Cause for Applause
Award winning projects 2012-13
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ABSTRACT
Non availability of information on urban services / projects to the citizens in our country, lack of clarity on processes in the city administration, rework efforts for gathering / transmitting information for same user across multiple departments, endless cycle time etc are the well known grievances of the customer of civic services i.e. Urban citizen. There is a need to look at present e-Governance initiatives from a service management perspective, where in a Citizen needs to have a channel of requesting a Service. The fulfilment of the same to be achieved leveraging Information Technology (IT) where information exchange among various departments is enabled to deliver the service and provide support assurance to the end customer, the citizen. The concept of “Open Government” can be partially translated into reality by empowering citizens to demand services they need. This paper intends to bring out a roadmap towards Open Government through an approach of On Demand Service for citizen.

1. Introduction
In recent past Governments, across the world are agreeing in principle to share their data in open formats i.e datasets released are free to use, reuse and redistribute by anyone. Once done Citizens, Researchers and domain experts can access this data through direct download or develop models for better understanding and meaningful interpretations. In India lack of a credible data on public services area has been a cause of concern for academicians, administrators and investors.

Even with use of Information Technology (IT) in the past few years, there has been lack of publically available information on service delivery in India. This data has a lot of untapped potential. Data available in open format can be used to develop new products and services around existing government functioning to serve the citizens better. In our country there are variety of reasons to the resistance of such an initiative, however the thought of “Open Government” is getting place in discussion forums. In such a situation there is a likely delay in a formal milestone getting reached where the benefits of this data can be leveraged. However since IT has found place on agenda of almost all government departments, this “data” under reference can be effectively used to roll out a concept of “Service on Citizen Demand” which is another form of realizing the vision of Open Government. The subsequent sections of this paper outline the same.

2. Urban Service delivery - A situational Analysis
As part of Second Phase of Jawaharlal Nehru National Urban Renewal Mission (JNNURM) there is a proposal under consideration of central government to set up two Smart cities in every state. These Cities are proposed to be the ones which are medium sized with population around 1 million. Austrian Institute of Technology and the National Institute of Urban Affairs that is a research, information and training wing under the Urban Development Ministry, would be the partners in the project. As per Census 2011, the urban areas in India account for 31 % of the population. About one-third of Urban India (377 million) lives in urban areas, 50% of the urban population resides in metro cities. The number of such cities in India has increased from 35 in 2001 to 53 in 2011. Urbanisation is associated with increased incomes, improved health, higher literacy, expectation of improved quality of life and other benefits. The job profiles in the mature urban areas are driving the need for an effective, efficient and economic urban service provider. The Urban Local Bodies(ULB) i.e. Municipal Corporation and Urban Development authorities play this role and use of Information
Technology via e-governance initiatives is gaining momentum in the provision of the urban services to the growing number of urban customers. It's important to look at the current situation where the service delivery is fragmented with multiple entities in each service. These entities often map to different departments under state/central government. The net result is that the ULB has limited control over the key services provided in their jurisdiction impacting the statutory functions which a ULB is required to perform. The situation is linked to the issue of governance in urban areas which is extremely important not only for the millions who live in cities but also for the economic development of the country as a whole. Effective and efficient service delivery mechanism is a key to this.

3. The Concept “Service on Citizen Demand”.

One of the key aspects of local government function is the delivery of services to its citizens with due focus on performance of the services provided. In the country currently several programs are underway for betterment of service; these are commonly referred as Government to Citizen (G2C), Government to Business (G2B), Government to Government (G2G) services. In addition to these to bring in Agility in city functions, there is a need of another set of services like Citizen to Business (C2B), Citizen to Citizen (C2C), Business to Citizen (B2C) to be added on over all service catalogue. The overall objective of such a catalogue is to equip the city administration to provide services with affordable cost and optimum time of service delivery processes to the end user. In broad sense improvement of service delivery and robust maintenance/support mechanism to improve Governance is the intended outcome.

In the preceding paragraphs we have mentioned about "Open Government" and making data available to a citizen. However while procedures are formulated to achieve this the same data can be used to derive new set of services to be extended to citizen “as per their demand”. The concept of a formal Service Catalogue is missing in urban service delivery in our country. In IT service management (ITSM) procedures adopted globally, the end user (Citizen in our context) can put a request for service either new or existing. If its new it goes through analysis to gauge its utility, scalability and benefits at large. Cost aspects, Infrastructure sharing and conflict if
any with existing service is also looked into before putting the service in production. Same concept is proposed in this paper. The request put in by citizen is analyzed with respect to the available process data with multiple services already existing and based on assessment of feasibility a new service is suggested and rolled out. This new service is thus as per citizen requirement and shall be a step in realizing the vision of “Service on Demand”.

Today we are in a situation where technology has opened avenues for achieving things which were impossible to think of two decades ago, however there is a need to align the service provision with end user requirement.

4. Data Elements and Service Linkages

In context of city development key element is Land under the jurisdiction of the city administration. Over this element i.e land there are other elements which get linked like use of land, physical infrastructure laid over it, the built forms and their usage. Along with these elements the various data attributes get linked to these elements like ownership of land, various permissions, fees levied etc. All these form a cohesive eco system where in the local administration drives the same with provision of variety of services. Illustration 1 below depicts

1. The linkage of “User Information attributes” with the various service provider departments.
2. The interlinkages amongst the various departments providing the basic services to citizens (users) in urban areas.

In urban areas the civic authority i.e municipal corporation is the key stake holder as it governs the place of existence (land) of the elements constituting this group of entities. Furthermore these urban local bodies facilitate the provision of services like road, water, power, telecom etc either directly or through another supplier department owned by government. In addition the governance is mandated by the office of Inspector General of Stamps & Registrations along with Town planning department which keep inventory of all transaction and usage of constituents of building activity in area of jurisdiction.

As depicted in illustration above service delivery is happening in multi channel provider medium, where we have State Electricity boards for power, Water supply & Sewerage board for Infrastructure, ULBs for service provision, Revenue department for Land; over all we see all converging to land and its user data attributes. A centralized repository of such information is thus comparable to a CMDB(Configuration Management Data Base) in IT world.

Now we see the end user identity getting mapped to multiple service delivery channels, Commonly used identity instruments link customer of a service to many other provider departments which maintain their data and can be easily reused for meaningful validations.

The illustration 1 above also depicts multiple touchpoints in service delivery channels in terms of data exchange. Lets consider example of IGR – Inspector General of Stamps & Registration. The department has an existence in all the states and is the second highest revenue earning department in most of the states. In a large state like Maharashtra the dept has 500+ offices managed by 2500+ employees. The Department is primarily responsible for Registration of Documents under the Registration Act.

