regulation is an essential step to strengthen citizens' fundamental rights in the digital age and facilitate business by simplifying rules for companies in the digital single market. A single law will also do away with the current fragmentation and costly administrative burdens.

The EU GDPR is a comprehensive data protection framework which applies to processing of personal data by any means, and to processing activities carried out by both the Government as well as the private entities, although there are certain exemptions such as national security, defence, public security, etc. Similarly, it continues to recognise and enforce the core data protection principles recognised in the OECD Guidelines. The EU GDPR follows a rights based approach towards data protection, and places

the individual at the centre of the law. As a consequence, it imposes extensive control over the processing of personal data both at the time of, and after the data has been collected. Further, collection of certain forms of personal data, known as sensitive personal data (such as racial or ethnic origin, political opinions, religious or philosophical beliefs, trade-union membership, and data concerning health and sex life) is prohibited subject to certain exceptions.

The regulation came into force on 24 May 2016 and will apply from 25 May 2018. The EU GDPR defines Personal data as any information that relates to an **identified or identifiable living individual**. Different pieces of information, which collected together can lead to the identification of a particular person, also constitute personal data.

Personal data that has been de-identified, encrypted or **pseudonymised** but can be used to re-identify a person remains personal data and falls within the scope of the law. Personal data that has been rendered **anonymous** in such a way that the individual is not or no longer identifiable is no longer considered personal data. For data to be truly anonymised, the anonymisation must be irreversible.

The law protects personal data **regardless of the technology used for processing that data** – it's technology neutral and applies to both automated and manual processing, provided the data is organised in accordance with pre-defined criteria (for example alphabetical order). It also doesn't matter how the data is stored – in an IT system, through video surveillance, or on paper; in all cases, personal data is subject to the protection requirements set out in the GDPR (General Data Protection Regulation).

In the US, privacy protection is essentially a —liberty protection i.e. protection of the personal space from government. Thus, the American understanding of the —right to be let alone has come to represent a desire for as little government intrusion as possible. While there is no provision in the US Constitution that explicitly grants a right to privacy, the right in a limited form is reflected in the Fourth Amendment to the US Constitution – the right against unreasonable searches and seizures. US courts however, have

collectively recognised a right to privacy by piecing together the limited privacy protections reflected in the First, Fourth, Fifth and Fourteenth Amendments to the US Constitution.

In addition to the distinction in the conceptual basis of privacy, the US approach towards privacy and data protection varies from the EU in multiple respects. First, unlike the EU, there is no comprehensive set of privacy rights/principles that collectively address the use, collection and disclosure of data in the US. Instead, there is limited sector specific regulation.

3. Open Data

The UN e-Governance survey 2016 report, greater emphasis has been given to Open Government Data. In an effort to make public institutions more inclusive, effective, accountable and transparent, as called for in the 2030 Agenda for Sustainable Development, many governments across the globe are opening up their data for public information and scrutiny. Making data available online for free also allows the public – and various civil society organizations – to reuse and remix them for any purpose. This can potentially lead to innovation and new or improved services, new understanding and ideas.

Overall, in 2016, 128 out of 193 UN Member States provide datasets on government spending in machine readable formats. The remaining 65 have no such information online.

The availability and use of Open Government Data initiatives, however, vary around the world; not only in terms of the number of datasets released and how they are presented and organized, but also in terms of the tools provided to increase usage of data.

Combining transparency of information with Big Data analytics has a growing potential. It can help track service delivery and lead to gains in efficiency. It can also provide governments with the necessary tools to focus on prevention rather than reaction, notably in the area of disaster risk management.

The issue that many governments are tackling today is not whether to open up their data, but how to do so. Proper governance and careful consideration of both opportunities and challenges are needed. Challenges

include issues related to legal frameworks, policies and principles; data management and protection; identity management and privacy; as well as cyber security.

In the future, steps should be taken to increase the publication of Open Government Data related to vulnerable groups. Ways should also be found to ensure that such data truly contribute to improving the lives of the poorest and most vulnerable. For example, data about location of health services and water points near slums or disadvantaged areas can help improve communities' access to essential social and economic resources. Support can also be provided to help relevant non-governmental organizations to analyze and use open Open Data for improving the situation of the poorest and most vulnerable.

In India, as we are moving towards a digital regime, a large quantum of data generated using public funds by various organizations and institutions in the country remains inaccessible to civil society, although most of such data may be non-sensitive in nature and could be used by public for scientific, economic and developmental purposes. The Government of India Open data policy aims to provide proactive access to Government owned shareable data along with its usage information in open/machine readable format, through a wide area of network across the country, in a periodically updated manner, within the framework of various related policies, rules, and acts of the Government. The National Data Sharing and Accessibility Policy (NDSAP) is designed so as to apply to all sharable and non-sensitive data available either in digital or analogy forms but generated using public funds by various Ministries/Departments/Subordinate offices/ organizations/ agencies of Government of India.

The Open Government Data (OGD) Platform India (<https://data.gov.in>) has been setup by the National Informatics Centre (NIC) in compliance with the Open Data Policy (NDSAP) of India. Developed using Open Source Stack, the project is one of the initiatives under Pillar 6 (Information for All) of the Digital India initiative. It facilitates community participation for further development of the product

with Visualizations, APIs, Alerts, etc. It has an easy to use and user friendly interface with dynamic/pull down menus, search based reports, secured web access, bulletin board, based on Dublin Core metadata standards and parametric & dynamic reports in exportable format. The platform reflects how innovative use of information technology has led to a paradigm shift in accommodating huge data potential of the country. The Platform has a rich mechanism for citizen engagement, which could help Ministries/ Departments/Organizations prioritize the release of Government Datasets. Besides, enabling citizens to express their need for specific datasets or apps, it also allows them to rate the quality of datasets, seek clarification or information from nodal officers of participating government entities.

References:

1. Report of the Expert Committee on HR policy for e-Governance, January 2013
2. eGCF, e-Governance Competency Framework, National eGovernance Division, Government of India, 2014 <http://negd.gov.in/egovernance-competency-framework-e-gcf>, last accessed on 1 February 2018
3. Gupta Piyush. 2014. Time to move to e-Governance competency based professional development for government employees. Published in Compendium of National e-Governance Conference, Department of Administrative reforms and Public Grievances, Government of India.
4. Improving Program Management in Federal Government, A White Paper by a Panel of the NATIONAL ACADEMY OF PUBLIC ADMINISTRATION sponsored by the Project Management Institute, USA, 2015
5. UN e-Government Survey 2016 report
6. Gupta Piyush. 2016. Delivering Impactful e-Governance for Citizens – Empirical study of the performance and issues in G2C projects in India. LAP-Lambert Academic Publishing, Germany.
7. India Enterprise Architecture framework, draft circulated under public review by NeST, STQC, MeITY GoI, ver 1.1 August 2017
8. <https://darpg.gov.in/about-e-governance-division>, last accessed on 1 February 2018
9. NIC presentation on eOffice, 14 September 2016
10. White paper on data protection in_india 171127_final_v2
11. https://ec.europa.eu/info/strategy/justice-and-fundamental-rights/data-protection/data-protection-eu_en. Last accessed on 29 January 2018
12. <https://data.gov.in/sites/default/files/NDSAP.pdf>, Gazette notification 2012.

2020: An era of b-Governance (Blockchain)

Dr. R Balamurali Krishna

System Analyst, Tamil Nadu e-Governance Agency (TNeGA), Govt. of Tamil Nadu

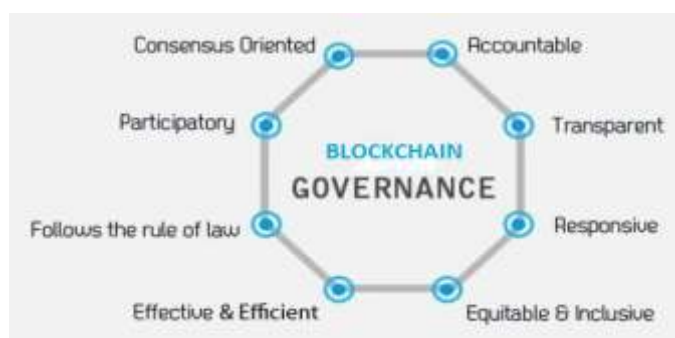
Abstract— Emergence of e-databases, as opposed to file folders and filing cabinets has dramatically improved the efficiency and cost of managing all that information in governance. But, it took the internet to unlock the greater value by making the data more accessible and transparent. Creation and exchange of that ocean of information take place through broddingnagian transactions each year: the collections, disbursements, transfers, procurements, sales, fees, fines, approvals, certifications and many more. Wherever those transactions involve or could involve a digitization of assets and decentralized exchange, there exist a potential for b-Governance. This paper outlines the concept of b-Governance, issues & concerns, principles and its critical appraisal along with an illustrative framework. The apparent effect of b-Governance and its integration in government would be: increased effectiveness of government, reduced transaction costs and simpler, quicker, more effective and consequently more convenient means of interaction with government (i.e. G2C, G2B, G2G). Thence, the b-Governance can be viewed as a unique technology to streamline and automate nearly all administrative procedures while increasing transparency and effectiveness.

Keywords— Citizen Participation, b-Governance, Blockchain, Decentralized Trust, Distributed Architecture, e-Governance 2020

INTRODUCTION

Our citizens make the future of the country. Many things depend on them. Every citizen can do something useful for the development of the country. It really doesn't matter in what sphere they work, as it is their duty to do everything they can to live in better ambience. This is called as Citizen Participation. In nation like India with population of 130+ million, engaging everyone in the decision making is hardly possible. But still with the intent to engage professionals in the legitimate decision making process, our hon. architects of the Constitution had laid the provision of Vidhan Parishad (Legislative

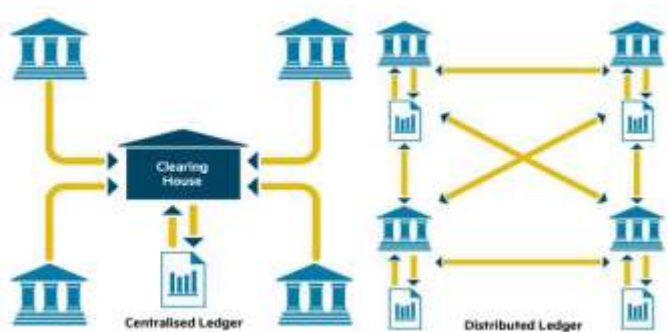
Council) under the Article 169. Yet, majority of Indian States has not harnessed this provision effectively due to underpinning ground that it's not time and cost effective. With onset of e-Governance, constant efforts are being taken to rope citizen participation via MyGov portal. But sadly, the participation is not up to the expectation level. Hence, there prevails a lacuna on citizen participation in decision making despite we being in an era of techno-revolutions.



I. BLOCKCHAIN TECHNOLOGY

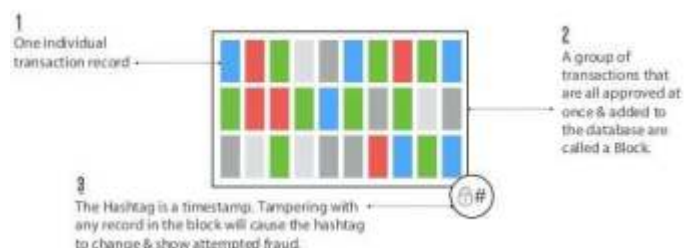
Blockchain-based Governance (b-Governance)

The Blockchain-based Governance is acknowledged as a major breakthrough in fault-tolerant distributed computing. Rationale of b-Governance is decentralized trust or trust-by-computation. It represents the shift from trusting people to trusting mathematics with irreversible and tamper-proof public records repository for the documents, contracts and assets. Formidable innovation applied by this technology is that, the network is open and participants do not need to know or trust each other to interact: electronic transactions can be automatically verified and recorded by nodes of the network through cryptographic algorithms, without human intervention, central authority, point of control or third party. Even if some nodes are unreliable or malicious, the network is able to identify transactions and protect the ledger from being tampered via mathematical mechanism called proof-of-work, i.e., validation majority (trust).



Blockchain (Block = Transaction)

The word 'Blockchain' means 'Chain of Transactions' that are all approved at once and added to the database. In nutshell, it can be conceived as a transparent distributed database that records details on all transactions performed by the system's participants. In the context of Governance, this means technology that stores data as result of all interactions between citizens and Government. Significantly, the data are interlinked, coded and stored by all members of the system, and are automatically updated to reflect the changes made. Users act as a collective notary that certifies the accuracy of data in the system and guards against abuses and scheming attempts. It acts as a control over the egoistic motives that cause some people to engage in corrupt practices to the detriment of society and state sovereignty. It also creates a powerful incentive to abide by the rules that apply to all participants equally, thus creates, fosters a spirit of collective responsibility. Notably many researches ascertain that Indian youngsters are keen to change something. However what's more important is they must really do that in legitimate path; for which the blockchain technology would be appropriate platform to cater their expectation.



Technically, Blockchain is a technology that facilitates virtual agreements among participants without involvement of an intermediary organization; it thus creates a foundation for the decentralized

governance, promotes consensus-based social contracts and maintains a fair balance of interest beneficial to society. The cost of transactions can be greatly reduced by eliminating intermediary fees, while transactions themselves can become less time-consuming, and also more transparent and more secure.

b-Governance: Issues and Concerns

The b-Governance has remarkable props as a distributed ledger, such as efficiency, cost-effectiveness, irreversibility, transparency, accountability, audit ability and the censorship resistance. Yet, proposal to decentralize government services through an open, unpermissioned transaction entails a whole set of unknowns, which might overweight the benefits. Although blockchain is frequently described as a universal, permanent, continuous ledger, these claims may somehow overstate, as they do not take enough account of the several performance risks at stake. In short, an open unpermissioned blockchain for govt. services may be prone to several risks:

- ✦ Domination of market logic over essential public services and citizens' rights, which should be rather protected by speculations of any kind.
- ✦ Possible lack of service continuity and preservation of data in medium-long run without delineation of liability, due to market dynamics or any serious technical flaws.
- ✦ Rise of dominant technocrats with supervisory powers over strategic services at nationwide, without necessary formal legitimacy.

Therefore, government records require high performance and high degree of reliability, accessibility, predictability being not tolerant of any service interruption or failure: a flaw in the management or in the implementation of the network could compromise the security and the civil rights of millions of citizens. Moreover, a formal and transparent process of legitimization must be strictly required when dealing with government services, in order to avoid the indiscriminate emergence of private powers over public affairs. Therefore centralized and democratically legitimated public institutions are crucial to ensure the accessibility for extremely sensitive data in long run and to preserve from uncontrolled centralization, speculations, technical

flaws and private supervisory powers. Thus, the b-Governance should orient itself towards permissioned transactions, as these are replicated and shared ledgers that can be administrated by government in order to guarantee adequate levels of network coordination, reliability and security by human intervention, when necessary.

II. PRINCIPLES OF B-GOVERNANCE

Min Government, Max Governance

b-Governance has potential to transform our societies in something very similar to our **hon. Prime Minister's Vision on State**: “Minimum Government, Maximum Governance”. The notion is that governments need to become more like business and less of a default monopoly provider of citizen services. Thereby, government should have more proactive relationship with citizens, offering value propositions and services that are demanded and valued by different sectors.

III. CRITICAL APPRAISAL OF b-GOVERNANCE

Assuming that b-Governance represents an inescapable future or a natural progression of humanity is common amongst its advocates. Nevertheless, it's questionable that there is such a thing as natural progression of humanity: rather, humanity sets priorities and makes choices among many possible options and scenarios, often in a conflicting way. It is even less acceptable that individuals and societies can be coerced to grow into a new level of maturity by technology, since the success of a new technology depends more on social factors and interactions, than on superiority of the technology itself, and in this regard every society has diverse social practice, with unpredictable dynamics. The perception is that technological developments are inevitable, with fatal, unstoppable and irreversible consequences on society, which can be defined as 'technological imperatives'. Interestingly, it tends to grow as the technological systems become large, complex, interconnected and interdependent. When dealing with the government, however, determinism should never be the driving force behind decentralization. Indeed, the objective is not to challenge the centralized model of governance at any cost. b-Governance confronts trade-offs and it is instrumental in promoting governance but it is not an end in itself. So, it shouldn't be uncritically embraced in name of antigovernment feelings, technological imperative or wish for innovation at any cost.