The mandate to this department is Registration of deeds or instruments and their preservation. The Registration process encompasses the sub-functions such as receipt generation, valuation, recovery of evaded stamp duty, refund of excess stamp duty, adjudication and issuing notices.

In states of magnitude of Maharashtra, Madhya Pradesh, close to 2.2 million plus documents are registered and revenue handled is Rs. 5000+ Cr. Approximately 8 million people are direct beneficiaries of IGR Services annually at state level. These figures establish the potential of much wider user base in allied departments which call for a comprehensive and innovative application of the Public-Private partnership in betterment of quality of service given to millions. The same is discussed in this paper in context of data exchange parameters. This office has existence in all states and has a reach to district / taluka level. IGR functions as outlined above mainly cover...
a. End to end process where finally documents are registered to close deal.
b. Beginning of another set of process where the end-user initiates record updating with multiple departments.

The processes under point a and b above cut across multiple departments and even touch upon IGR itself for certain validation checks before final document registration takes place. Further these interdepartmental touch points often result in lots of rework for end user as well as concerned departments. The data exchange shall minimize the rework loops generated in these processes. The touch points to other service delivery channel departments arising out of main IGR citizen interfacing services are

1. Urban local bodies – where the property records are maintained and records need to be updated post registration. The record for various permissions is also maintained for all properties under jurisdiction.
2. Urban Utilities like Electricity, Telephones etc – Updation of records is done post registration.
3. Land records – Ownership of land need to be checked before finalization of deal and updated later.
4. City Survey Departments – Property ownership records need to be verified before submission.
5. Various Id provider departments – RTO – Driving License, Voter id card, validity of the ids need to be confirmed for witness of deal.
6. Post Department – This link is not fully established yet, but can be a potential one in future.
7. Various real estate sites – End users often refer to these sites, however no authentic information about postings is available. This can be made available through a comprehensive solution making over all system fool proof.

5. Channelizing Citizen Inputs

While ICT gives channel for government to reach citizen, it also opens up ways and means for citizen to reach out to administration. This can be done in multiple ways by citizen depending on his needs and abilities. There are departments like Post, Food & Civil Supplies, Panchayat, Police which have set ups till the last land parcel supporting habitat i.e the

Illustration 2: Communication Channels
village where ICT can help information reach; in addition ICT also enables the service providers to reach the last mile population through alternative channels like local grocery shop, commercial outlet and government set kiosks.

Illustration 2 above depicts the variety of options which are available to a citizen to interact with administration. These need to be leveraged to gather citizen input with respect to service delivery. These inputs need to be subsequently analyzed by service extending departments with respect to the data available with them to be able to decide on the mechanism of delivery of service requested.

Data exchange amongst the initiatives using the customer centric approach like the one described above shall lead to rollout of solutions which shall have a wide user base. As we progress towards maturity of e-governance, there is a need for provision of IT enabled services tuned to end user requirements.

The challenge faced by the champions of IT initiatives in India is the limited scope of expansion of the Service Catalogue to cover a varied range of services. The underlying cause for this is the siloed style of IT implementations by service provider departments wherein individual processes are automated. The key link of interdepartmental information exchange is missing and is left to the end-user to bridge by manual means leading to rework at the customer end. There is an urgent need to work at the individual solution level at each department in order to build an interface layer and security solution and facilitate the information flow.

5. Leveraging Best Practices from ITSM

In the context of Urban Service delivery the synergy in process framework outlined in ITIL can be effectively leveraged. The Urban Service Delivery is primarily concerned with the proactive and forward-looking services that the Government departments require from its ICT provider in order to deliver to Citizens. It needs to be focused on the need of citizen as the Customer of the ICT services. The Service Support is focused on the Users of the services and is primarily concerned with ensuring the access to the appropriate services to support the business functions. Shared IT infrastructure and adoption of Process Framework frame work is a potential solution. Service management in IT world has effectively leveraged the best practices across globe in effective service delivery and support. These are known as ITIL framework. ITIL® is a set of best practices intended to facilitate the delivery of high quality information technology (IT) services. The acronym ITIL® (IT Infrastructure Library) is a Registered Trade Mark of the United Kingdom’s Office of Government Commerce (OGC). The ITIL® processes aim at achieving high financial quality and value in IT operations. These procedures are supplier-independent and have been developed to provide guidance across the breadth of IT infrastructure, development, and operations.

6. Benefits of Information Exchange

The inclusion of masses into the system through ICT can open doors for delivery of multiple benefits to the end user. In other words e governance operating framework needs to support interoperability across service delivery channels, within a tier across different domains, to complement city functions; for example in the transportation domain, such a framework would support the exchange of information between a statewide system overseeing traffic on state highways and an application managing traffic lights at the city level.

In general, from citizen's viewpoint the broad benefits of interdepartmental data exchange can be summarized as below

- Common Process Framework for Service Delivery at highest Level (State Govt).
- Harmony amongst Multiple Service Provider Department.
- Channel for End user to Demand a Service of his choice.
- Central Assessment of Service Demand and fulfilment of decision making.
- Cycle time Reduction across Multiple Processes
- Building Synergy amongst Service department Initiatives.
- Optimised IT infrastructure.
- Virtual “Single Window Service” reducing the
crowding in offices, visiting multiple websites and saving in travel time of citizens to offices.

- Online exchange of interdepartmental user specific data to effectively reduce cycle time for service fulfilment.
- End User Defined Services.

7. Conclusion

ICT provides channel for System Inclusion for all citizens. The dynamic nature of demographics is a challenge for all the major service delivery providers worldwide. The portability of data across departments is important for efficient e-governance mechanism with scalability to cover variety of services for citizens across the country in order to ensure over all system inclusion.
Electronic Transaction Aggregation & Analysis Layer- A Tool for Measuring Outcomes

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ABSTRACT- Governments implement large number of eGovernance initiatives for ensuring efficient, affordable, transparent and convenient service delivery to citizens. Most such initiatives use technical and sector specific Service Levels or Key Performance Indicators for evaluating the impact and quality of service delivery. However, there is no standard Government-wide criterion or metric to evaluate the impact of such initiatives. Department of Electronics and Information Technology, Government of India and the National Informatics Centre have identified the number of end-to-end electronic transactions as the best indicator for measuring real-time performance of eGovernance services. Electronic Transaction Aggregation & Analysis Layer, an electronic dashboard has thus been developed with the objective of providing a real-time aggregated view of eServices across different states and levels of government.

eTaal project is based on the principle: “You Can MANAGE Effectively What You Can MEASURE”. Apart from providing information to administrators and citizens, it also provides them with a means to objectively evaluate performance and identify areas for improvement. eTaal is being widely used by decision makers across India to assess the success of eGovernance projects. Over the past one year, several services have been linked to the dashboard. This reflects the Government-wide acceptability and importance of eTaal.

Index Terms- eGovernance, monitoring, performance outcome, transaction aggregation, citizen benefits

1. INTRODUCTION

A large number of eGovernance initiatives are being implemented globally by the Governments and Ministries/Departments for ensuring efficient, affordable, transparent and convenient service delivery to citizens. These initiatives include projects having national importance and the ones included in the country’s IT strategy. Some applications use internal performance measurement mechanisms defined through Service Levels and Key Performance Indicators (KPIs), but there is no standard Government-wide criterion or metric to evaluate the impact of all initiatives. Considering the rapid growth in the number of services delivered through electronic means in India, Department of Electronics and Information Technology (DeitY) under Ministry of Communications and Information Technology, India and National Informatics Centre (NIC), a nodal information technology organization of Government of India, identified the number of end-to-end electronic transactions as the best indicator for measuring the real-time performance of eGovernance services in terms of service delivery to citizens.

DeitY and NIC have developed Electronic Transaction Aggregation & Analysis Layer (eTaal); URL: http://etaal.gov.in, an electronic dashboard for providing a real-time aggregated view of eServices being delivered across different states and levels of government. eTaal provides a real-time aggregated view of e-Transactions performed through eGovernance applications implemented including, but not limited to, the projects of national importance like 31 Mission Mode Projects (MMPs) defined under National eGovernance Plan (NeGP). eTaal automatically pulls the e-Transaction count from applications integrated with it in real-time using Web Services technology.

The dashboard also facilitates quick analysis of transaction data of various applications in tabular as well as graphical form enabling the user to drill down to the lowest level of detail without com-
promising on the privacy of the service-seeker or the security and integrity of the application software.

A. e-Transaction and Across the Counter Service

An e-Transaction is a transaction which delivers a public service using Information Communication Technology (ICT) tools to improve access, enhance transparency and reduce response time while also satisfying all of the following four conditions:

1. Service is requested through electronic means (self access or assisted access) including mobile devices
2. Workflow/approval process is electronic
3. Database is electronic/digitized
4. Service delivery is through electronic means (including assisted delivery)

Further, in several instances, the relevant information is proactively collected, digitized, verified and stored in a digital repository. This enables immediate across the counter service delivery on request by the citizen. Since, such cases fulfil all the pre-requisites of an e-Transaction, these can be considered as Across the Counter Services.

2. PROJECT OBJECTIVES

eTAAL project is based on the principle: “You can MANAGE effectively what you can MEASURE”. The objectives of the Project are:

- Providing quick view of Transactions performed electronically (self-service or assisted access mode)
- Measuring the number of Transactions performed by various eGovernance applications on a real time basis
- Acting as an indicator of scale of services being delivered to the citizens
- Providing quick analysis of transactions in tabular and graphical form- analysis by the service, by the time-period, by the State/Department, or by the geography, instantaneously
- Enabling the Ministries/Departments implementing eGovernance projects get a real-time view of the impact of their projects and take remedial steps or interventions where needed

3. STANDARD SERVICES

In India, a large number of services are being offered by various Government Departments at Central and State Governments. However, the name of a particular service may vary across states. For example, a Land Revenue service, Record of Right may be with different names in different states depending on local dialect. For ease of classification, grouping and presentation in a uniform manner, the services have been defined as described in Table 1.

4. SERVICE CATEGORIZATION

To facilitate better analysis and more effective decision-making, services have been classified into six categories:

1. **Category A** comprising of All Statutory Services e.g. Payment of taxes by citizens (Income Tax/VAT etc.), Payment of subsidies/Scholarships/Social benefit transfers etc. and Non-statutory services e.g. Services delivered under Agriculture/Rural development schemes etc.
2. **Category B** (Utility Bill payments) e.g. Water/telephone/electricity bill, e-municipality services, piped-gas bill etc.
3. **Category C** (B2C Transactions) e.g. banking transactions, mobile/DTH recharge etc.
4. **Category D** (Informational Services) e.g. Information access from various eGovernance Portals/Websites, Downloading of forms, tenders, Enquiry (such as Passport Status, Railway passenger (PNR) inquiry) etc.
5. **Category E** (Social Benefits) e.g. Repetitive Government disbursements to citizens like social sector pensions, scholarships etc.
6. **Category F** (Mobile Governance) e.g. end-to-end services delivered through mobile devices.
Table 1. List of Standard Services

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<td>Integrated Finance Management</td>
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<td>Commercial Tax</td>
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<td>6</td>
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<td>Social Welfare and Pension</td>
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<td>Employment</td>
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<td>8</td>
<td>Transport</td>
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<td>e-Procurement</td>
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<td>9</td>
<td>Education</td>
<td>24</td>
<td>Industry and Commerce</td>
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<td>10</td>
<td>Public Distribution System</td>
<td>25</td>
<td>Urban Development including Municipality Services</td>
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<td>11</td>
<td>Agriculture &amp; Allied</td>
<td>26</td>
<td>Passport and Visa Services</td>
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<td>12</td>
<td>Court and Judiciary</td>
<td>27</td>
<td>Financial Inclusion</td>
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<td>13</td>
<td>Election</td>
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<td>Skill Development</td>
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<td>14</td>
<td>Police</td>
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<td>State Specific Services</td>
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<td>15</td>
<td>Personnel and Admin</td>
<td>30</td>
<td>Other Services</td>
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5. **CHANGE MANAGEMENT**

State-wise workshops are being organised across India to sensitize State level Departments and to bring all eGovernance applications on board. During the early stages, a large number of services were compiled as potential candidates for integration with eTaal. However, the services having partial electronic workflow and partial manual processes were not included. This in turn, had a positive impact and encouraged Departments to bridge the gaps through effective process reengineering and evolve existing eGovernance services into end-to-end electronic workflows thereby leading to efficiency gains and optimal realisation of the potential of Information Technology. eTaal is acting as a motivating factor for different departments to provide more services online and linking them to eTaal which is a step towards outcome-oriented approach.