The technological innovations are specific tools of entrepreneurs as such, it generally belongs to a

market-oriented vision of the world that sets as priorities profit, competition and commercial interests, however it does not necessarily represent the most desirable characteristic for government services, which are connected to preservation of social, economical and political rights, and must rather prove security, reliability and long-term durability, in the face of societal evolution.

The b-Governance ideology might tend to gestate as privatization of public functions, with the transformation of government services and citizens rights into a new profitable private business. But recalling the reason why the central coordination of public institutions was originally created – and why we should keep it: to protect common good and collective rights in the long term from transitory individual interests and from any reckless logic of profit. In this regard, it cannot be ignored that the permissioned, token-less blocks (transactions) hold a considerable advantage over the fully distributed transactions.

Frankly speaking, the advocates of b-Governance tend to have in common the dissociative attitude towards centralized institutions and the State in particular. Dominant discourse mostly emerges through media, and so called themselves as Technical Specialists and Financial Experts, who perceive governments as somewhat of an encumbrance – too slow, too corrupt, too lacking in innovation, and ;benefiting too few. So, it's quite significant to recall that there exists a certain variety of positions towards the role of the State in b-Governance, but dividing lines between disintermediation of government services, free market and even the anarchism are often blurred.

IV. ILLUSTRATIVE FRAMEWORK

Let's conceptualize that an officer of Child Development department envisages implementing a scheme - 'Mera Oorja Pey' (My Energy Drink) which targets to ameliorate the nutrition of school children. The aspiration of the officer is to implement this scheme in such a way that it benefits the students sufficiently and obviously at the earliest (within his/her tenure), thereby making this scheme as forerunner. Below steps would probably be involved for implementing the scheme/project viz.

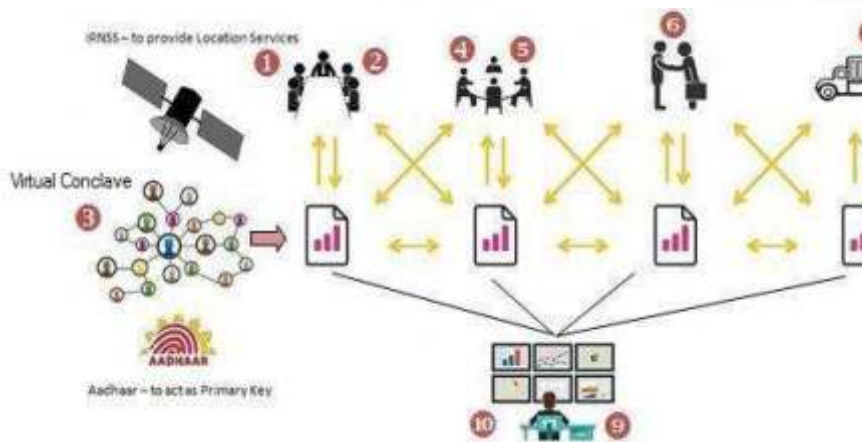
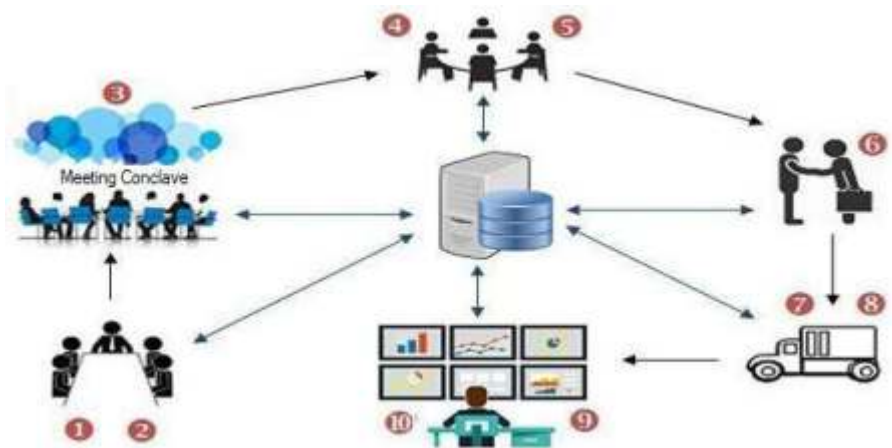
- ❶ Preliminary Discussion
- ❷ Strategic Planning
- ❸ Stakeholder Collaboration

- ④ Budget Proposals
- ⑤ Voting and Sanction
- ⑥ Implementation
- ⑦ Procurement
- ⑧ Supply and Delivery
- ⑨ Monitoring
- ⑩ Outcome Analysis

Below thematic diagram depicts an overview of how the b-Governance accelerates the 'Mera Oorja Pey' as compared to the today's e-Governance system.

e-Governance

- ^ Centralized Architecture
- ^ Top-Down Approach
- ^ Transaction Lag
- ^ Retard Contract
- ^ Digitalized Conventionalism



b-Governance

- ^ Distributed Architecture
- ^ Near Real Time Monitoring
- ^ Smart Contract
- ^ Enhanced
 - o Efficiency,
 - o Transparency,
 - o Accountability,
 - o Accessibility

CONCLUSION

It's certain that, the b-Governance would bring in more efficiency, transparency, accountability and accessibility in government set-up. Reckoning that b-Governance tends to be the future of India, States – Andhra Pradesh, Chhattisgarh, Maharashtra, Tamil Nadu and Telangana are keen to foster blockchain ecosystem in governance. Risks and benefits related to its applications, however, must be carefully weighted, avoiding utopian expectations, as well as the pitfalls of technocratic reasoning and

determinism. If properly managed, decentralization of government services through permissioned transactions is possible and desirable, as it can significantly increase public administration functionality. Let's believe that India will grow exponentially once all the States start accepting this new technology!

Acknowledgement

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Author can be contacted at

☎ +91 9487370775, 9095117775

✉ balamuralikrishna.tnega@tn.gov.in

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REFERENCES

Dr. Marcella Atzori, (Dec 2015), “the Blockchain Technology and Decentralized Governance: Is the State Still Necessary?“, Doctorial Dissertation, University of Nicosia, Cyprus.

Don and Alex Tapscott, Blockchain Revolution: How the Technology behind Bitcoin is Changing Money, Business, and the World (N.Y.: Penguin Random House, 2016).

Mark White, Jason Killmeyer, Bruce Chew, (Sep 2017) “the Blockchain basics for Government”, Deloitte.

Dzmitry Markusheuski, Natallia Rabva, Vital Kuharchyk, (Nov 2017) “the Blockchain Technology for electronic Governance”, BIPART

Smart Cities – Internet of Things Data to fuel Predictive Models

Sanjay Jaju, IAS, Director (A&F)
 NHIDCL, 3rd Floor, PTI Building,
 4-Parliament Street, New Delhi – 110 001
 Ph: 011-23461604, +91-9849132344
 E-mail: jajus@gov.in

The Ministry of Urban Development is coming up with Smart Cities all across our country. The Smart Cities would, inter alia, include installation of large number of Internet of Things (IoT) devices. This paper describes how the data and information collected from various IoT sources can help city governments by enabling them to improve the overall infrastructure management through better management of urban flows, improving operational effectiveness and cost-efficiency besides helping them to provide real time response to challenges.

1. Introduction

A smart city is a dynamic city that makes living in an urban environment more civil and more rewarding. A smart city is not only attractive to people who want to live there, but also to companies that want to do business there.

In the vision of creating such a smart city, sensors deployed in different parts of a city will gather data and information to monitor everything from noise levels to water use, in real time and at a very granular level.

The collected data can be integrated with city verticals, like traffic flow, environment, parking, lighting and water to draw meaningful relationships to get insights.

These insights can help businesses and city planners become more efficient and more effective, and that would translate to revenue eventually.

The question thus remains, how can all this data be used for the greater use and good for our cities?

The collaboration happens through the most talked about technology – the Internet of Things and the sensors and all-pervasive connectivity. This makes cities remain better connected, integrated and being able to analyze information more cohesively in order

to enhance their efficiency.

Though the value of all of this data is enormous –only a right business analytics approach can exploit the best possible outcomes for global citizenship.

With the right answers to the questions of how this data affects our world, we can empower cities and citizens to take action and help them lead better lives.

Imagine a use case where sensors in cars connected to transportation management systems that analyze day-to-day traffic flow data. In addition to providing drivers with better routes to their destinations, these systems could provide public safety and other city departments with what-if scenarios in case of events or accidents to improve response times. It is ultimately the aggregation of data coming out of thousands of devices connected to a foundation city network that delivers the significant value.

Today, urban planners would be in a position to draw from a decade or more of data to understand how a city might grow.

There are various verticals wherein lie the potential applications for data collected by the IoT sensors.

2. Urban Mobility

2.1 Traffic

The sensors installed in different parts of the city can measure traffic flows, which can help in:

- Timing traffic lights during peak traffic hours to improve pedestrian safety and reduce congestion-related pollution.
- Observe which areas of the city, pedestrians heavily populate at different times of day to suggest safe and efficient routes for walking late at night.
- Traffic Monitoring:
 - Displaying live video from any traffic camera and presenting live traffic conditions on a map.

- Collecting data on average vehicle speed, traffic volume, and lane occupancy.
- Incident Detection and Management:
 - Identifying traffic incidents by fusing multiple inputs, displaying their locations on a map, and alerting operators.
 - Automatically creating an incident record and collecting all relevant data into an incident management kit for operators.
 - Providing recommended procedures to guide operators quickly through the response process.
 - Helping ensure continuous communications with responders.

Use Case: Installing systems across city to make signals congestion free

- *Sensors connected to traffic signal keep sending information to a central server on number of vehicles piling.*
- *Analytics platform gets real-time data from sensors, traffic signals within certain configured distance of the intended junction & GIS mapping of roads.*
- *When a threshold is reached, analytics software sends a message to the traffic display, just few configured km before the signal.*
- *Motorists driving towards signal are asked to divert to another road.*
- *When number of vehicles at signal decrease below threshold, message flashed on display stops urging drivers to drive towards signal.*

2.2 Crowd Management/ Location Analytics

The solution helps enable analysis of various city areas, generating essential metrics for operational and marketing insights. These include traffic counts by location or time of day, number of visitors, and visit duration offering key information to managers of airports, malls, or business districts, for instance, about their patrons and facilities use. The data collected by the platform allows location analytics partners to generate:

- A deeper understanding of populations served.

- Detailed reports comparing traffic over time.
- Traffic counts by visit frequency and duration.

3. City Infrastructure

3.1 Environment

The cities can install sensors on lampposts in different parts of the city to monitor environmental conditions including temperature, noise, and air quality parameters.

This information can be used to manage incidents, identify patterns in microclimates, and make predictions about vehicle and pedestrian congestion.

- Sensors monitoring air quality, sound and vibration (to detect heavy vehicle traffic), and temperature can be used to suggest the healthiest and unhealthiest walking times and routes through the city.
- Sensor data can contribute in the city's efforts to reduce pollution through the deployment of street sensors. These sensors can measure traffic flows at different times as well as total emissions. The government can implement actions to divert traffic to less congested areas in a move to reduce carbon emissions in a particular area.

Moreover, these systems can feed data into open data portals, where it is available to the public, allowing citizens to take part in tracking and responding to local environmental issues.

3.2 Waste Management

The sensor-enabled trashes can be installed in the city, which measure waste levels in public bins and compact trash to reduce overflow. The bins share the data with local authorities, allowing them to enhance efficiency by planning collection routes, in terms of where and when a pickup is needed. The same logic can be extended to the homes, with home trash monitoring to facilitate efficient collection.

A proper and well-planned smart waste management system can reduce labor and increase the efficiency of the whole process.

3.3 Parking

One of the most popular IoT applications is the use of

sensors to track the availability of parking spaces. The search for parking in busy urban centers is frustrating for the driver, intensifies congestion on the roads, and increases pollution from circling cars.

When deployed as a system, smart parking thus reduces car emissions in urban centers by reducing the need for people to needlessly circle city blocks searching for parking. It also permits cities to carefully manage their parking supply.

The data gathered from parking sensors enable real-time way finding, dynamic pricing, and parking management, benefiting drivers, cities (in terms of lessening congestion) and owners of parking facilities. By using this common infrastructure, cities can reduce the hardware cost and service fees associated with traditional smart-parking deployment using existing parking structures in malls or public parking lots, for instance, to offset street parking shortages.

Few more use cases of deploying a smart parking solution in the city are:

Cities can:

- *Lower vehicle miles traveled and carbon emissions.*
- *Improve the parking utilization.*
- *Optimize parking revenue through dynamic pricing*

Citizens can:

- *Search for parking spaces based on point of interest or preferences.*
- *Receive voice guidance to a parking space.*
- *Make payments using a mobile phone.*

Parking-enforcement officers can:

- *View a live video feed of parking and no-parking zones.*
- *Detect and report parking violations in no-parking and loading zones via video.*

Administrators can:

- *Easily configure and manage the sensors and video infrastructure.*
- *Monitor the enforcement of policies for parking violations.*

City planners can:

- *Gather parking occupancy, revenue, and*

enforcement reports.

- *Provide detailed information such as time of day, day of week, etc., to assist with pricing decision.*

3.4 Lighting

It's estimated that as much as 40% of city energy budgets are spent on outdoor lighting, and that a single street light can emit 200 kg of CO₂ each year. Increasingly, cities need to save energy or do more with less energy, reduce carbon emissions, lower operating and maintenance costs, and comply with tighter government regulations. In addition, many are exploring Smart City applications and the use of lighting to boost safety for both drivers and pedestrians.

For all these reasons, better lighting

A smart lighting solution creates Light Sensory Networks that transform LED light fixtures into sensor-equipped, smart devices that are capable of capturing and transmitting data in near real time. This provides unprecedented actionable insight and helps to enable an array of applications and services for cities, citizens, and businesses. and lighting control top most cities' priority lists.

Lighting control, energy optimization and impact on environment:

Because energy savings and lighting optimization are the primary drivers for lighting upgrades, this solution focuses on improving management of lighting, energy, and maintenance for all light fixtures on the network. These applications can be accessed securely through a web browser to set such controls as occupancy-based dimming, daylight harvesting, copper-theft alerting, energy usage, savings reporting, and real time maintenance status.

Lets talk about a use case.

In the night, a policy can be configured where in the intensity of the lamps can be reduced whenever the traffic intensity is really low. Decreasing the duration and intensity of lighting will just not reduce energy costs and carbon emissions, but will also help in reducing light pollution, which is brightening of the night sky caused by street lights and other man-made sources, which has a disruptive effect on natural

cycles. Light pollution is costing us money, energy, and is also disrupting our environment.

Scientists have gathered mounting evidence that city lights are altering the basic physiology of urban birds, suppressing their estrogen and testosterone and changing their singing, mating, and feeding behaviors. Not just birds, the intensity, spectral quality, duration and periodicity of exposure to light affect the biochemistry, physiology and behavior of many other organisms as well. In plants, the presence of light-sensitive chemicals provides the basis for photosynthetic activity. Light is also an important environmental modulator of growth rates and growth patterns for which changes can have profound consequences at the level of the individual plant.

By using smart technology to change our habits for nighttime lighting, we can save money, be good to the environment, and see the stars – without giving up all of the pretty city lights.

Given the effects of artificial light on living organisms, it is plausible, and even probable.

Smart lighting that includes high efficiency fixtures and automated controls that make adjustments based on conditions such as traffic will help cities to save the environment from light pollution.

In the paper, "Energy savings due to occupancy sensors and personal controls: a pilot field study", Galasiu, A.D. and Newsham, G.R have confirmed that automatic lighting systems including sensors are suitable for environments and can save a significant amount of energy (about 32%) when compared to a conventional lighting system, even when the installed lighting power density of the automatic lighting system is ~50% higher than that of the conventional system.

Apart from benefits on the environment, energy savings and increased safety, below are few more benefits of deploying smart lighting in a city to free up energy according to demand

- Lower ongoing maintenance and inventory costs through remote identification of lamp failures, preventive maintenance, and the use of lower-wattage, longer-lasting street lights
- Improved public satisfaction due to reduced

lamp downtime, less light pollution, and better overall lighting quality

- Reduced CO2 emissions
- Rapid detection of electricity theft and leakage

3.5 Safety, Security and Surveillance

There should be an intelligent fabric of network that should be build that optimizes all stages of the public safety and security process, including detection, assessment, and response. The network collects and provides live information in the surveillance room where authorities can keep an eye on the city.

Also, data combined with advanced analytics can help in mapping crime patterns and trends, which further helps in minimizing the impact of an emergency by staying connected to the data, people, and resources you need.

The sensors installed have video, sound, and motion-capture capabilities that help enable security services management in the city, especially places where there is a need for enhanced security, asset protection, and perimeter detection. It's capable of streaming video, but more importantly, it provides edge-based intelligence for analyzing data at the capture point. It can transmit the analytics, along with alerts to a central cloud database and to the appropriate agencies based on system rules.

3.6 Accident Detection

Not just this, the sensors can also help with the accident detection. Wherever there is an accident, the lamps near by, will start flashing and snoring, to alert everybody around about the accident.

These edge-based, real-time analytics can include:

- Configurable events and alerts that can trigger lighting conditions and other actions (like throbbing of lamps as mentioned above).
- Cost-effective extension of the security perimeter.
- License plate, or facial recognition, and more.

4. Use cases

4.1 How Smart Analytics can save life on road

- *Imagine a scenario where an ambulance carrying a critical patient, is driving at full speed towards hospital.*
- *Analytics platform gets real time data from the sensors, from the traffic signals on the way and GIS mapping of all the roads leading to the hospital..*
- *Based on the above information, a message will be sent to the ambulance display panel, in front of the driver informing him about the road to take.*
- *All signals towards hospital will be asked to be on a particular color (Red or Green) prompting ambulance to pass through.*
- *A message will also be sent to the hospital system prompting them to be ready, including an auto message to doctor's phone to rush back if he is out of the hospital.*

4.2 How Smart Analytics help prevent and catch crime

- *Imagine a scenario where a criminal places a suspicious bag near a roadside bus stop.*
- *CCTV camera keeps recording all the activities including this one.*

Abil

- *All information from CCTV, sensors on the road, criminal database and information from police command center is continuously fed to*

analytics platform, which keeps analyzing the information and take further decisions.

- *Based on the analytics, a message is flashed to police command center and nearest public display asking public to remain away from the site.*
- *Police squad is dispatched to site to check bag contents and take necessary action.*
- *Video of person placing bag is flashed across all the police stations by command center.*

4.3 More Use Cases

Sensor data can also help cities to know other information like:

- *Correlation of crime rate in an alley with the lighting condition at the time of crime.*
- *Percentage of drivers in a specific street who are residents of the street and to know where the other drivers are coming from.*
- *Whether people parking on the streets are the residents or non-residents.*
- *Wait time for the people to get parking space.*
- *Create parking fare policy based on the parking demands.*
- *Temperature/Humidity/Light vs Parking occupancy/violations over a period of time.*
- *Provide auto data correlation.*
- *Understand the analytics of crowd movement in a certain direction and correlate it with other sensor data.*
- *Correlation of pollution level in the water bodies with the industries and other landmarks around it.*

'Treat Your Sensor Data Like a Valuable Asset'

Decentralised Blockchain based IOT and Deep learning Intelligence for Smart Cities

Amit Gupta

Scientist-B, National Informatics Centre, Haryana

Government of India

amit.gupta@nic.in, 9468081265

Abstract Sensors and Internet enabled devices in IoT usually depend on the central node to be managed by their users, but blockchain could transform by providing a distributed ledger for their functioning. Blockchain can stave off security threats to Internet of Things (IoT) devices thereby securing the data with primitives of availability, accountability, integrity, confidentiality and audit ability. Deep learning and Blockchain facilitates each other in the form of self operating computation nodes. Blockchain based deep learning can be performed on data obtained from diverse IoT devices used to automate the smart city management.

Keyword: Deep Learning, Big Data, Internet of Things, Smart City.

1. Introduction

Key factors that influence IoT are not just to generate and analyse the data but also to protect the data throughout its lifecycle duration. Securing data at all ends becomes so difficult because the data has to travel across different gateways, network devices and these boundaries have different access policies and frameworks to be crossed.

IoT is not just system of physical connected components, due to its diverse composition of different elements it is to be considered as system-of-systems, this requires the deep challenge of making this IOT secure for its architectural layout.

In today's world all of top internet giant companies offer their AI based solutions on Cloud based model in terms of API's, where the user has no controlled on this centralized architecture.

Sensor networks are the main component involved in the development of the IoT. Security and privacy handling for sensor networks present new issues due to specific constraints. Low resources on computation, hardware functionalities and energy consumption in sensor devices present new challenges to be worked upon.

2. Securing IoT Deployment Challenges

1. Weak Web Interface: Most of the IoT devices are built with weak interface to be interact with the device which allows to gain unauthorised access for the IoT devices, these vulnerabilities range from weak device credentials, cross-site scripting, SQL injection and default session management.
2. Network Service Vulnerabilities: Network services allows the ways to access the devices, there are some vulnerable services like Denial-of-Service, Buffer overflow and other remote exploitation weaknesses.
3. Data and Identity Hacks: Identity hacks are most crucial to be handle on.
4. Botnets: these systems tried to take control and propagate the malware across the systems connected for the purpose of stealing information.
5. Privacy Assurance: Abundant information is available across the systems connected and Privacy protection and assurance in IOT has become increasingly challenging due to factors:

3. Decentralised Intelligence

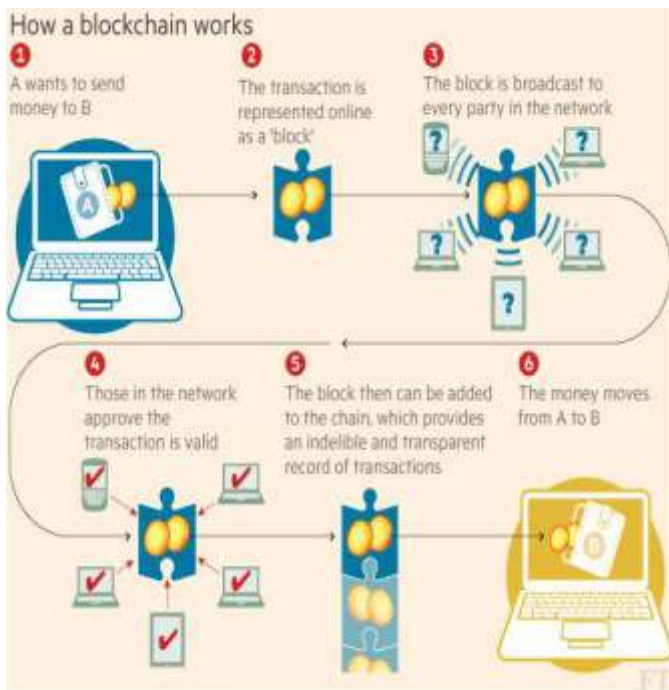
Decentralised deployment of the IoT devices solve many of the challenges involved. Peer to Peer model for device communication will usually minimizes the cost involved in terms of processing of transactions involved between communicating devices and maintaining large centralized pool of resources. This decentralised architecture will reduce the chances of failure in terms of computation at single node by distributing it across thousands of nodes involved in the IoT network. This will significantly reduce the risk of over costing and failure of nodes in centralized fashion of IoT computing.

3.1 Blockchain

Blockchain is a database that maintains a continuously growing set of data records. It is

decentralised; no single entity maintains the central record keeping of any transaction. It is public: every entity participating in the chain has a copy of all the blocks. Data blocks are added to the chain in an incremental manner. The transactions stored in the blocks are visible in transparent manner to all the entities, so no one can deny the occurrence of the transaction. The public- private key pairs are used to hide the data in the transaction.

In Blockchain when someone wants to send money to other entity, the whole transaction is represented to all entities as a block in an online fashion, which is then propagate to all parties involved. The consensus must be framed across all parties for the approval of the transaction and all the nodes in the network will validate it. The verification of validity depends upon the cryptographic mechanism used by the chain which differs from system to system. After the transaction is approved and validated, a set of validated transactions are then grouped and bundled in block which is transmitted across all participants. This process is repeated for validation of new block in the chain.



(source twimg.com)

Figure1: Blockchain Transaction

transaction; all participating nodes have to reach a consensus to accept the commitment of transaction which provides the trust across all nodes. It is secure: hashing mechanisms are used to validate the transactions. The hash generated for the block are generated and stored in their successor blocks to validate them.

3.2 Blockchain based IoT

Blockchain technology is believed to overcome the privacy and security issues in the IoT networks. By moving away from centralized architecture blockchain technology removes the risk of compromising the single entity of security breach.

Instead of all trust requests generated from IoT devices accumulated in a single location, creating a single point of security breach, a decentralised approach is used for communication among devices. In centralized fashion IoT devices are not smart enough to take decisions on their own without the help of the central node responsible for processing.

In Blockchain decentralised framework single decision making node is no longer decides on his own in spite all participating nodes make a common consensus for the decision making to protect them for single point of failure. The participating nodes form a group consensus and remove any node in the chain who behaves abnormal. This framework can be used to track all the transaction processing between participating nodes involved resulting in cost savings and more resilient system for coordinating devices. The Public-Private Key Pairs and cryptographic algorithms used by blockchain would make the data more secure.

Blockchain could transform the functioning of Sensors and Internet enabled devices by providing a distributed ledger for their functioning, which is tempered proof and cannot be modified by malicious intenders who try to gain intercepted messages and modify them for their benefit. For data integrity blockchain maintains a public ledger of data entries where every deletion or modification of data is stored and a common consensus is reached for any chain of events.

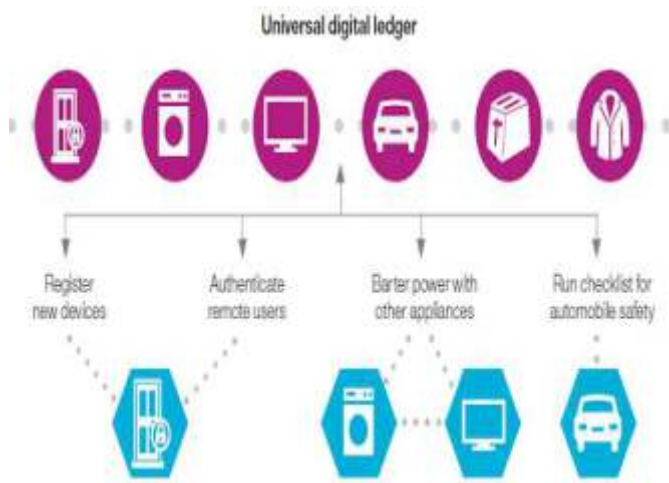
Blockchain can stave off security threats to Internet of Things (IoT) devices thereby securing the data with primitives of availability, accountability, integrity, confidentiality and audit ability



Figure2: Blockchain for IoT

A Blockchain is decentralised: no single entity approves the

Transaction acceleration, reduction of costs and trust building are the key benefits of using blockchain in IoT networks. The peer to peer message passing, decentralization and trustless capabilities of the blockchain makes it an ideal solution for the deployment of IoT system. In blockchain complex rule based transactions like smart contracts are executed for the execution of immutable information which makes the system more transparent and secure. The confidentiality and integrity of data in IoT is maintained by enhancing the trust between parties involved in the communication by recording the interactions within the internal ledger thereby reducing the chance of security failure. The universal digital ledger registers the new devices whenever new device want to connect in the chain and provide authentication mechanism for remote users to facilitate transactions.



3.3 Deep Learning

Deep learning is a class of machine learning algorithms in the form of a neural networks that uses a tiers of hidden layers of processing units applying weights and bias to extract features from data and make predictions about the data. IoT data is in large volume which requires efficient machine learning algorithms to be processed upon.

The objective of deep learning is to solve intuitive problems that are characterised by high dimensionality and unstructuredness.

3.4 Deep learning challenge for IOT:

1. Data produced by sensors are in large volume which is unorganised in nature being difficult to label them. This unstructured data is in large volume which is tedious to be categorized.
2. Data representations for data collected from diverse resources vary from temporal to non-trivial in pattern.
3. Feature engineering seems to be complex for this unstructured data pattern.

4. Integration Framework

Data collected from IoT devices usually sensors and other computing nodes are represented and stored in blockchain based decentralised database, which address the security needs, and

when deep learning will be performed on this data, predictions are more accurate. Converging blockchain and deep learning, the later can be used to analyse and accelerate enormous amount of data in short span. As deep learning loves to work on enormous amount of data, better models can be created by taking edge of decentralised nature of blockchain.

Deep Neural Networks, Convolutional Neural Networks (CNNs) and Deep Boltzmann Machines are widely used for Deep Learning applications for the Smart City management. CNNs are more commonly used along with their easier training, need for fewer parameters, ease of implementation and success rates compared to other methods.

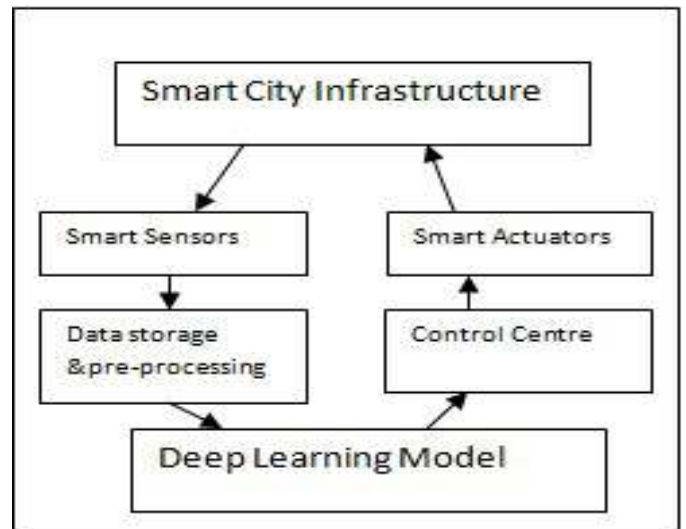


Figure3: Deep learning and Smart City Integration

Deep learning and Blockchain facilitates each other in the form of self operating computation nodes in the design of directed acyclic graphs. Deep learning on blockchain can be used to detect and track fraudulent activities.

Incorporating Blockchain and Deep learning for the development of smart cities provides the platform for providing the secure, transparent and corruption less services to the citizens.

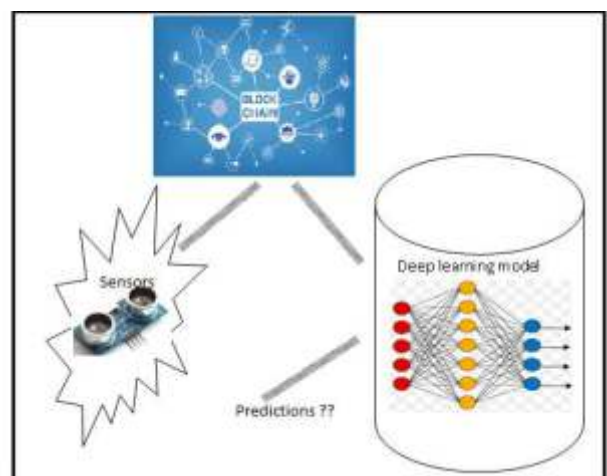


Figure4: Integration Framework

In smart cities, deep learning encourages the evolution of smart sensors in IoT that can do more with less energy. Smart cities can utilise deep learning for enhancing face and voice recognition facilities.