6. **HIGHLIGHTS OF THE PROJECT**

The most important facet of the initiative is that it provides the **means to evaluate performance in the highly technical IT/eGovernance field**
through a completely non-technical metric and places real-time information proactively in the public domain allowing the users to drill down to the lowest denominator. The only restrictions are with respect to individual privacy and cyber-security. Hence, eTaal not only provides information to administrators and citizens, but also provides them the means to objectively evaluate their performance and identify areas for improvement.

eTaal is assisting decision makers and planners to assess the success of various eGovernance projects and obtaining real-time information about the number of citizens benefiting from eGovernance initiatives. The Government has also decided to display e-Transaction counts received from eTaal through electronic display boards in prominent locations across the country.

Most of the projects designed on the principle of consolidation work on a push mechanism. However, eTaal is distinctive because it pulls the data from clients in real-time. The eTaal Data Pulling Engine collects the data automatically in real time through a synchronization mechanism between the Data Server Connector hosted centrally at NIC’s National Data Centre and the Data Client Connectors hosted at the respective servers hosting the connected applications. After a synchronization frequency is set, the Data Pulling Engine automatically draws out the data from respective client server. Thus, eTaal is a unique offering in the sense that there is no overhead on the users for synchronizing the data in terms of manpower or monetary resource requirements.

In addition, since the information is collected with time stamping, any date range can be set by the users and specific information pertaining to services or geographies can be obtained for a specified period.

7. TECHNICAL ARCHITECTURE

As illustrated in Figure 1, eTaal is broadly composed of the following three components:

1. **Dashboard Server Connector (DSC):** Dashboard Server Connector (DSC) runs as a service on Central Server of eTaal with inherent pulling engine mechanism to pull the e-Transaction count from various servers located at State and Centre.

2. **Dashboard Client Connector (DCC):** Dashboard Client Connector (DCC) runs as a service on the Servers which are providing the e-Transaction count.

3. **eTaal Portal:** eTaal Portal is a web portal to give view of dashboard.

8. USERS

eTaal caters to a vast range of users including Central and State Government departments, research scholars, students, analysts, NGOs, survey agencies, consultants and the public at large who use the data for review and monitoring progress of their departments vis-à-vis other departments as well as own performance in the past. The dashboard aggregates the impact of eGovernance initiatives of Central and State governments and proactively shares this data in the public domain. This data can be used for information as well as research and analysis.
9. **IMPACT OF ETAAL ON SOCIETY**

eTaal has been in nation-wide operation since last year and 1733 eServices from 21 Central Ministries and all 35 States and UTs have been linked to the dashboard with over 177.14 crore e-Transactions recorded as on November 29, 2013. This reflects the Government-wide acceptability of the initiative in terms of its utility and importance. Table 2 illustrates the comparison of the scenarios before and after implementation of eTaal.

<table>
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<th>Scenario</th>
<th>Pre deployment</th>
<th>Post Deployment</th>
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<tbody>
<tr>
<td>Obtaining aggregated from views of eGovernance</td>
<td>No standard criterion /metric for measuring outcomes</td>
<td>Standardized e-Transactions counts eGovernance applications; self and com Projects parative analysis possible</td>
</tr>
<tr>
<td>Status of eGovernance</td>
<td>Transactional data compiled and submitted in spreadsheets with varying periodicity</td>
<td>Web Service technology automatically pulls real-time data from applications</td>
</tr>
<tr>
<td>Measuring Citizen Benefits</td>
<td>Number of citizens served not easily measurable; high overhead since data pulled from back-end or manual registers</td>
<td>Data pulled from application servers; no overhead in measuring number of citizens served</td>
</tr>
<tr>
<td>Accuracy of Data</td>
<td>Dependency on manual records and individuals; possibility of error/deliberate misreporting</td>
<td>Data extracted directly from servers; no manual intervention; accurate reliable real-time data</td>
</tr>
<tr>
<td>Ease of Data Analysis</td>
<td>Manual analysis; difficult to obtain/analyse cross-department data</td>
<td>Multiple views of data; easy analysis; no external input required</td>
</tr>
</tbody>
</table>

10. **CONCLUSION**

eTaal has won recognition at National level with Platinum Award and Order of Merit at Skoch Digital Inclusion Awards 2013. It has been appreciated by Minister (Communications & IT), GOI, Secretaries to Govt of India, and the State Governments. Exclusive State-specific views have been developed on demand by States. It has been observed that introduction of eTaal has led to a significant degree of healthy competition among states and departments in providing more services online. Thus, the application is turning out to be instrumental in promoting outcome-oriented implementation of eGovernance projects in the country. eTaal has inspired the Prime Minister’s National Council on Skill Development to develop a similar portal for monitoring Skill Development activities across India.
A. User Testimonials
NIC is getting an overwhelming response from the IT Secretaries in various states as they are integrating more and more services with eTaal. To mention a few,

i. Delhi
The National Steering Committee for eGovernance headed by the Prime Minister of India appreciated eTaal as a useful tool for measuring performance outcome of various eGovernance initiatives.

The Apex Committee on NeGP found eTaal to be very effective for evaluating the performance of various MMPs. The Mission Leaders responsible for respective MMPs use this portal to monitor the services delivered to citizens by their projects. DeitY has mandated that for eDistrict and CSC MMPs, only the number of transactions reported on eTaal portal will be considered authentic and valid and would be used for project evaluation. The transactions reported in any other form will be discarded. Respective circulars/orders have been passed as a formal communication to the concerned stakeholders.

ii. Maharashtra
IT Secretary, Maharashtra has appreciated eTaal and addressed it as the “Best Monitoring Tool”.

iii. Gujarat
Times of India, a leading newspaper of India has covered the achievements of Gujarat State which is being reflected in eTaal. In the state of Gujarat, eTaal is used as an enabler during the weekly review meetings chaired by the Chief Secretary, for tracking progress of various departments.

iv. Madhya Pradesh
As stated by the Chief Secretary, Government of Madhya Pradesh, “eTaal is acting as a motivating factor for the department to tweak their applications to do process reengineering.”

ACKNOWLEDGEMENTS
The authors express their gratitude to Hon’ble Minister of Communications & IT for proactively supporting this initiative and coining the name eTaal and also acknowledge the valuable suggestions and ideas of Secretary, DeitY, Mr J Satyanarayana, for conceptualizing the project and focusing the Department’s attention on developing a single standard metric for evaluating the success and outcomes of eGovernance initiatives in real-time in non-technical terms.