5. Conclusions

Deep Learning and Blockchain complements each other, their combined use for the processing of large amount of IoT data results in better predictive and prescriptive analytics. Smart cities with deep learning framework integrates the blockchain technology with smart IoT devices to provide a secure communication platform.

References

1. <http://ieeexplore.ieee.org/document/7828539/>
2. <http://dataconomy.com/2016/12/blockchains-for-artificial-intelligence/>
3. http://researchgate.net/publications/317825624_Deep_Learning_Based_Learning_artificial_Manager_for_Smart_City.
4. <http://www.cso.com.au/article/575407/internet-things-iot-threats-contermeasures>.
5. <http://dataflog.com/read/securing-internet-of-things-iot-with-blockchain/2228>
6. <https://www.bbvaopenmind.com/en/a-secure-model-of-iot-blockchain>.
7. www.exeblock.com/how-blockchain-could-be-integrated-in-smart-cities/

Urban Indicators using Spectral Indices

Sanjiv Jha, Chief Data Scientist, Quantela Inc.

Mohana Roy Chowdhury, Lead Data Scientist. Quantela Inc.

Gajanan Kothawade, Data Scientist. Quantela Inc.

Abstract

Sustainability has become a global pursuit with government agencies in the United States offering programs, technical assistance, and funding opportunities for strategic growth within cities. Climate change, growing populations, the decrease of essential resources, and the availability of funding to deal with these emerging conditions, provide the incentives for cities to mitigate and adapt through urban sustainability programs. This article presents a methodology that combines the use of urban indicators and spectral indices as a valid diagnostic and prescriptive tool to generate relevant information regarding some of the important urban indicators.

Introduction - Urban Indicators

Urban indicators are signposts that allow you to measure whether a place is becoming liveable. They allow you to monitor whether, over time, the methods you're using to manage urban amenity are working. An indicator will often be a goal, a target, a threshold, or a benchmark against which you can assess change.

According to the Food and Agriculture Organization of the United Nations, indicators allow for the measurement of change in a system: "Indicators are selected to provide information about the functioning of a specific system, for a specific purpose — to support decision-making and management. An indicator quantifies and aggregates data that can be measured and monitored to determine whether change is taking place. But in order to understand the process of change, the indicator needs to help decision-makers understand why change is taking place. Policymakers and city managers are today faced with a great array of available sustainability indicator frameworks. These vary in their fundamental purpose, their approach to measuring sustainability, their scale, and of course, their selection of indicators. The common ground to be

found is this: all of these frameworks endeavour to promote sustainable urban development by aggregating diverse information into focussed and applicable knowledge. Indicator frameworks achieve this by reducing the data required to illustrate urban sustainability, and allow communication of that information with diverse audiences.

Urbanization is a phenomenon of paramount importance due to direct impact on the quality of life. In 2007, urban dwellers had exceeded rural population for the first time in history and by 2030 two thirds of the world population are expected to be accommodated in urban areas. Nowadays, there are conflicts in the urban planning goals towards a sustainable city arising from the different environmental, economic and political thoughts, where the motivation for planning lies in different disciplines and conceptions. There upon, successful urban planning must take into account the three

sectors: environment, economy, and policy, trying to keep a balance between them. Recently, much effort has been spent to produce tools for the observation and analysis of the urban environment not only by the scientific community, but also by the public and private sectors. In particular, a huge number of studies has been carried out to understand and characterize urban sustainability, where numerous indicators have been proposed in urban research for a better management of cities. Many environmental and socioeconomic variables affect urban development and the application of alternative approaches to capture these variables is a challenge. Although conventional data are useful for calculating urban indicators, they are frequently inadequate due to generalization, outdated or unavailability.

Some of the urban indicators gathered from the sources mentioned in the Reference sections are as displayed in the table below: **Urban Indicators List**

Land Use	City Population	Population Growth Rate
Women Headed Households	Average Household size	Household formation rate
Income distribution	City product per person	Tenure type
Birth and death rates	Migration rates	Household expenditures
Dwelling type	Informal employment	Crime rates
Crime rates	Child mortality	School classrooms
Illiteracy of poor	Employment growth	Life expectancy at birth
Airport activity	Child labour	Infectious diseases mortality
School enrollment rates	Adult literacy rate	Tertiary graduates
Refugee	Deaths due to violence	Household connection levels
Access to potable water	Consumption of water	Median price of water
Cost to household income ratios	Sources of water	Piped water supply reliability
Public latrines	Water leakage	Sewage disposal
Revenue to operating cost ratios	Capacity to load ratio	Line losses
Electricity price	Modal split	Expenditure on road
Travel time	infrastructure	Automobile ownership
Transport fatalities	Fuel price	Transport household budget share
Transport fuel consumption	Length of road per vehicle	Road congestion
Vehicles failing emission standards	Automobile fuel consumption	Pedestrians killed
Public and mass transport seats	Cost recovery from fares	Percentage of wastewater treated
Solid waste generated	Disposal methods for solid waste	Regular solid-waste collection
Housing destroyed	Air pollution concentrations	Emissions per capita
Acute respiratory deaths	Percent of BOD removed	Cost of wastewater treatment
Lowering of groundwater table	Waste water recycled	Level of treatment

Biodegradable waste	Recycling rate	Average cost of waste disposal
Industrial waste generation	Energy usage per person	Renewable energy usage
Food consumption	Disaster mortality	Housing on fragile land
Fatal industrial accidents	Green space	Monument list
Income level	Unemployment	City product/wealth index
Population growth	Population density	Population distribution
Population limit for an area	House price to income ratio	No. of squatters
House ownership	Housing density	Land use distribution
Land use change	Green open space	Area and distribution of forest
Rate of deforestation	Rate of wetlands loss	Housing around high-industrial pollution areas, airports, railroads, energy transmission lines.

Categories of Urban Indicators

Based on the previous table, a number of urban indicators have been selected which could be obtained using spectral indices :

i) Based on the Green Cover/ Vegetation

- Rate of deforestation
- Rate of Wetland loss
- Green space
- Change in farming land
- Green Open Space
- Area and distribution of forest

ii) Based on infrastructure

- Housing around high-industrial pollution areas,

airports, railroads, energy transmission lines

- Dwelling Type
- Expenditure on Road
- Housing Density
- Length of Road per vehicle

- Housing on fragile land

iii) Pollution

- Air Pollution Concentrations

iv) Change Detection

- Land Use (distribution and change)

v) Based on Population

- Population growth
- Population density
- Population distribution
- Population limit for an area

Based on Green Cover/Vegetation :

One of the most important applications of remote sensing is that they can be used for the analysis of medium- or long-term processes of the earth. Analyses of forest degradation and change in land use are major examples of applications of this approach. Images from different years can be compared. These images must be captured during the same time of year so as to minimize the expression of variations in such factors as light quality, the geometry of the

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factors as light quality, the geometry of the observation and differences in the behaviour of a community over the course of the year, in the case of plant ecosystems

There are various methodologies for studying seasonal changes in vegetation through satellite images, one method of which is to apply vegetation indices relating to the quantity of greenness. The NDVI is a measurement of the balance between energy received and energy emitted by objects on Earth. When applied to plant communities, this index establishes a value for how green the area is, that is, the quantity of vegetation present in a given area and its state of health or vigour of growth. The premise is that NDVI is an indicator of vegetation health, because degradation of ecosystem vegetation, or a decrease in green, would be reflected in a decrease in NDVI value. Therefore, if a relationship between the quantity of an indicator – aerial biomass – in various forest ecosystems and the NDVI can be identified, processes of degradation can be monitored.

The NDVI is a dimensionless index, so its values range from -1 to $+1$. In a practical sense, the values that are below 0.1 correspond to bodies of water and bare ground, while higher values are indicators of high photosynthetic activity linked to scrub land, temperate forest, rain forest and agricultural activity.

Other spectral indices which have shown potential in identifying green areas are GRVI, PVI, SAVI and TCT. GRVI stands for Green Red Vegetation Index and it is useful for distinguishing between vegetation, soil and water. TCT of Tasseled Cap Transformation is a very useful method for defining the wetness of soil and the greenness of vegetation. PVI stands for Perpendicular Vegetation Index which is similar to TCT. PVI uses the red and near infrared bands to calculate the perpendicular distance between the vegetation spot on the NIR-Red scatterplot and the soil line. In areas where vegetative cover is low and the soil surface is exposed, the reflectance of light in the red and near-infrared spectra can influence vegetation index values. This is especially problematic when comparisons are being made across different soil types that may reflect different amounts of light in the red and near infrared wavelengths (i.e., soils with

different brightness values). The soil-adjusted vegetation index or SAVI was developed as a modification of the NDVI to correct for the influence of soil brightness when vegetative cover is low. SAVI also takes into consideration that there may be environments with a mixture of different soil types. However, one major issue is the process of differentiating between vegetation - classifying them as forests, grasslands, farmlands. For such purposes, a new spectral index called forest index has been explored. Forest cover maps are essential for current researches of biomass estimation and global change, but traditional methods to derive forest maps are complex. These methods usually need training samples or other ancillary data as input, and are time- and labor- consuming for large scale applications. The idea of forest index is useful for highlighting forest land cover in Landsat scenes. The FI is derived from three bands, green, red and near-infrared (NIR) bands. In case of wetlands, remotely sensed images become a valuable source for monitoring wetlands, and image classification allows the measurement of changes to be quantified. Studies concerning the recession or loss of different types of wetlands are often based on the analysis of remotely sensed data. Comparison of multiple images typically yields better results, as evaluation of wetland condition using a single image is not as reliable due to the dynamic nature of wetland environments.

Based on Infrastructure

One of the main problems in mapping urban areas is assessing the change in land usage from non-residential to residential. Land use changes usually occur because of high urbanisation and residential development rates. Indices for mapping the built-up and bare land in urban areas, such as the Normalised Difference Built-Up Index (NDBI), Index-based Built-Up Index (IBI), Urban Index (UI), Normalised Difference Bareness Index (NDBaI), and Bare soil index (BI), have been employed in various studies. The application of currently available remote sensing indices, however, has some limitations with respect to distinguishing built-up and bare land in urban areas. Built-up areas and barren land experience a drastic increment in their reflectance from band 4 to band 5

while vegetation has a slightly larger or smaller DN value on band 5 than on band 4. This pace of increment greatly exceeds that of any other covers. The minimum and maximum DNs in band 4 are much smaller than those in band 5 for the same cover.

BUI (Built-Up Index), is developed based on the combination of the bands of Landsat ETM+: RED (band 3), SWIR1 (band 5) and SWIR2 (band 7).

The Enhanced Built-Up and Bareness Index (EBBI) is able to map built-up and bare land areas using a single calculation. The EBBI is the first built-up and bare land index that applies near infrared (NIR), short wave infrared (SWIR), and thermal infrared (TIR) channels simultaneously. This new index was applied to distinguish built-up and bare land areas and had a high accuracy level when compared to existing indices. The EBBI was more effective at discriminating built-up and bare land areas and at increasing the accuracy of the built-up density percentage than five other indices.

Road extraction from satellite imagery has become a heated research subjects in recent years. Many ways of road extraction have been proposed and they are quite different due to the differences in strategies, type and resolution of input images, experiment configurations, ways of processing and general assumptions, etc. Resolution of satellite images has important effect on roads or other objects to be discriminated. Images having different resolution include different types of road. In a low resolution images roads are exist as single line on the other hand in a high resolution images roads have particular width and the pixels located at two sides of road have irregular pattern because of existing of trees, cars and houses along the roads.

In some studies, texture data, such as classical one-band texture (e.g., gray-level co-occurrence matrix (GLCM) texture), provide additional information for land cover mapping and have been widely used in diverse applications, including urban built-up area extraction. However, since each band of a multispectral image generates band-specific texture data, the resultant texture bands have varying capabilities to discriminate between land cover types. The inclusion of one-band texture may not take full

advantage of the available texture information contained in the multispectral image. In contrast, multivariate texture (or multi-band texture), e.g., measured by multivariate variogram, extracted simultaneously from all available spectral bands of a multispectral image identifies the spatial variation of multiple bands, thus avoiding the need to select a single band as required in the traditional one-band texture method.

Pollution

Fine particulate matter (aerodynamic diameters of less than 2.5 μm , PM_{2.5}) air pollution has become one of the major environmental challenges, causing severe environmental issues in urban visibility, climate, and public health.

A major challenge in studying the relationship between air quality and human health outcomes such as asthma is characterization of population-level or individual-level exposures. Human exposure measurements are typically unavailable and are estimated using a variety of techniques that rely on environmental measures available from the existing ambient air monitoring network. While monitoring data provide the best characterization of pollutant concentrations levels at a particular place and time, temporal and spatial gaps in this data can limit their applicability for exposure assessment in health studies. A number of modeling techniques to address issues in estimating exposure concentrations including proximity to air monitor models, statistical interpolation, land use regression, dispersion models, integrated emission-meteorological models, and hybrid models have been explored.

One promising method for characterizing PM_{2.5} exposure for public health practice and epidemiologic research is integration of remote sensing satellite systems data with air monitoring network data. Remote sensing data have been used to detect and track particulate matter plumes from major events such as dust storms, volcanic emissions, and fires. However, the aerosol optical properties retrieved by space-borne sensors may also be useful in filling the temporal and spatial gaps found with monitoring ground level data. Satellite data cover large

geographic areas at moderate spatial resolution for multiple years and with reliable repeated measurements. NASA's MODIS satellite provides a measure of Aerosol Optical Depth (AOD) - the measure of the degree to which sunlight is scattered and absorbed by aerosols of various sizes throughout the entire atmospheric column. The MODIS AOD product is available for any area up to two times each day and can be used to estimate the amount of aerosols present in the atmosphere. Research has shown that AOD is indirectly related to ground level PM_{2.5}, with the correlation between the two being strongest on days with low cloud cover, low relative humidity, and good vertical mixing within the atmospheric column. Similar analysis for PM₁₀ and other pollutants can be performed, however there is an issue of data availability and quality.

Land Use (Distribution and Change)

There is no one ideal classification of land use and land cover, and it is unlikely that one could ever be developed. There are different perspectives in the classification process, and the process itself tends to be subjective, even when an objective numerical approach is used. In attempting to develop a classification system for use with remote sensing techniques that will provide a framework to satisfy the needs of the majority of users, certain guidelines of criteria for evaluation must first be established. The classification system must allow for the inclusion of all parts of the area under study and should also provide a unit of reference for each land use and land cover type. The problem of inventorying and classifying multiple uses occurring on a single parcel of land will not be easily solved. Multiple uses may occur simultaneously, as in the instance of agricultural land or forest land used for recreational activities such as hunting or camping.

The size of the minimum area which can be depicted as being in any particular land use category depends partially on the scale and resolution of the original remote sensor data or other data source from which the land use is identified and interpreted. It also depends on the scale of data compilation as well as the final scale of the presentation of the land use information. In some cases, land uses cannot be

identified with the level of accuracy approaching the size of the smallest unit mappable, while in others, specific land uses can be identified which are too small to be mapped. Farmsteads, for example, are usually not distinguished from other agricultural land uses when mapping at the more generalized levels of the classification. On the other hand, these farmsteads may well be interpretable but too small to be represented at the final format scale. Analogous situations may arise in the use of other categories.

A land use and land cover classification system which can effectively employ orbital and high-altitude remote sensor data should meet the following criteria (Anderson, 1971):

1. The minimum level of interpretation accuracy in the identification of land use and land cover categories from remote sensor data should be at least 85 percent.
2. The accuracy of interpretation for the several categories should be about equal.
3. Repeatable or repetitive results should be obtainable from one interpreter to another and from one time of sensing to another.
4. The classification system should be applicable over extensive areas.
5. The categorization should permit vegetation and other types of land cover to be used as surrogates for activity.
6. The classification system should be suitable for use with remote sensor data obtained at different times of the year.
7. Effective use of subcategories that can be obtained from ground surveys or from the use of larger scale or enhanced remote sensor data should be possible.
8. Aggregation of categories must be possible.
9. Comparison with future land use data should be possible.
10. Multiple uses of land should be recognized when possible.

Some of these criteria should apply to land use and land cover classification in general, but some of the criteria apply primarily to land use and land cover data interpreted from remote sensor data.

Large datasets of sub-meter aerial imagery represented as orthophoto mosaics are widely available today, and these data sets may hold a great

deal of untapped information. This imagery has a potential to locate several types of features; for example, forests, parking lots, airports, residential areas, or freeways in the imagery. However, the appearances of these things vary based on many things including the time that the image is captured, the sensor settings, processing done to rectify the image, and the geographical and cultural context of the region captured by the image. The application of deep convolutional networks have been explored for analyzing land use patterns. Unsupervised learning algorithms based on polarimetric scattering similarity have also been experimented with to segment the image into forests, urban settlements etc.

Based on population

Knowledge of size and spatial distribution of human population in urban areas is essential for understanding and responding to a wide variety social, economic and environmental problems. Practically there are three ways used for collecting population data - census, population registers and remote sensing. The former two ways of population collection is extremely resource expensive and hence the possibility of using remote sensing to approximate the population is still under exploration.

Population estimation using remotely sensed images generally occurs by identifying the size of the houses and associating it to a household size based on the same.

One of the resources available online suggested the use of segmentation to isolate individual households and represent individual household data using a quad-tree based technique. The advantages offered by the proposed approach, in the context of census collection, are: (i) low cost, (ii) speed (iii) automated processing. The disadvantage mentioned is that it will not be as accurate as more traditional “on ground” census collection. It has also been mentioned that the proposed approach is more applicable with respect to rural areas than suburban and inner city areas.

Spectral Indices

Spectral indices are combinations of surface reflectance at two or more wavelengths that indicate relative abundance of features of interest. Vegetation indices are the most popular type, but other indices are

available for burned areas, man-made (built-up) features, water, and geologic features.

The following topics provide definitions and formulas of the indices, grouped by feature type:

- [Vegetation Indices Background](#)
- [Geology Indices Background](#)
- [Burn Indices Background](#)[Miscellaneous Indices Background](#)

- Vegetation Indices : Analyzing vegetation using remote sensing data requires knowledge of the structure and function of vegetation and its reflectance properties. This knowledge enables the linking of vegetative structures and their condition to their reflectance behavior in an ecological system of interest. Vegetation reflectance properties are used to derive vegetation indices (VIs). VIs are constructed from reflectance measurements in two or more wavelengths across the optical spectrum to analyze specific characteristics of vegetation, such as total leaf area and water content.

The solar-reflected optical spectrum spans a wavelength range of 400 nm to 3000 nm. Of this range, the 400 nm to 2500 nm region is routinely measured using a variety of optical sensors ranging from multispectral (for example, Landsat TM) to hyperspectral (for example, AVIRIS).

Vegetation interacts with solar radiation differently from other natural materials, such as soils and water bodies. The absorption and reflection of solar radiation is the result of many interactions with different plant materials, which varies considerably by wavelength. Each category of indices typically provides multiple techniques to estimate the absence or presence of a single vegetation property. For different properties and field conditions, some indices within a category provide results with higher validity than others.

Some examples of vegetation indices are NDVI, SAVI, GRVI etc.

- Geology Indices : Geology Indices are used for the analysis of geologic features. A few examples of the same are Clay Ratio, Ferrous Minerals Ratio, Iron Oxide Ratio, WorldView Soil Index etc.

Clay ratio highlights hydrothermally altered rocks containing clay and alunite.

Ferrous Minerals ratio highlights iron-bearing minerals.

WorldView Soil index ratio uses WorldView-2 bands to identify pixels that primarily consist of soil.

- Burn Indices : Land resource managers and fire officials use burn severity maps from remote sensing instruments to predict areas of potential fire hazards, to map fire perimeters, and to study areas of vegetation regrowth after fires. Landsat imagery has traditionally been used to create indices that indicate burn severity because of its repeated coverage, ease of access, and spectral wavelengths. Some examples of burn indices are Burn Area Index, Normalized Burn Ratio etc.

- Burn Area Index highlights burned land in the red to near-infrared spectrum, by emphasizing the charcoal signal in post-fire images.

- Normalized Burn Ratio highlights burned areas in large fire zones greater than 500 acres. The formula is similar to NDVI, except that it uses near-infrared (NIR) and shortwave-infrared (SWIR) wavelengths.

- Miscellaneous Indices : Some of the other indices are Modified Normalized Difference Water Index (MNDWI), Normalized Difference Built-Up Index (NDBI), Normalized Difference Mud Index (NDMI), Normalized Difference Snow Index (NDSI) etc.

MNDWI enhances open water features while suppressing noise from built-up land, vegetation, and soil. The MNDWI was originally developed for use with Landsat TM bands 2 and 5. However, it will work with any multispectral sensor with a green band between 0.5-0.6 μm and a SWIR band between 1.55-1.75 μm .

NDBI highlights urban areas where there is typically a higher reflectance in the shortwave-infrared (SWIR) region, compared to the near-infrared (NIR) region. Applications include watershed runoff predictions and land-use planning. The NDBI was originally developed for use with Landsat TM bands 5 and 4. However, it will work with any multispectral sensor with a SWIR band between 1.55-1.75 μm and a NIR band between 0.76-0.9 μm .

NDMI highlights muddy or shallow water pixels.

NDSI highlights snow cover using a combination of visible (typically green) and shortwave-infrared

wavelengths. NDSI was originally designed for use with MODIS bands 4 (0.555 μm) and 6 (1.64 μm).

However, it will work with any multispectral sensor with a green band ranging from 0.5 to 0.6 μm and a

Spectral Indices Information:

Spectral Index	Use
NDVI (Normalized Difference Vegetation Index)	Vegetation analysis
NDWI (Normalized Difference Water Index)	Analysis of water bodies
NDBI (Normalized Difference BuiltUp Index)	Used to extract built-up features
SAVI (Soil Adjusted Vegetation Index)	Vegetation analysis(used to correct the influence of soil brightness)
TCTG (Tasseled Cap Transformation Greenness)	Measure of vegetation
TCTB (Tasseled Cap Transformation Brightness)	Measure of soil
TCTW (Tasseled Cap Transformation Wetness)	Measure of interrelationship of soil & canopy moisture

References

- [Book on urban indicators with city profiles](#)
- [list of spectral indices](#)
- [Urban Indicator Paper with list of Urban Indicators](#)
- [Urban Indicator Guidelines](#)
- [Land Use Land Cover theory](#)
- [NDVI as an indicator for degradation](#)
- [Change detection in forest cover using remote sensing](#)
- [Detecting forest area and crops using spectral indices](#)
- [A review of wetland remote sensing](#)
- [Detecting wetland change using supervised classification](#)
- [Change detection in wetland ecosystem using TCT](#)
- [Classification of grasslands from high resolution images](#)
- [New spectral vegetation index for grassland](#)
- [A review of remote sensing vegetation indices](#)
- [Texture based forest segmentation in satellite images](#)
- [Change detection estimates](#)
- [Enhanced Built-Up and Bareness Index \(EBBI\) for Mapping ... - MDPI](#)
- [NDBI for mark urban areas from TM imagery](#)
- [Identification and Area Measurement of the Built-up Area with the Built-up Index](#)
- [Landsat 8 handbook](#)
- [Mapping Land Use using Landsat Images](#)
- [Road Extraction Researchgate](#)
- [Sub Pixel Unpaved Road Detection in Landsat Images](#)
- [Urban Built-Up Area Extraction from Landsat TM/ETM+ Images ... - MDPI](#)
- [Forest Index Paper](#)
- [SAVI tutorial](#)
- [PM2.5 using MODIS data](#)
- [MODIS NASA document](#)
- [Land Use Land Cover](#)
- [Land Use Land Cover KNN and decision Trees](#)
- [Population density estimation](#)
- [Population density using high resolution satellite imagery](#)
- [Population estimation using night time satellite imagery](#)

Blockchain: New Paradigm For Connected Government

Dr. Gopala Krishna Behara, Tirumala Khandrika

Wipro Technologies, Strategy Consulting and Architecture Group, Hyderabad, India
Email: Gopalkrishna.behra@wipro.com, tirumala.khandrika@wipro.com

Abstract: Blockchain in connected Government helps to deliver better services for citizens, departments and external entities (that interact with government) in more secured and transparent way. It improves the stakeholders trust in government. With secure and accessible information government services makes more efficient, data driven, changing the lives of citizens for the better. In summary, this opens up the new opportunities for government to exchange information that instills the stake holder confidence, eliminates the need for any intermediaries to broker various processes and make the process more efficient and quick (in terms of time).

Keywords: e-Governance, Blockchain, Distributed Ledger Technology

1. Introduction

Blockchain is a digital, distributed and decentralized network to store information in a tamper proof form with an automated way to enforce trust among different participants. An open distributed ledger can record all transactions between different parties efficiently and in a verifiable and permanent way. It captures, manipulates and builds consensus among participants in the network.

Each Block is uniquely connected to the previous blocks via a digital signature which means that making a change to a record without disturbing the previous records in the chain is not possible, thus rendering the information tamper-proof.

Blockchain influences the following government interactions:

- 1) **Government Efficiency:** Helps in establishing better efficiency in Government-to-Government (G2G) interaction. To achieve efficiency, eliminating manual efforts by automating, sharing and verification of information across multiple government entities using shared ledger, Blockchain technology is used.
- 2) **Citizen experiences:** Better citizen experience is a need in Government to Citizen (G2C) interaction. To enable seamless automated verification and delivery of citizen services such as loan/grant approval process through smart contracts, Blockchain technology is used
- 3) **Improving transparency & reporting:** Categorized as Government to Business interaction (G2B). Blockchain can be used to improve transparency and trust using immutable and secure record of business transactions and enhance governance of business contracts encoded as smart contracts providing for auditability and reporting

Market Research predicts that, by 2024, global Blockchain market expected to be worth \$20 billion. The use and adoption of Blockchain technology is expanding at a rapid pace, all over the world, and it seems that e-Governance is the most widely used application as of now [1].

Recently, Dubai announced that they would put 100% of their records pertaining to land registry on Blockchain. Dubai Land Department (DLD), in fact, has claimed to be the first such

Govt. department anywhere in the world, to adopt Blockchain for such high-level task [2]

Republic of Georgia declared that they would use Blockchain technology to 'validate property-related government transactions.

Countries like Sweden, Honduras and others are also developing such similar Blockchain based systems, for enabling secured e-Governance [2].

European Union's commercial research group, the European Innovation Council (EIC) has launched a program to grant 2.7 billion euros to 1000 projects, who are developing systems and solutions using Blockchain technology [2].

Andhra Pradesh State has become the first state in the India to pilot Blockchain Technology in two departments and plans to deploy it across the administration [3]

Blockchain holds the potential to disrupt any form of transaction that requires information to be trusted. This means that all intermediaries of trust, as they exist today, exposed to disrupt in some form with the initiation of Blockchain technology. Blockchain works by validating transactions through a distributed network in order to create a permanent, verified and unalterable ledger of information. The following diagram shows the end-to-end flow of the Blockchain transaction creation.

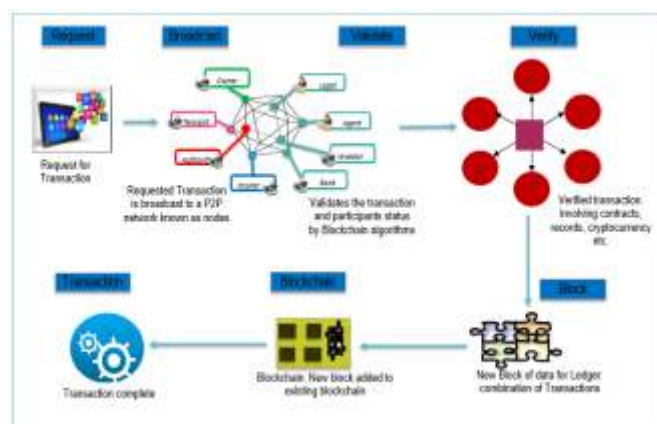


Figure 1– Blockchain Flow

2. Blockchain Challenges Today

There are number of challenges preventing adoption of Blockchain in governments. The main challenges are,

- a. **Initial Costs:** It is expensive initially to establish Blockchain at the enterprise level. The software required to run Blockchain technology in organizations must typically be developed for the specific firm and is therefore expensive to purchase
- b. **Integration with legacy systems:** Difficult for Blockchain solutions to handle all functions needed by Government/departments, initially making it difficult to eradicate legacy systems. Therefore, considerable changes are done to the existing systems in order to facilitate a smooth transition. This process may take a significant amount of time, funds and human expertise to find a way to integrate their existing system with the Blockchain solution.
- c. **Inviolability:** Information stored on the Blockchain is permanent and cannot be deleted. This may be an issue from a privacy perspective.
- d. **Digital Signature:** Legal validity of a digital signature is increasingly diminishing with such signatures now viewed as legally binding.

3. Characteristics of Blockchain Technology

Decentralized and distributed: Rather than one central authority controlling everything within an e-governance ecosystem, Blockchain distributes control among all peers in the transaction chain, creating a shared infrastructure. Ledger replicated across parties, each keeping full record of transactions. No single point of failure because of distributed system operation.

Immutable: All the transactions encrypted and include time, date, participants and hash to previous block and hence are immutable.

Digital signature: Blockchain enables exchange of transactional value using unique digital signatures that rely on public keys (decryption code known to everyone on the network) and private keys (codes known only to the owner) to create proof of ownership. This is very critical in avoiding the fraud in Land records management.

Mining: A distributed consensus system rewards miners for confirmation and verification of transactions and stores them in blocks using strict cryptographic rules.

Data integrity: Use of complex algorithms and consensus among users ensures that transaction data, once agreed, it could not be tampered. Data stored on Blockchain thus acts as a single version of truth for all parties involved, reducing the risk of fraud.

Transaction Management: Blockchain, records and validate every transaction made, which makes it secure and reliable. Users are in control of all their information and transactions.

Consistent: Blockchain data is complete, consistent, timely, accurate, and widely available.

4. Blockchain Government Conceptual Architecture

Below diagram presents an integrated view of the Blockchain

infrastructure along with enterprise’s architecture and a brief description of each layer. Blockchain infrastructure has been highlighted in the below stack for quick reference.

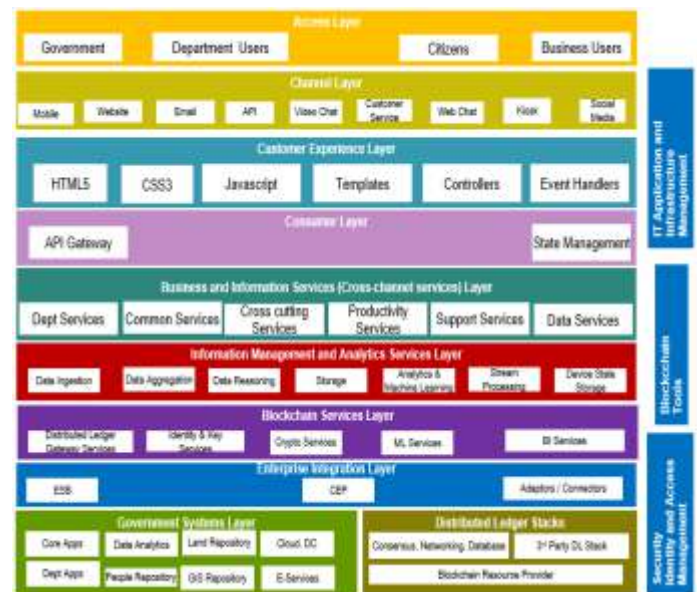


Figure 2 – Blockchain Government Conceptual Architecture

Access Layer

Various stakeholders, both internal and external will be part of this layer. They are the primary users of the systems.

Channel Layer

Stakeholders use channels to interact with government. They engage with government departments over multiple channels both physical and digital.

Customer Experience Layer

Collection of presentation components and services. This layer also constitutes the critical systems, which used by governments in engaging stakeholders.