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17th National Conference on e-Governance

e-Governance- Vision to Implementation
Best Practices in e-Governance: Mee Seva

11/30/2013

Information Technology, Electronics & Communication Department, Government of Andhra Pradesh
Abstract
"MeeSeva" in Telugu means, 'At your service', i.e. service to citizens. It is a good governance initiative that incorporates the vision of National eGov Plan "Public Services Closer to Home" and facilitates single entry portal for entire range of G2C and G2B services. The objective of MeeSeva is to provide smart, citizen centric, ethical, efficient and effective governance facilitated by technology. The initiative involves universal and non-discriminatory delivery of all government services to Citizens & Businessmen of all strata and improved efficiency, transparency and accountability for the government. The initiative features transformed government-citizen interface at all levels of administration along with a shared governance model.

MeeSeva started with 10 services in November, 2011 and today it offers 192 services to the citizens of Andhra Pradesh [1] through 7000 plus Mee Seva centers. Mee Seva is now an all-encompassing model covering most of the departments and services; thus converging into a value added technology-driven good governance initiative. Mee Seva has already been adopted as a National model for delivering G2C services. The eDistrict MMP was redesigned, taking Mee Seva inputs, making it become ready for replication pan-India. The DeitY (GoI) has already sanctioned grants to AP to replicate Mee Seva in 5 states and convert Mee Seva into components to be placed in the National eGov app store for wider use.

1. Introduction
Before the era of Mee Seva, Government service delivery systems were manual and opaque. Citizens faced difficulties in accessing Government offices and services because of the tedious office processes and longer time lags in service delivery. Scenes of overcrowded government offices with unfriendly employees combined with chronic absenteeism and inefficiencies were a normal sight. Long queues, resultant delays and rent seeking were common during those days. In addition, the focus in administration was more on following procedures and keeping records than catering to the needs of citizens, thus losing the vision and treating citizen as subject rather than object of development.

Government records like land records, registration records, birth/death registrations, municipal permissions etc., which were essential aids in getting benefits under various welfare programmes lay archived in unidentifiable sheaths and bundles of papers. This made retrieval a time-consuming and difficult process. The power of IT was primarily under-utilized and most of the departments had ineffective interfaces for service delivery to the citizens. Government employees too were not satisfied as the system induced drudgery and lack of occupational motivation were affecting overall productivity. Meanwhile, the Information Technology, Electronics and Communication infrastructure in AP was growing at a brisk pace. GoAP had initiated eSeva in 2001 with the intention of providing bill payment services for various Government Departments and Private organizations in urban parts of the State. Success of eSeva has led Government of India at National level to introduce Common Service Centers (CSCs) scheme as a part of NeGP. Though eSeva succeeded in reducing the drudgery of bill-payments, it was still serving like a 'post-office'; accepting applications, sending by post to the concerned office, receiving back and then handing over to the citizens without any integrated service delivery model. Subsequently CSCs too were established to extend similar benefits to the rural Citizens of the State. But lack of services rolled out and general apathy of the departments made them completely unviable. The infrastructure created under NeGP like State
The Data Centre, State Wide Area Network was also grossly underutilized.
The process of metamorphosis of eSeva to MeeSeva started with this backdrop. The idea was to make use of the existing infrastructure to deliver services to departments to align with such thinking. The selection of departments depended on the extent of citizen centricity of such departments. The focus of e governance was tweaked to identify the services and set in motion a process of business process reengineering to support such service delivery.

2. The Initial Hiccups

Mee Seva was brought in to bring in true convergence of all the NeGP initiatives in rendering G2C services in a transparent, fast and secure way. However, the journey of Mee Seva was not an easy one. Like any other initiatives, Mee Seva too faced numerous challenges at various stages of its voyage. One of the most challenging tasks Mee Seva had, during its initial days, was to establish itself as a citizen's one stop e-governance shop.

ITE&C department, the Nodal agency for implementation, identified the departments which had high public interfaces, like Revenue, Police, Urban Local Bodies, Health, Education, Social welfare, Rural Development etc., and initiated discussions with them. At the same time they also deployed teams to learn the issues and problems faced by the citizens while accessing information/services/benefits from these departments. Studies done by the teams revealed that the large demand and lack of transparency had resulted in widespread corruption and breeding of large number of unauthorized agents and touts. It also revealed that at many places these unauthorized touts were looting citizens by creating a monopolistic environment.

3. Standardization & ESD Rules

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

In addition to these, the state also came up with ESD rules [2]. Government of Andhra Pradesh issued Andhra Pradesh Information Technology Rules (Electronic Service Delivery), 2011 in order to provide legal sanctity to the digitally signed certificates. It was also made mandatory for Departments to migrate to electronic service delivery within a period of three years. This ensured that departments moved to electronic delivery of services with in a period of time.

4. IT Readiness of Departments

Convincing other departments and bringing them under the Mee Seva parasol was another and perhaps the most challenging task the team had to undertake. Inter departmental coordination meetings were arranged regularly with key departments to ensure that they join the bandwagon. When the top level officers concentrated on convincing the department, the rest of the team worked on identifying the level of IT Readiness of each department.

5. District eGovernance Societies

Another bold step from the state came in the form of District e-Governance Societies. Such societies were formed, registered and empowered to function as nodal agencies for the implementation of Mee Seva. These DeGSs played a vital role in implementing Mee Seva. With the help of DeGSs, the central team did many capacity building activities in every districts and mandals and ensured that the IT awareness levels of department officers were enhanced. In the similar manner, trainings for using digital signatures were also given to the concerned officers.
6. Architecture

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

Mee Seva adopted the concept of central pooling of records. The records were digitally signed and stored in the database and were rendered using a web-service. Additionally the fact that citizens/officers can verify the authenticity of such digitally signed electronically made such documents tamper proof.

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

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

7. Innovative Features

The Project successfully tried out Innovative, Novel and hitherto Unknown practices and thereby unraveled the mysteries and did burst the myths surrounding and hampering the country’s e-Govt. space for the last ten years. In the process, Mee Seva reduced the service delivery time and improved the customer service experience dramatically. Some of the ‘many firsts’ of the project are:

- **Categorization of services** - Since the first priority was to deliver services across the counter, services were categorized into Cat. A and B. Cat.A services were those which were delivered across the counter within 15 minutes.

- **Digital signing of databases including bulk signing** - Using the newly developed web-based application, the data ported to the central databases were pre-signed digitally. Bulk signing was adopted to increase the pace of signing manifold. This had never been tried
before at this scale and was also tamper-proof allowing audit trail to be maintained for all transactions.

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

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

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

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

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

### 8. Accessibility and User Convenience

After the implementation of Mee Seva, 37% of the applicants were able to get their certificates within one visit. Applicants need not visit the Mee Seva Centers multiple times or respective department offices at all for availing the services. All the efforts had been taken to closely monitor the SLAs by the concerned authorities to ensure timely delivery of services to the applicants.