Consumer Layer

The Consumer layer is a gateway for channels and aggregates functionalities through composition and orchestration, mediation, and routing. Key capabilities are:

- API Gateway: a single point of entry for consumers to access back-end services. The service composition and orchestration is based on customer journey and context. This capability is provided by API Management platforms
- State Management: manages state and transition. Control logic is decoupled from the user interface and managed at the Consumer

Business and Information Services Layer

Business and Information Services layer is designed using “Smart Architecture” principles and which will provide cross channel capabilities

Information Management and Analytics Services Layer

Focus on data ingestion, processing, complex event processing and real-time analytics and insights. A basic service system provides fundamental data services, which include data access, data processing, data fusion, data storage, identity resolution, geographic information service, user management, and inventory management, etc.

Blockchain Services Layer

This layer act as a gateway for reaching out to the Blockchain infrastructure. This layer has various services related to identity management, key management, cryptography, ML and BI. Identity, key and cryptographic services are key for data integrity. BI and ML were used for analysis and reporting purposes.

Enterprise Integration Layer

Enterprise Integration Layer is a key enabler as it provides mediation, transformation, protocol and routing capabilities and acts as a gateway to integrate with Core Government Systems. It also provide aggregation and broker communications. Enterprise integration and presentation layer is responsible for the integration of Blockchain infrastructure with the enterprise application stack.

Government Systems Layer

Collection of enterprise back office core systems and applications that house business data.

Distributed Ledger Stack

This layer has the core distributed ledger technology stack. Blockchain building, transaction execution and consensus will happen in this layer. The components in this stack might vary on the distributed ledger product chosen. However, the common sub components will be consensus algorithms, data storage, transactions management and other relevant services.

Security

Handles single sign-on, authentication, encryption and authorization capabilities.

Infrastructure Management

Leverage Infrastructure-as-a-service, Platform-as-a-service technologies as it requires large computing capabilities

5. Role of Blockchain in Connected Government

In government, linking the data between the departments with Blockchain ensures that the data realization in real time, when both the departments and the citizen agree on sharing data. Blockchain technology could improve transparency and check corruption in governments worldwide.

Domain	Applications	Features	Benefits
Registration	Land Registration	Property record creation, Managing Ownership	Trusted source of land and property, Provenance of Ownership, Clarity on rights, risks and disputes
Election	Digital Voting	Vote Casting, Vote Tally, Ballot Casting Verification	Eliminating Cyber attack threats on Election results, Transparency
Finance	Digital Identity	Security, checking, authentication and authorization	Eliminate Middle men, User Identification Mechanism
Revenue	Document Verification	Automated Verification, Immutability	Low cost transactions, Easy Integration
Grant	Loans and Grants	Disbursement of Loans and Grants, Fraud Prevention	Escrow Services, Transparency
Entity	Addition of New Entity	Fair Task Approval, New Business Est. Registration	Automated Business Actions, Governance Execution
Agriculture	Integrated Agriculture Management	Farmhouse, Water Management	High Quality Data, Improve Traceability
Healthcare	Integrated Health Management System	Health Records Management	Secure and Flexible System, Improve Transparency
Education	Integrated Education Management System	Students, Faculty, Certificates, Courses Mgt.	Improve Transparency

Figure 3 – Blockchain use case matrix

Registration: By securing a unique and non-corruptible record on a Blockchain and validating changes to the status of that record across owners, a reliable property record can be created, whether for a piece of land that heretofore had no owner or as a link between stovepiped systems.

A decentralized, standardized system for land registration records could reduce the number of intermediaries required, increase trust in identity of transacting parties, increase process efficiencies, and decrease time and cost to process. Recording property rights via Blockchain would cost savings for parties through a tamper-proof ledger

Election : Citizens can cast votes the same way they initiate other secure transactions and validate that their votes were cast—or even verify the election results. Potential solutions are currently working to blend secure digital identity management, anonymous vote-casting, individualized ballot processes, and ballot casting confirmation verifiable by the voter. Potential cost savings through Blockchain-enabled voting.

Finance: Online identity has always been a time-consuming and costly process. There was always this need for registration and financial services like loans, mortgages, insurance requires always required a higher level of security, checking, authentication and authorization. This usually meant that checking official government identity documents was a required step.

One of the benefits of the Blockchain is that it has the potential to cut out the intermediaries and provide every organization/department in the network access to the same source of the right information. Blockchain technologies make tracking and managing digital identities both secure and

efficient, resulting in seamless sign-on and reduced fraud. Users are able to choose how they identify themselves and with whom their identity is shared.

Town Planning: Having property records on the Blockchain makes it possible that prospective buyers shall verify the owner of a house quickly and easily.

Revenue: Seamless cross-referencing of documentations across multiple government entities. All documentations will automatically be verified by the relevant entities. The inherent features of Blockchain (digital identity) enable it not possible to make changes to the ledger.

Managing Entity: Business Unit Incorporation and governance with the use of digital signatures and programmable business rules. Approvals and Validations of the entity and its application on the Blockchain. The DLT allows multiple parties to digitally sign for authorization and approve a transaction and documents.

Grants: An Integrated Blockchain Solution that enables seamless customer onboarding with automated Disbursements of Loans and Grants. Transactions on the Ledger are auditable real time providing greater transparency for Regulators. Highly Secured Digital Signatures which makes sure the transactions get executed only when relevant provide their signature

Agriculture: Integrated Agriculture Management System (IAMS) with a Blockchain infrastructure ensures immutability of data and a way to trace historical agricultural data as agricultural products move from production sources to the consumer. IAMS with a block chain infrastructure is a way to diversify current agricultural management practices in a way that engages the public through ownership of the agricultural production process. Other possible applications include the use of Blockchain technology to record and manage agricultural land records as well as agriculture insurance.

Healthcare: Digitization of health records is a significant task in the public health sector which is huge, complex task and associated with ethical issues. Blockchain technology can disrupt public health by creating a secure and flexible ecosystem for exchanging patient's electronic health records. This technology could also make the space more transparent by creating basis for critical drugs, blood, organs, etc. In addition, by putting all medical licenses on a Blockchain, fraudulent medical practitioners, druggists, chemists can be prevented from practicing and selling drugs.

Education: Student records, faculty records, educational certificates, etc., are key assets in the education domain and are to be shared with multiple stakeholders and it is imperative to ensure that they are trustworthy. All these records can be maintained with the application of Blockchain technology. Blockchain can also simplify certificate attestation and verification.

6. Conclusion

Blockchain is not a silver bullet. It is not applicable to every situation, and government leaders are researching out challenges both technological and managerial in the form of

proof of concept. Government leaders need to understand the benefits of positioning the Blockchain technology in e-governance domain.

Blockchain based e-governance applications increase the effectiveness of government, reduce cost of transactions and

more quickly means of interaction between the government and the citizen.

Lot of exploration is needed today in e-governance space is, who will take the lead in applying Blockchain technology across Government departments, how to cut government costs, improve security in an era of cyber uncertainty, and enhance citizen delivery.

View Blockchain as a unique and a universal technology that helps streamline and automate nearly all citizen services, legal contracts, while increasing the transparency and effectiveness of e-government.

7. Abbreviations and Acronyms

API – Application Programming Interface
BI – Business Intelligence
CSS – Cascading Style Sheet
CEP – Complex Event Processing
DC – Data Center
DL/DLT – Distributed Ledger Technology
ESB – Enterprise Service Bus
HTML – Hypertext Markup Language
ML – Machine Learning

References

- [1] <https://www.coindesk.com/transformed-role-government-blockchain-era/>
- [2] <https://www.ccn.com/100-dubai-put-entire-land-registry-blockchain/>
- [3] <http://www.firstpost.com/tech/news-analysis/andhra-pradesh-to-become-first-state-to-deploy-blockchain-technology-across-the-administration-4125897.html>

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Disclaimer

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e-Governance Good/Best Practices of Telangana Civil Supplies

C. V Anand (IPS), Commissioner & Ex-Officio Prl. Secretary to Government,
Vice Chairman & Managing Director (FAC), Government of
Telangana, commr_csc@telangana.gov.in

Abstract

To conduct 100% Decentralised Procurement System (DCP) by ensuring Minimum Support Price (MSP) to the farmers unlike the earlier systems of levy operations conducted by Food Corporation of India (FCI). Department has adopted e-Governance to ensure procurement of paddy from farmers, custom milling of rice by millers, transportation to mills, buffer and corporation godowns, storage, supply and final distribution of PDS items through Fair Price Shops (FPS) which is completely digitized. To involve e governance is a big way to make all department's processes consumer friendly and also plug leakages in the above processes.

Key Words: Decentralised Procurement System, Minimum Support Price, Fair Price Shops, Digitization

1. Introduction

- Steps were taken to plug loopholes in the existing system of PDS and strengthen the system to avoid diversion of PDS rice and other essential commodities by utilizing the latest technology available.
 - ePoS (Electronic Point of Sale)
 - Supply Chain Management (SCM)
 - Command and Control Centre
 - Global Positioning System (GPS)
 - CCTV's
 - Online Procurement Management System (OPMS)
 - Financial Management System (FMS)
 - WhatsApp
 - T-Ration
 - SMS alert to the card holders

Some of major steps in that direction include- the constant check on the transportation of rice and ration commodities, computerization of all activities right from the procurement of paddy – to the supply of ration items till the distribution to the beneficiaries,

Custom Milled Rice (CMR), storage, changeover to online transactions including payments, quality checkup, recovery of dues, recovering of dues, recovering the gunny bags, elimination benami dealers as well as the middle-men, portability system to obtain ration commodities from any ration shop as per the availability, GPS tagging of all vehicles that carry ration items including kerosene tankers, installation of CC cameras in godowns, distribution of ration through biometric system, Command Control Centre to monitor the movement of vehicles that carry ration commodities, bridging the communication gap among field staff through WhatsApp groups, Online Procurement- first one its kind in the country introduced to avoid middle men in the payment of support price to farmers, T- Ration App to erase the distance between the department and people and so on.

2. electronic Point of Sale (ePoS)

- The National Food Security Act, 2013 is being implemented in Telangana state from 1st October, 2015. As per the guidelines prescribed by GoI for implementation of end-to-end Computerization of TPDS under NFSA, FP Shop Automation is mandatory and required to be implemented in all the FP Shops as per the action plan. Under FP Shop Automation, the ePoS (Electronic Point of Sale) devices will be provided at all the FP Shops for delivery of ration to the genuine beneficiaries with ePoS devices through Biometric Authentication.
- A pilot project was launched in GHMC to cover 1545 shops. This is operated online. The machines recognize the finger prints of the beneficiaries. It resulted in Rs.140 Crore savings from September, 2016 to March, 2017.
- After demonetization, several hi-tech changes were implemented in ePoS to help the common people and non tech savvy people. The machines are connected to Iris Scanner, Electronic weighing machine. It was

swiping facility for Aadhaar Enabled Payment System (AEPS). In the biometric process, often problems were cropping up whenever the finger prints are hazy. So to get over it, IRIS was introduced and similarly voice over system in the local language would be of much help to the people from rural areas and particularly so to the illiterate. After the introduction of this system it was now been extended to all 31 districts of Telangana in 17,200 shops, phase wise. The tedious tender process was completed and the System Integrator is Oasys Cybernetics Pvt. Ltd. The new project has incorporated latest features of a cashless economy like A) Biometric Aadhaar Authentication, B) Iris Authentication, C) Electronic Weighing Machine, D) Voice Overlay in Local Language, E) card swiping facility and F) Micro ATM facility to cater to the needs of demonetized economy to enable AEPS.

- The installation of all 17,200 machines is almost completed with only Adilabad (Old) District, Nalgonda and Suryapet being left to be done 1February, 2018.
- A closing balance of an average of 15% for the entire State in the Essential Commodities, will result in a saving of Rs. 828 crore per annum to the State in the next one year.
- From April, 2017 to December 31st, 2017 the savings reported in the State in the already implemented districts & GHMC is Rs. 381.93 crore in addition to the Rs.140 Crore already saved in GHMC area from August, 2016 to March, 2017

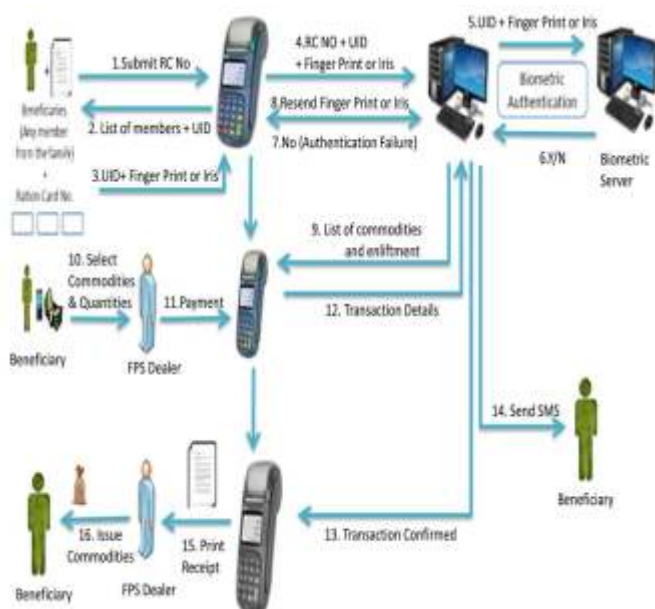


Figure 1: ePoS Workflow



3. Supply Chain Management:

The following flowchart explains the supply chain in the entire civil supplies network.

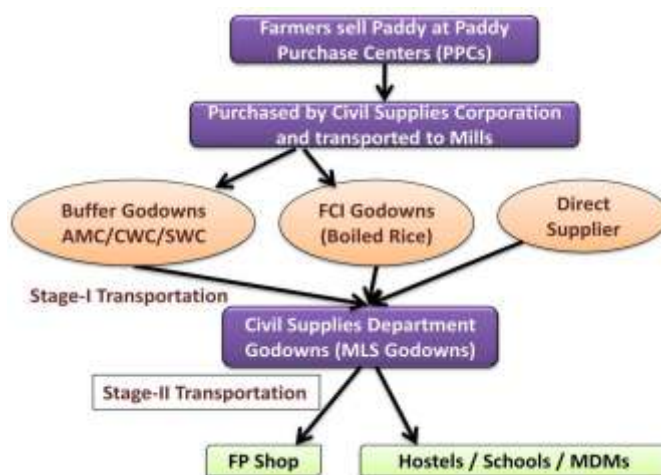


Figure 2: SCM Work Flow

- In Telangana, 1383 vehicles are moving for the above Stage-I and Stage-II Transportation
- Supply Chain Management is being implemented under end to end computerization of TPDS operations by TSCSCL in MLS Points/Godown space hired by TSCSCL for buffer storage from November 2015.
- All the stakeholders of PDS (Commissioner, VC & MD, FCI at Central level and at District level the Managers, the Tahsildars, the MLS Point Incharges and the Buffer godowns incharges have been provided with login Id's (10 districts) through digital key for active participation.

- All the 171 MLS Points of Telangana State have been provided with computers, internet connectivity and personnel on outsourcing basis towards implementation of Supply Chain Management.
- The real time stock position at each of the MLS points can be verified online at <http://scm.telangana.gov.in/SCM/> in public domain. Computerisation has also been completed in the CWC/SWC and FCI godowns that are used by the Telangana Civil Supplies Corporation and they are now integrated with MLS godowns and provided with login Id's.

4. Command Control Center

- Civil Supplies Department has taken steps to plug loopholes in the existing system of PDS and strengthen the system to avoid diversion of PDS rice and other essential commodities by utilizing the latest technology available.
- With a view to prevent diversion of PDS rice which has been going on for decades, a Command Control Centre was designed to watch every movement of vehicles involved in Stage-I i.e., stocks moved from Buffer go-downs to corporation godowns (or MLS points) and Stage – II transportation of PDS rice i.e., stocks moved from MLS Points till the commodities reach the Fair Price Shops.
- A Video Wall of 210 inches width, 72 inches length was setup in the Civil Supplies Bhavan at the Hyderabad Head Quarters which is biggest in the State to supervise and monitor the movement of Stage-I & II Vehicles and kerosene oil tankers throughout the state. This facility of seeing the operations on a video wall has also been extended to all the Joint Collectors in the District offices.
- The establishment of the Command Control Centre enables to locate diversion of Stage-I & II vehicles en route. This technology helps in locating diversion of stocks into the black market and the erring persons involved are brought to book.