### 9. Government Process Re-engineering (GPRs)

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

### 10. Communication and Dissemination Strategy

ITE&C department utilized the power of communication in effective implementation of Mee Seva project and has innovatively devised an exclusive communication strategy utilizing various media platforms such as: Electronic Media, Television, Print Media, and Display Boards etc. along with established PR techniques to connect with various stakeholders of the projects. Mee Seva communication strategy incorporates various key segments where information is required to be communicated to stakeholders such as: capacity building, awareness, stakeholder motivation & enhanced participation, feedback/grievance management, conflict resolution, developing common interactive forums etc. Some of the many channels Mee Seva uses are Portal, Social Media tools, Television Media, Citizen Charter Boards, Mee Seva Award Functions, Discussion Forums, 1100 (Call Center), Workshops/Trainings, Video Conferencing etc.
11. Technical Sustainability

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

Class-3 digital signatures were issued to all the Departmental officers and kiosk operators for accessing Mee Seva portal for delivery of services. All the certificates issued are stored at the SECR for future on-line verification through the portal. SECR also serves as a repository, where certificates issued under Category B (involving Departmental work-flow and field level verification) are stored and can be re-issued second time across the Counter (Cat. A). The Mee Seva Portal is integrated with PKI components such as Form Signer & Form Signer Pi for authenticating the respective individual for accessing the portal as well as for processing the requests through digital signatures. Mee Seva Portal uses standard Web technologies and techniques such as Secure Sockets Layer (SSL), HTTP redirects, cookies, JavaScript, and strong symmetric key encryption to deliver the single sign-in service. The sign-in, sign-out, and registration pages are centrally hosted in the Mee Seva Portal.

12. Economic Sustainability

The project was launched with an initial seed investment of Rupees 9 Crores. But the user fee model deployed allows ploughing back the revenues for maintenance, development and upgrading of services. User charges were fixed considering the profitability for various stake holders involved in the project without unduly burdening the citizen. With 3.3 Crore transactions by now, project has already made more than Rs 101 Crores in user fees and recovered the entire initial investment allowing decent returns for all the stakeholders, which are being shared amongst them. More than 28%/20% (A/B Category) is shared with respective departments (to maintain the databases, necessary infrastructure, capacity building), 26%/14% (A/B Category) with Director, ESD (to maintain Mee Seva Infrastructure/application maintenance), 14%/9% (A/B Category) with Authorized Service Providers (SCA, Monitoring & Infrastructure) while the majority of 32%/57% (A/B Category) is shared with the Mee Seva center which is a cutting edge interface at the local level. This approach made the project self-sustainable.

Table 1: Economic Sustainability

<table>
<thead>
<tr>
<th>Category</th>
<th>% of Breakup</th>
<th>Kiosk</th>
<th>SCA</th>
<th>Infra</th>
<th>Department</th>
<th>Total user charges with Service Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Amount</td>
<td>8</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>% Share</td>
<td>32</td>
<td>14</td>
<td>26</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td>B</td>
<td>Amount</td>
<td>20</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>% Share</td>
<td>57</td>
<td>9</td>
<td>14</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

13. Payment Processing

As all ‘Mee Seva’ transactions are financial transactions which take place in ‘Mee Seva’ service centers, the SCAs are responsible to remit the collections arising out of ‘Mee Seva’ transactions to Government. Hence at the time confirming the receipt of service request in ‘Mee Seva’ system, the details of service request are recorded in the SCA database through SCA specific web service. After receiving a valid response from the web service, further processing related to the service request takes place in the ‘Mee Seva’ system.

14. Electronic Funds Transfer System (eFTS)

Electronic Fund Transfer System (eFTS) enables ‘Mee Seva’ system to automatically transfer statutory charges collected through various ‘Mee Seva’ service centers/ kiosks to respective department accounts. eFTS enables to consolidate all funds collected through various ‘Mee Seva’ centers in one central account in state capital (aka Pooling Account) and transfer funds elec-
electronically to the respective department accounts at a regular frequency. SCAs transfer the statutory charges collected for rendering various services into their respective bank accounts in a nodal bank. The nodal bank then transfers the amounts in SCAs’ amounts into ‘Mee Seva’ Pooling Account. Then ‘Mee Seva’ system generates FTO (Fund Transfer Orders) which is sent to the nodal bank. Nodal bank processes all the FTOs and money is transferred to respective department bank accounts. SCAs transfer the money collected from their ‘Mee Seva’ service centers into SCA Pooling Account in the Nodal Bank. Periodically on the advice of Director, Electronic Delivery of Services (EDS) Department, the amount in SCA Pooling Account is transferred to ‘Mee Seva’ Pooling Account in the same Nodal Bank. The amount in the ‘Mee Seva’ Pooling Account is then transferred to the respective Department Accounts in different banks, through FTOs generated by the ‘Mee Seva’ system, again on the advice of Director, EDS. The fund transfer to Department accounts is processed through RBI gateway using RTGS and NEFT systems. ‘Mee Seva’ system also generated all necessary fund transfer statements that are necessary for reconciliation between multiple stakeholders.

15. Replicability and Future Enhancement Plan

Replicability at State level - Both vertical and lateral expansion became very easy and it has also boiled down to a matter of plug and play job. The addition of departments, districts, services, kiosks helped the state achieve scale, scope and learning economies. The expansion of Mee Seva from 1 district/120 centers/10 services/2 departments to 23 districts/7000 centers/192 services/18 departments in just about a year’s time itself is an example of this. Replicability at National Level: Mee Seva has already been adopted as a National model for delivering G2C services. The eDistrict MMP was redesigned, taking Mee Seva inputs, making it become ready for replication pan-India. The DeitY (GoI) has already sanctioned grants to AP to replicate Mee Seva in 5 states and convert Mee Seva into components to be placed in the National eGov app store for wider use.

16. Capacity Building

ITE&C Department collaborated with IEG, Hyderabad to organize trainings to kiosk operators and department officials on Mee Seva services. Monthly Training calendars/schedules were prepared and communicated to government offices and kiosk operators, who can attend the training as per the schedule. Department officials and kiosk operators trained till 26th November 2013 by capacity building team of ITE&C department are as below:

<table>
<thead>
<tr>
<th>Department/Kiosk Operator wise Training Details</th>
<th>Nominations</th>
<th>Trained</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Department Officials</td>
<td>15534</td>
<td>12766</td>
<td>82%</td>
</tr>
<tr>
<td>No. of Kiosk operators</td>
<td>60884</td>
<td>43245</td>
<td>71%</td>
</tr>
<tr>
<td>Total</td>
<td>76418</td>
<td>56011</td>
<td>73%</td>
</tr>
</tbody>
</table>

17. Feedback Mechanism

The feedback from the beneficiaries is obtained periodically by teams visiting the centers and is used for improving the system. For e.g. in high volume centers, where scanning of documents was resulting in long queues, high-speed scanners were introduced with scanning by a dedicated team in the kiosk. Beneficiary feedback was also being collected from the citizen using the call-center 1100. The project also bridged the digital divide by allowing uniform access to services to the digitally illiterate population. The daily transactions and their disposal were also exhibited through an LED board outside State Secretariat and District Headquarters for better transparency and beneficiary feedback.
18. Key Learnings

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

The project also holds a lesson that thorough preparatory work is important to avoid mishaps or breakdowns in service delivery, availability and updating of accurate data, adherence to timelines indicated in Citizen Charters, monitoring the performance & dynamic evaluation from time to time. The project has been a success mainly because of the involvement of multiple stakeholders with specific motivations, all seamlessly fusing towards a common goal. Mee Seva is a simple, home-grown initiative which has evolved every passing day through the efforts of thousands of stakeholders all across the state. The big learning is to involve all the stakeholders’ right throughout the project cycle and allow the project to evolve. The push from Hon’ble Chief Minister of Andhra Pradesh helped in getting the departmental buy-in and this truly exemplifies the need of political will in such changes.

18.1. Economies of Scale, Scope and Learning:

Mee Seva approach to service delivery needed a complete transformation in capacity which was strategized to be achieved by bringing in Innovation in organizational and Technological Model. A complete realization that the process had to move through all the stages starting from visioning and leading to a sustainable model of service delivery was the cornerstone of the overall strategy. Figure 4: Transformation in Capacity Technology driven efforts were planned, assigned and implemented for various departments to increase efficiency in service delivery. Department processes were re-engineered considering the feasibility of implementation. Besides these, participation from various stakeholders was ensured for problem solving and decision making processes. Resource utilization was maximized by incorporating innovative procedures and expanding domain expertise among government departments to increase their overall capacity. Mee Seva approach also made it possible to achieve multiple economies of scale, scope and learning leading to enhanced capacities and ease of expansion.

18.2. Breaking the Department Silos:

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

19. Conclusion

Mee Seva currently offers more than 190 high impact services. This is expected to go up to 300 in the next 1 month. The project has already crossed 3.3 crore transactions and most of the government departments are on board now. The target is to ensure that Mee Seva becomes the entry and exit point for the citizen to approach the government for any service. The project also delivers more than 20 crore transactions every year for other services like Bill Payments, thus making it the country’s biggest one stop e-governance shop and a perfect role model for Best Practices in e-Governance.

20. References

Abstract – The need for effective and transparent Government processes and speedy service delivery is a long-felt one. Moreover, the age-old physical file movement of documents incurs a lot of time and requires continuous monitoring from one desk to the other before a final decision is taken. Consequently, many crucial decisions get delayed due to the slow movement of files and/or unavailability or absence of the senior officials in the office for clearing these files. Theft and missing of files is also not uncommon in most of the government offices. The immediate need in such scenario was to have a system in place where an authorized employee could locate the required documents and/or files in the shortest possible time, update and share them with other relevant users and eventually store them with proper references.

This paper presents a classic example of business process reengineering and change management that aims at developing an understanding of how the phased manner of eOffice implementation in Mantralaya and Sindhudurg district has revamped the conventional paper based office operations to a virtually paperless workplace. It also reveals the road blocks, the various means to remove them and how this massive transformation can be replicated.

Index Terms – eOffice, Sindhudurg, Mantralaya, Directorate of Information Technology (DIT), National Informatics Centre (NIC), Government of Maharashtra, change management, business process re-engineering

I. e-Office: An Introduction

The first thing that attracts attention when one enters a typical government office in India is stack of papers and lots of files, piled high on the desks, sometimes even making it difficult to find a person behind those files. One can just think about the people who work every day with these files—creating, retrieving, signing, forwarding, storing, and searching. Physical file management has been a part of Government since ages.

Due to the large number of physical files, average search time for any document is very high and sometimes files are never even found. Misplacement of files is a very common issue. In organizations where there is lot of paper based work, significant part of the employees’ time is spent in handling papers and filing documents. Protecting the files kept in record rooms from wear and tear or any misuse is another challenge. In any unforeseen event such as fire, no backups are available for the physical files stored.

e-Office is aimed at improving internal efficiencies in an organization through electronic administration. e-Office is workflow software that enables departments to clear, edit or suggest on files in the computers connected through intranet. e-Office is aimed at increasing the usage of work flow and rule based file routing, quick search or retrieval of files and office orders and digital signatures for authentication. The components of eOffice application and the electronic file movement are depicted in the figure shown below:
II. Methodology adopted

The transition from a typical Government Office and a typewriter based system to a modern day office with seamless connectivity and total process integration was a daunting task for the administration. But with meticulous planning and a steady and persistent approach the change management and the transition was effectively handled.

In order to smoothly roll out e-Office in each of the 39 departments of Mantralaya, following preparatory steps were followed:

1. The scope of eOffice implementation in terms of locations (as some of the Departments have offices outside Mantralaya premises)- which helps to decide the cost and time pertaining to setting up an intranet connectivity and no. of users etc.

2. An eOffice Government Structure was created by each department:
   a. A single point of contact for eOffice implementation in all departments, known as the Nodal officer, was appointed by each department
   b. Nodal Coordinators were appointed in each of the departments for preparing digitization and migration plan.
   c. A core committee comprising top officials including Nodal Officer was formed in each department -committees take important strategic decisions while addressing inter and intra-departmental issues

3. Number of users in eOffice who need DSC token were assessed and then the request for the same was sent to NIC, Mumbai for requisition of the same.

4. The cost of upgradation of hardware post expiry of warranty was planned.

5. A plan was devised for the three stages:
   a. Planning: Appoint Nodal Team, identification of documents for digitization, selection of data within identified documents, decision on sequence (closed/active/all files) and model (in-house/outsourced/mixed) of digitization, estimation of volume of documents and effort/resources required.
   b. Preparatory: Preparation of digitization timetable (digitization activities outlined in the planning stage vis-a-vis responsibility vis-a-vis timeline), procurement of resources (in case digitization work is outsourced depending on the decision taken in planning stage) and training for document identification, indexing and scanning of files.
   c. Implementation: Implement the digitization timetable.