- Any vehicle deviating from the Geofenced route, raises an alert in the form of three SMS to the District Officers and the Command & Control Centre. It is possible to trace vehicle history of the past one year, whether it is moving – stationery – engine on at what times etc. The CCC also helps watch live feed from CC TVs being established in all the 171 godowns of the state



Figure 3: Command Control Center

a) Global Positioning System (GPS)

- 1383 Vehicles viz., 855 vehicles of stage-I [in PURPLE (Permanent) and YELLOW (temporary)] & 482 vehicles of stage II (in RED) are provided with GPS facility and magnetic devices. 46 Kerosene tankers are covered by GPS tracking. The Stage-I vehicles transport the stocks of essential commodities from the CWC/SWC buffer godowns to the MLS Points (Corporation Godowns).
- The Stage –II vehicles transport the stocks from MLS points to Fair Price Shops.
- Pre-determined routes are setup for movement of vehicles in the authorized routes for their destinations.
- 18,000 routes have been Geofenced.
- If the vehicles divert from their authorized routes an indication is received to the System Integrator by way of a notification basing on which an alert i.e., SMS or Mail is given to the Managers of Civil Supplies Corporation in the Districts for (1) route diversion, (2) stopped for a longer time, (3) outside the district, basing on which the Managers take action.
- At the State level, the System Integrator monitors

the vehicles in the Command and Control Centre. For such diversions en route throughout the State, reports are generated.



a) CCTV's

- 1750 CCTVs are to be installed in all the 171 MLS points in the State and to be monitored in Commissioner of Civil Supplies and Joint Collectors offices at a cost of **Rs.17 crore**.
- The tender has been completed and the project roll out has been started.
- As a pilot project, 64 CCTVs installed in 9 MLS Godowns in Hyderabad District have been connected to the CCC & are being monitored live.
- This is 24x7, live transmission, with 30 days recording, 2 megapixel cameras with night vision and IP base.
- This step is expected to control the activities in the Corporation Godowns where there is a complaint that the main activity of diversion, under weighment and other malpractices, are resorted to.

1. Financial Management System (FMS)

- This Financial Management System Software is vital in making all payments and transactions in Civil Supplies Department and Corporation, online and real time, and can be viewed by concerned officers for live, real time analysis and supervision of finances and transactions.

1. Online Procurement Management System (OPMS)

- Softwares like OPMS (Online Procurement Management System), SCM (Supply Chain Management), FMS (Financial Management System) have been developed to move towards 100% cashless transactions. **Rs.8,107.93 crore** payments to **10.86 lakh farmers** for the 2017-18 Kharif and Rabi crop was made totally online, using tabs in paddy purchase centres through SBI accounts using OPMS Software. This has brought lot of happiness to farmers as all middlemen, brokers have been eliminated and is the biggest welfare activity for them.

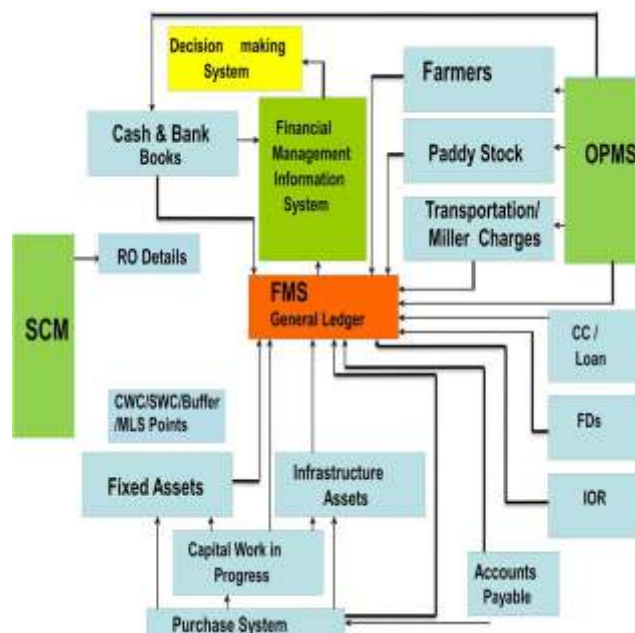


Figure 8: FMS Workflow

1. WhatsApp Control Room

- Not just applying technology to the administration, one has to involve the stake holders too, to make it a fruitful effort. Whatsapp is one which has the capacity to do so.
- The vastly popular Social Media App “Whatsapp” has become a very important tool in Administration. Several administrative departments, police etc., have been using Whatsapp not only for internal administration but also for redressing public grievances.
- Civil Supplies Department swiftly started a Whatsapp Control Room in HO with No. 7330774444. It is a 24 X 7 service for all its stakeholders like farmers, rice millers, godown owners, transporters, fair price shop dealers, card-holders etc.
- Now anyone can interact with the officials of the department and vice versa for sending messages, images, audio-video clippings on anything including complaints.
- The Control room at HO coordinates. Apart from bringing transparency in the department, this curbs corruption to a large extent. 15 Groups of WhatsApp for officers were formed which played a vital role in ensuring timely action, coordination and solutions to problems throughout the State.
- Earlier, there used to be a gap between the Head office and the Districts with very little communication between them, except for official communications and meetings.
- Also, there used to be communication gap between the Civil Supplies Department and the Civil Supplies Corporation officers. These 15 groups have bridged all these gaps and broken all the walls, leading to quick decision making.
- In Group 1 - All JCs / DCSOs, DMs; Group 2 - JCs only; Group 3 - All Collectors only; Group 4 – All DCSOs / ACSOs; Group 5 - All DMs /

AMs / Gr.1 Officers. And also EPOS, FCI-CS Dept., DCSO, Head Office, Enforcement and Taskforce (ETF), Finance, IT Wing groups were established.



Figure 6: OPMS Process Flow



Figure 7: OPMS Workflow through Tabs

1. SMS Alert to Beneficiaries

- Civil Supplies Department started sending SMS alerts to the beneficiaries on the availability of commodities in the ration shops.
- As soon as the commodities are transported from godown to the ration shop, a message is sent to the card holder's mobile phones to avail the goods.
- After the goods are taken, another message is also sent to his phone.
- Card holder gets all the details pertaining the stock availability at the ration shop. For this, all the mobile numbers of the card holders are linked to ePDS.

2. T Ration

- This T-Ration App erases all the distances between the Government and beneficiaries. A cardholder who downloads this app in his/her mobile can now get Live direct access to the

operational statistics (stock position, distribution pattern etc.), precisely of that time in the concerned ration shop at his own comfort.

- This App allows the Officers concerned to discharge their duties from anywhere by accessing 13 applications positioned for the purpose. By entering his/her card number, the card-holder virtually can locate the nearest rations shop, and get direct access to the live activity of that shop and even know the complete information about the monthly quota allotted, and drawn, how much a card holder is getting, availability of types of commodities. Apart from this, one can also find out the status of their application for ration card, the stocks in go-downs, loading and unloading details from the 7 applications under G2C(services of the Government to its citizen) excluding the 13 applications meant for the Government.
- **Allocation to Ration Shop:** This link informs you the total monthly quota allotted to a particular ration shop.
- **Allocation to Ration Card:** This link informs the card holder of the maximum quantity of each commodity allotted to him/her.
- **Transaction of Ration Card:** The card holder can even get the transactions made through E-POS machines.
- **The up to date stock position:** By activating this link one can know the latest stock position in his/her ration shop. One can even know the latest stock position in ration shops other than what is allotted to him by entering the number of that shop.
- **Ration Shop Location:** All the shops are getting geo-tagged. So now by activating GPS in their mobiles, one can get to know how much nearer a particular shop is from the place where he/she is standing. And by clicking on the shop in the map

one can know the route to reach it and also can know whether the shop is open or closed, and the stock position in that shop etc.,

- **Government Service (G2G):** This section of the App contains 13 applications and is exclusively meant for the officials of the department. This is like a mobile office for them. By activating the particular link they can get all the updated information that is necessary for discharging their duties irrespective of the place where they are located.
- **Ration Card Search:** By entering the ration card number, the card holder gets all the details of his card like number of family members included and their names, address and whether the card is operational or eliminated. Those who have applied for fresh ration cards or requested for any changes in the card can get the latest status of their application like approval, rejection or pending for clearance at a particular officer etc.



Figure 9: WhatsApp Control Room

1. Conclusion

To ensure food security of its citizens and to avoid diversion of subsidized food grains into the black market, Telangana government has adopted 'digital' for PDS. It has achieved 100% digitization of ration cards, which are also seeded with Aadhaar. The use of an Aadhaar-enabled authentication system ensures that only the bonafide beneficiary can claim the entitlements, which curbs pilferage and diversion. Digitization of the supply

chain management has ensured that the movement of food grains is tracked at each stage in the supply chain. PDS outlets in

Telangana have been automated by installing electronic Point of Sale (ePoS) devices at the PDS outlets.



Figure 10: T Ration App

Paryavaran Mitra (पर्यावरण मित्र)

Author

Santulan Chaubey, Director,
Delhi eGovernance Society
Department of Information Technology,
9th Level, B-Wing, Delhi Secretariat, New Delhi
santulan@gov.in
+91-9818180683

I Abstract

Rapid growth of cities has resulted in a large number of vehicles. The road infrastructure has been unable to keep up with the growth of the vehicles. Delhi has more than a crore Vehicles registered with the Transport Department; In addition to this, lakhs of vehicles enter in the city for business or transit purposes. At present, Delhi has 1000+ centers to issue “Pollution Under Control Certificate (PUCC)” under Central Motor Vehicle Rule (CMVR) 115(7) to those vehicles passing the pollution checks.

Internal Combustion Engines need sporadic maintenance and checks lest they become one of the major source of air pollution. Most parts of India has no standard mechanism to issue a PUCC though it is very well defined under CMVR 115 (7). There is a need to have a comprehensive system.

There is an urgent need to control air pollution. It calls for strict monitoring of vehicles. Vehicles without a valid Pollution Under Control Certificate (PUCC) should not be allowed to ply on the roads. Delhi is home to more than a crore of vehicles. A real time monitoring of vehicles will not only help the environment but also generate a lot of data for scientists, activists and the government to further analyze and improve upon the subject.

This paper analyses the opportunities of using contemporary and future technologies to streamline the process of pollution check of the vehicles. The current solution developed for Transport Department has been in usage to issue online Pollution Under Control Certificate (PUCC) to the vehicles in Delhi. On an average, around 14,000 vehicles are issued an online PUCC every day.

Index Terms: CMVR; Vehicles, Pollution Checking, Urban Planning, Technology, IoT.

II. Background

Transport Department of Delhi Government had been issuing the PUCC to the vehicles. Earlier, they engaged an agency to issue the PUCC. The earlier system was client server base. The PUCC data used to get transferred to a server in the Transport Department on a regular interval. All the data of each PUC Center was kept on a local central computer.

There was no control and monitoring system except the field inspectors. Because, the system of getting reading was manual, the operators had option to freeze the readings at desired point of time. Most of the Pollution Checking Units had a common password. The data entry of the vehicle was manual. Therefore, operators used to take more time to enter the details of vehicle. The Pollution check was not possible without Registration Certificate (RC) of vehicle. Based on the details of the vehicle entered from RC, the PUC checking was performed and processed on local computer.

To modernize the entire process, the Transport Department decided to go online for issuing the PUCC. Delhi e-Governance Society (DeGS), a 100% owned society by Department of Information Technology, GNCTD, was assigned with the task to develop the system to generate online PUCC and to provide a user friendly application to the citizens.

III. Scope of Assignment

The broad scope of work is given below:-

1. To develop a software which will be available to all PUC's to check the pollution level of the vehicle and to issue an online PUCC.
2. To use other modes of communication like SMS and Website updates to remind the citizens the due date of pollution check.

3. To provide information on number of pollution checks done every day and number of vehicles filling the website of pollution under control. It will have other citizen facing features like checking the validity of pollution control certificate, verifying the valid PUC's online, seeing the history of vehicle pollution checks etc.
4. To develop various reports required by Transport Department as well as by the PUC owner.

To understand a complex system of conducting pollutions check as per the guidelines defined under CMVR 115(7) and other procedures, following documents were referred –

1. TAP documents regarding test procedures for measurement of CO and HC emission at idling for in-service vehicle fitted with SI (spark ignition) Petrol/CNG/LPG engine (downloaded from ARAI website).
2. TAP documents regarding test procedures for measurement of smoke levels by Free Acceleration for in-service vehicle, fitted with Diesel engine (downloaded from ARAI website).
3. Compliance, of Emission Standard for Petrol, CNG, LPG and Diesel driven vehicle in view of changes as notified by Ministry of Road Transport and Highways, GOI.
4. Relevant copies of Rule 115(2) of CMVR depicting the measurement and emission testing procedure of Petrol/CNG/LPG and Diesel driven vehicle.
5. Copy of notification No. GSR 103(E) dated 23.02.12 regarding measurement of Lambda and Smoke level of diesel and Petrol driven vehicles complying BSIV Mass Emission norms.
6. TAP documents regarding test procedures (downloaded from ARAI website).

IV. Challenges in the System

The biggest challenge was non-uniformity of data format generated by pollution checking devices.

There are around 13 manufacturers of Gas/Pollution

Major Pollution Checking Machines used in Delhi:
AVL, Indus, Ozone, HORIBA, ARO, I3, Auto Serve, Mars, I3, Sys, Neptune

Analyzers (27 variants). These analyzers come with proprietary software and do not provide generic drivers. There is also no standardization of output containing reading of gas contents. It was found that the machines used for pollution checking showed readings in different format. Each OEM had its own process to send the data. Non-uniformity of machines forced developers to write connector for each machine to fetch the values of various parameters like CO₂, OH, etc along with other required procedures like lambda testing to get the testing results. This task was not only cumbersome but also time consuming. It required separate testing Major Pollution Checking Machines used in Delhi:

AVL, Indus, Ozone, HORIBA, ARO, I3, Auto Serve, Mars, I3, Sys, Neptune

of code for all types of fuels (Petrol, Diesel, LPG and CNG).

The other big challenge was to deal with various testing procedures attached with Bharat Status (BS). If the vehicle is BS-IV then the validity of PUC is one year otherwise, it is 3 months from the date of issue. Its associated challenge was data mismatch in VAHAN database.

The operators working at Pollution Checking Centers are generally less educated. They have very little understanding of computers. Most of the Pollution Checking Centers had unsupported legacy version of Windows XP.

None of the gas analyzers (pollution checking equipment) are integrated with the camera. A web camera is to be integrated separately in the computer system to take a photograph of the number plate of the vehicle. It is always possible to mislead the system by conducting pollution check for one vehicle and taking photograph of another vehicle.

Capacity building of all PUC operators in using new software was a big challenge. Top level management

of Transport Department took the lead in building capacity of operators. Various training programs were organized in Delhi at Zone level. A big training program for all operators in Delhi Secretariat was organized to give a big picture of the whole project. A committed, dedicated and motivated team of Transport Department consisting pollution checking inspector, IT support made this difficult task of capacity building in manageable proposition.

Intentionally, the frontend process of checking the pollution and issuing the certificates was kept similar to previous version of software. This helped operators to correlate the workflow.

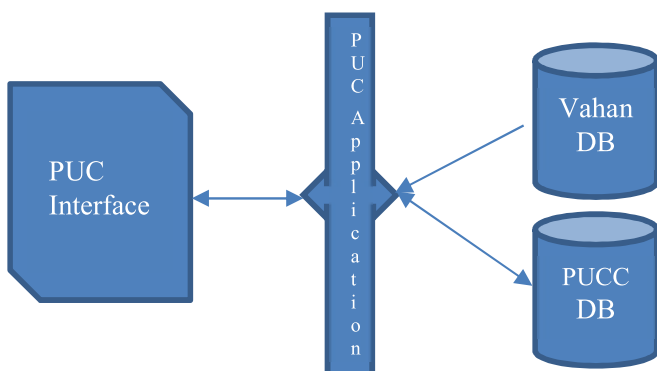
However, new value addition features like fetching information about the Vehicle by typing just the vehicle number was appreciated by the operators at initial stage itself because it reduced the efforts of typing by the operator.

There was no visible benefit to the citizens. Most of them even could not identify the change in the process as nothing was changed in the process except now operator did not ask for the RC.

However, after the implementation of facility of SMS and email reminders for PUC before its expiry period, the citizens started regular pollution checks.

V. System Architecture

There are two major components in the overall architecture. The first one is a Java based plug in to be installed in all the PUCs. This component interfaces with the gas analyzers. The PUCs also login into the system using this component.



The integration of the pollution checking machines was a major aspect of the entire project. It was decided to use a Java based local client to access the readings

of machine and pass the data to the Transport Servers to process as per the set rules. Based on the results, the proposed system will print the PUC or a Rejection Slip.

The Transport Department decided to go with the cloud service from NIC. Three virtual machines were procured to act as the application server, the backup server and the database server respectively. The back-end server and database servers were clustered to have high availability.

The architecture is based on high availability model. The database servers are clustered. Whenever one database is down, the application shift to another database automatically.

Entire architecture is based on open source software. DeGS has used open source database platform called PostgreSQL. The web services are REST based and developed in Java.

VI. Benefits

We have leveraged the advantages of Technology in delivering the real time PUC to the citizens. The system bears following advantages for the Transport Department and to the operators–

- a) Entire control of the PUC is now real time and online. The credentials of PUC center are verified through database server. There is a provision to change the password for PUC operators.
- b) The PUC tests are processed at the server. The PUC is issued based on data available on the server. There is no local repository of data.
- c) The vehicle database of transport department has been linked / accessed to get the vehicle details. Pollution Testing is done on the vehicle data (Vahan). The operator is allowed to enter some missing information if required. As the data of VAHAN will mature, there will be absolutely no intervention from the operator.
- d) This process has also reduced the data entry work. The present software has no provision of stopping tests in between.

- e) There is ease of operations. Merely a 10th class pass operator can operate the system
- f) This application brought a “certainty” factor into the system. Now if the pollution factors are under limit then there is certainty to get the certificate. There is minimal human intervention in the system.
- g) Entire operations are now 24x7 base. Many of Pucc in the state border areas operate the PUC round the clock.

The Delhi e-Governance Society has leveraged the latest trends in PUSH and PULL based SMS communication to make the pollution checking a public facing event. The new system has following citizen facing services, which were not in earlier system. Delhi perhaps, is the first state to have the online Pucc with citizen facing services. The official website <http://www.pucc.delhi.gov.in> has been set up. The interaction with vehicle owners is in following ways:-

- a) As soon as the test is over, the details of Pucc are sent on SMS.
- b) Reminder to renew the Pucc owner SMS
- c) Online status of open PUC centers
- d) Online checking of genuine Pucc
- e) Information on failed vehicles in pollution checking

SINo	Description of Activity	of Previously	Now
1	Printing of Certificate using Computer	✓	✓
2	MIS	✓	✓
3	Online transfer of data	✗	✓
4	Integration with VAHAN data	✗	✓
5	Online display of PUC issued on website	✗	✓
6	Online checking of Pucc	✗	✓
7	Total control over PUC centers	✗	✓
8	Availability of PUC data for analysis	✗	✓

VII. Adoptability of Application

Recently, this system of pollution checking has been further made more robust. Generally in most of the cases, the payment to the operator is made after “successful” pollution check. It put operator under compulsion of passing the vehicle otherwise payment might not be made by the customer.

Now system has been changes in such a way that first the operator ask for the mobile number of the customer and charge a fee to check the vehicle. Once paid, an OTP is received by the customer. After entering the correct OTP, the process of pollution check takes place.

The team of DeGS successfully made changes in the system because of its flexible coding style and architecture.

VIII. Learning

This project is a classic example of stakeholders' management. The most influential stakeholder were the operators of PUC. Involvement of operators at early stage ensured their participation in positive direction. They were quick to point out the pain areas.

The inspectors and other employees of Transport Department were critical stakeholders to ensure the business as usual. The product had more dependency on Internet. Thankfully, arrival of 4G data helped in getting a reasonable bandwidth for the operations. Most of the operators nowadays a backup Internet connection to ensure business continuity.

Initially, this project looked like a normal IT based integration project. But soon it was realized that it is one of most complicated project in terms of integration of variety of machines with non-standard data output.

For such projects, a committed team of professionals is required. Before initiating the work, the project must be tested on Cost, Time, Benefits, Risk, Scope and Quality parameters.

Involvement of various stakeholders is must. In this project at mid stage, we could bring all stakeholders together. Capacity building plays a major role in such diversified project involves man, machine, rules, Acts together.

A sound strategy in place is must. Initially, we went ahead with a big bang implementation. But soon, we realized the complexity of operations. Top management very timely changed strategy to phased implementation based on models of machines. The machines covering the larger PUC centres were taken first and machines used in lesser centres were integrated at later stage. The e-Gov implementation mantra “Think Big, start small and scale fast” is best fit in this case.

There is need to standardize the output of pollution checking machines. Few machines have manual controlling of Pollution reading process. Every machine has its own format to throw the output (data of pollution check). There are few models they throw the data as soon as they sense the smoke/gas, whereas there are few other models they only sends the output when triggered to do so. The documentation of these machine is either do not exist or in the poor state.

IX. The Road Ahead

This is not end of journey but it is a beginning for new experiments. Real time capturing of data has opened various opportunities. Some of them are listed below-

1. Work on removing paper base issuing of PUC. As everything is available in real time basis. The field inspectors may validate the PUC using any handheld device.
2. Data containing values of various parameters like CO₂, CO, etc has been taken. This data may be of great use for activists, scientists. This data may be put on open domain to be used by those who could make better sense of this.

3. Automated challans may be issued online to the defaulters.
4. Paryavaran Mitra may be a tool for the traffic police to track the polluting vehicle in advance.
5. The present version can be replicated in any state.
6. Internet of Things may further make enhance process Pollution Checking to next stage. The entire process is very objective in nature. The vehicle manufacturing companies may add IoT based devices (sensors) at the time of manufacturing of vehicle itself. At the time selling of vehicle, the server address may be assigned to the vehicle to send reading of the sensors to a server. This server will be able to calculate the pollution level and send the result on regular intervals. Whenever, the levels of pollution are beyond the prescribed limits, the indicator at the dash board will inform the driver. In case, the same is not set within 24 hours, automatic challan or any other control may be exercised by the Department.

X. References:

1. Automobile Research Association of India-
<https://www.araiindia.com>
2. Pollution Under Control website
<http://pucc.delhi.gov.in>

E-Governance Solution for Election Management in Local Bodies (Te-POLL)

Seeram Vishnu Prasad,

TELANGANA STATE ELECTION COMMISSION

1st Floor, DTCP Building, AC Guards, Hyderabad – 500004. Telangana State.

Phone No. 9959090010 (Mobile) 040-29801521 / 23

vishnu.seeram@gmail.com

Maramamula Purushotham,

CENTRE FOR GOOD GOVERNANCE

Survey No. 91, Near Outer Ring Road Chowrasta, Gachibowli, Hyderabad -500032. Telangana State.

Phone No. 9652681732 (Mobile) 040-23130300

purushottam.m@cgg.gov.in

Nakshatram Bharath Kumar

TELANGANA STATE ELECTION COMMISSION

1st Floor, DTCP Building, AC Guards, Hyderabad – 500004. Telangana State.

Phone No. 9133119999(Mobile) 040-29801521 / 23

bharath.n@cgg.gov.in **ABSTRACT**

Information technology (IT) is playing a critical role in delivering government services to all the stakeholders more so the citizens in an efficient and cost effective manner. E-governance is the application of Information and Communication Technology (ICT) for delivering government services, exchange of information, communication transactions, integration of various stand-alone systems and services between government and citizen (G2C), government and business (G2B), government and government (G2G), government and employees (G2E) as well as interactions within the entire government framework. Through e-governance, government services are made available to citizens in a convenient, fast, efficient and transparent manner. This domain has evolved as a result of more *than two decades of technology innovation and policy response. The development of e-governance is comprehended in terms of five interrelated objectives: a policy framework, enhanced public services, high-quality and cost-effective government operations, citizen engagement in democratic processes, and administrative and institutional reform.*

Keywords: Te-Poll, E-Governance, Electoral Rolls, Local Bodies, Voterslips, Mobile Application.

1. INTRODUCTION

The Telangana State Election Commission was constituted in September 2014 as per the provisions of Article 243K read with Article 243ZA of the Constitution of India. The powers and functions of the State Election Commission under Article 243K and 243ZA of the Constitution of India are identical to those vested in the Election Commission of India constituted under Article 324 of the Constitution of India in their respective domains. The superintendence, direction and control of preparation of electoral rolls and conduct of all elections to Panchayat Raj and Municipal Local bodies in the State are vested in the Telangana State Election Commission. Local body elections on account of their sheer numbers pose a stupendous challenge to the State Election commissions on one hand and stakeholders such as candidates, poll officials on the other hand. There are nearly 1,05,000 Constituencies going to polls in a cycle of five years in the state of Telangana with concomitant number of Returning

Officers and multitudes of candidates. However, the rigor of procedures is identical to that associated with Member of Legislative Assembly or Member of Parliament elections, thus stretching the electoral machinery in the states to the maximum limits. Hence well designed application software becomes crucial in conducting local body elections with the standards that mirror those of the Election Commission of India.

2. EXISTING SYSTEM AND LIMITATIONS

(i) PREPARATION OF ELECTORAL ROLLS

The local body electoral rolls are prepared based on the latest electoral rolls of the Assembly Constituency published by Election Commission of India which are then adapted to the large number of local body constituencies falling within its jurisdiction.

The various election authorities at the district, block / Mandal and village level, who are authorized by the State Election Commission used to prepare and publish the electoral rolls for local bodies, by following locally adapted methods, often resulting in wide disparity from the stated model and from each other also. In spite of the huge amounts of official resources and funds spent, there still used to be plethora of complaints and grievances from candidates, political parties and even general public.

(ii) PHOTO VOTER SLIPS

The District Election Authorities are to generate and distribute the photo voter slips mandatorily to all the electors of that particular local body going to elections. In the process, they used to face formidable technical and logistical problems resulting in poor coverage of voters in poor voter turnout.

(iii) ELECTION PROCESS MANAGEMENT

Communication between the State Election Commission and the large number of Returning Officers / Election Officers distributed widely in the state becomes tenuous especially during the run-up to the poll day leading to chaotic conditions at times inviting bitter criticism from various stake holders.

It is mandatory to the contesting candidates in Local Bodies election to disclose information relating to their criminal antecedents, assets and liabilities and educational qualifications along with their

nomination paper in a prescribed format. The Returning Officer / Election Officer have to provide information on nomination papers and Declarations of assets, liabilities, criminal antecedents filed by candidates to any person or persons desirous of obtaining the same on nominal payment of copying charges. Due to lack of infrastructure this job could not be performed to the required satisfaction levels.

(iv) POLLING PERSONNEL MANAGEMENT

A very large number of polling personnel have to be drafted during elections and then randomly allotted to each polling station for conduct of election on day of poll. Managing the polling personnel, issuing appointment orders, training the polling personnel etc, in traditional methods was taking a lot of time and resources. In spite of this, there used to be plethora of complaints and grievances from the stake holders on the subject.

3. PROPOSED e-GOVERNANCE TOOL – THE Te-POLL:

In order to avoid all the above logistical, resource and technical problems, and to make available all electoral rolls and election related data in uniform formats with transparency and easy accessibility to all concerned, it necessitated the Commission to implement e-Governance project i.e. Te-Poll application software. The Te-Poll has six modules viz., Electoral Rolls Management System, Polling Personnel Randomization System, Election Process Management System, EVM Management System, Portal Administration and Tappal Tracking system.

4. BENEFITS

The Te-Poll application software is very useful to the District Officials as it reduces workload and expenditure in preparation and publication of electoral rolls very significantly. In traditional methods, generation of a Gram Panchayat electoral roll from the latest electoral rolls of the Assembly Constituency used to take nearly one week time even after spending huge amounts of official resources and funds. With Te-Poll, it takes maximum of 30 minutes time for generation of a Gram Panchayat electoral roll with less amount of official resources. Besides this, it improved efficiency of District Officials by extending services such as downloading voter slip, constituency and Polling Station-wise Voter list, dissemination of

affidavits filed by contesting candidates through web portal of Telangana State Election Commission. The election related data is also secured in electronic format amendable for easy, cost effective dissemination.

Citizen can download voter slip from the mobile phone, or from web. This empowers voters and saves a lot of time in identification of polling stations. Similarly the political parties and candidates are empowered to watch and download electoral rolls for any constituencies of their choice. Nominations module relieves the candidates by enabling them to prepare their nomination papers through web portal and also uploading the data to and by the Returning Officers. Similarly the nominations and affidavits filed by the candidates are visible to all the stakeholders and can be downloaded freely enhancing accountability and transparency.

The Te-Poll facilitates the district officials to build a database of government employees who are drafted for election duty and also to allot to polling stations randomly, and to generate appointment orders to be served to polling personnel by reducing the time spent on this job upto 90 percent.

The Returning Officers / Election Officers are guided seamlessly to proceed from nomination stage to declaration of results by the Election Process Management Module.

The Te-Poll software was implemented during the Greater Hyderabad Municipal Corporation elections, 2016. The Officials have generated electoral rolls from 26 Assembly Constituencies of Greater Hyderabad adapted to 150 ward constituencies within a period of 3-4 days. Nearly 30 lakh voters have downloaded the voterslips through web portal and mobile application on the poll day for knowing their polling station and electoral roll serial number. This facilitated easy voting for the citizens of Greater Hyderabad Municipal Corporation. In democracy the participation of people enhances the quality of Governance; hence implementation of Te-Poll application software in local body elections has immense utility in streamlining the local body administration and citizen satisfaction.

5. FURTHER STEPS

Mobile technology is used for cellular communication and has evolved rapidly over the past few years. 4G mobile networks characterised by high-speed packet transmissions or burst traffic in the channels has become common amongst the people. Telangana State Election Commission intends to develop appropriate mobile applications to render all the above services

through mobile phones. Further developing the e-Governance applications in local language is a challenging task. Once such tools become available, the Telangana State Election Commission shall undertake to develop web / mobile application in local language too so that the stakeholders may take full advantage of these applications which, in turn, helps to improve people's participation and consequently the Governance systems.

REFERENCES

[1] <https://en.wikipedia.org>

[2] Sharon S. Dawes (2008) - Public Administration Review - The Evolution and Continuing Challenges of E-Governance

Seeram Vishnu Prasad is working as Assistant Secretary in Telangana State Election Commission and he is holding Masters Degree in Technology in Computer Science & Engineering, Masters Degree in Geo-Physics from Osmania University. He has 23 years of experience in government sector especially in the field of Information Technology, Administration and conduct of elections. His area of interest is research, development and implementation of e-Governance projects.

Purushottam Maramamula is working as Project Manager in Centre for Good Governance and he is holding Masters Degree in Technology in Computer Science and Bachelors Degree from Osmania University. He is having 18 years of experience in Government sector the field of Information Technology and Infrastructure development (Road Sector). His is in to development and implementation of e-Governance projects in the domain of Land administration, Legal cases monitoring, dairy development, skill training and placements to unemployed youth in both Urban and Rural areas.

Nakshatram Bharath Kumar is working as System Analyst in Telangana State Election Commission and he is having Bachelors Degree in Computers from Osmania University. He has 4 years of experience in government sector the field of System Analyst & Network Engineer, Certified in CCNA & CCNP. His area of interest is system networking.



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