Records were classified in terms of Notings, Correspondences, Drafts and References so that scanned records are easily integrated into eOffice.

Staff was made cognizant about keeping their computer drives clean for faster and smoother eOffice usage.

The use of printers was discouraged and the printers in excess were removed from each department; similarly scanners were also redistributed to departments which requested for the same.

Active files in progress were identified and the same were scanned.
10. The manner in which files are scanned was decided, e.g. in Mantralaya, both physical and closed files are scanned.

11. Central Registry Unit was established for each department comprising individuals who have good computer knowledge- all receipts from any entity outside the department are diarized by this unit.

12. Issued orders to send letters only on A4 size paper except in cases of legal communication.

13. Kept the latest Employee Master Data (comprising details like employee name, designation, etc.) and Leave Data (comprising history of all types of leaves taken by each employee) ready for integration into eOffice.

14. Similarly, the latest Knowledge Management System data comprising circulars, GRs, office orders, etc. was kept ready.

15. A list of the primary, secondary and tertiary processes of file subjects was created in each department and the same was provided to NIC for updation in eOffice; these file heads are useful for classification of files and they are included in the drop-down list while creating a file in eOffice.

16. Categorized eOffice users in terms of the type and level of training required in terms of aspects covering basic computer usage, typing in Marathi/English, email usage etc. and conduct internal training programmes.

The entire generic project plan for the implementation of paperless office can be summarized as under:

a. Phase 1- Planning: This includes formation of Core Team, conducting an orientation workshop, infrastructure gap analysis and covering of gaps.

b. Phase 2- Preparation: In this phase, standardization of activities and digitization strategy needs to be finalized, employee master data and Organization Structure need to be defined, NIC email ID and Digital Signature Token need to be created.

c. Phase 3- Implementation: Training and handholding activities need to be conducted and eOffice application should be released.

A phased manner for implementation of e-Office and the stages can be identified as:

1. Business Process Re-engineering
2. Resource Gap Analysis and covering the gaps
   a. Infrastructure Gaps
   b. Human Resource Gaps
3. Change Management and implementation

The aforementioned stages have been explained in detail below:

1. **Business Process Reengineering**

At Sindhudurg, before starting with the implementation of eOffice, we realized the need of process reengineering to eliminate any inefficiencies in the system and to ensure a robust new system which does not carry any unproductive administrative processes.

To overhaul the entire system, BPR /GPR was undertaken and the following tasks were carried out effectively:

- Filing system was improved on the lines of Central Secretariat Manual of Office Procedures.
- Identified more than 2300 subjects being handled by the District Collector office and graded them into the Basic, Primary and Secondary Processes.
- Documented the ideal work flow for each process and the various provisions of the law or Government orders needed for the same.
- Record classification and record room improvement: Over 25,000 files with lakhs and lakhs of pages were classified and moved into record rooms thereby improving the overall environment of the office.
- Digitization of old records for integrating in eOffice: The remaining files that were current and required for the day to day work were identified for scanning and moving them into the e-Office system. We had a daunting task of scanning about 11 lakh pages in thousands of files, which was done very smoothly by our motivated set of employees.
2. Resource Gap Analysis:

a. Infrastructure Gap Analysis
   Based on the prerequisites of the eOffice product, we have studied our current infrastructure set and a detailed report has been made. E.g. the office at Sindhudurg district had terrible shortage of computers, scanners and also the internet connectivity. These gaps such as unavailability of computers, scanners, requisite software, digital signature certificate tokens were identified and through constant planning and resource management the gaps were plugged to create an ideal environment for the switch over to total electronic governance. Over 350 employees were provided with new computers; all offices were provided with heavy duty scanners and were connected through intranet.

b. Human Resource Gap Analysis
   Human resources are the most important stakeholders of the process and they are integral part of the overall system and the changes we bring in. A study on the assessing the eOffice related training needs of staffmembers was conducted and trainings were planned accordingly. All employees were trained initially on the use of computers and then slowly on the e-office application. For departments in Mantralaya, more than 300 mass training sessions were conducted, while desk to desk hands on training was provided to produce a pool of well trained and motivated lot to make the transformation possible.

3. Change Management and Launching of e-Office
   The slow and steady march towards creating the best governed office was not easy if the change management was not effectively tackled and this was done by following a strategy of training continuously and motivating people to work ceaselessly for achieving the aims. It was also imperative to define the roles of stakeholders involved in the project, as shown in table 1. The e-Office champions were selected and they were the people who managed the change over by training and personal example. With this approach we finally launched one of the biggest e-Governance projects in the history of Maharashtra state on 24th Dec, 2013 and this was inaugurated by the Honorable Chief Minister of Maharashtra. The function was attended by the Honorable Revenue Minister, Honorable Minister Industries and Ports, Honorable Chief Secretary, Honorable Additional Chief Secretary and various other dignitaries. The role played by each stake holder is highlighted in the below mentioned table:

Table 1: Stakeholders’ role in e-Office Project

<table>
<thead>
<tr>
<th>Stake Holder</th>
<th>Role</th>
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<tbody>
<tr>
<td>Chief Secretary, Government of Maharashtra</td>
<td>Drive complete eOffice Initiative across state Provide necessary leadership and direction to the state for eOffice implementation</td>
</tr>
<tr>
<td>Secretary, I.T / Directorate of IT</td>
<td>Nodal office for implementing eOffice in Maharashtra including Mantralaya To plan, execute, monitor and control the project end to end</td>
</tr>
<tr>
<td></td>
<td>Issued work order to NICSI as required Prioritize and planned for implementations across the state in different offices To form required committees to monitor the progress of the project Issue necessary Government Resolutions for implementing eOffice Conduct periodic meetings with various stake holders Liaison with NIC eOffice product team and implementation team for smooth implementation Provide any necessary infrastructure support</td>
</tr>
<tr>
<td>Head of the departments from each department</td>
<td>Identify Nodal officers and core team Issue directives and orders to implement eOffice Provide necessary support to nodal officers</td>
</tr>
</tbody>
</table>
III. Advantages of the eOffice

1. **Transparency & Accountability** has been one of the best advantages brought by eOffice. The documents or the files are preserved forever. There are no chances of the files being misplaced, modified or lost. There is an absolute transparency as anything once written on the file cannot be changed or undone. The files cannot be kept pending as the system is designed to give feedback and monitoring mechanism.

2. **Quick disposal of cases and systematic, timely monitoring of pending cases** has been the other immediate advantage we have seen.

3. **File tracking has become a lot simpler and easier** as the location of receipts and files is available at any point time to all required employees.

4. **Better communication** has been facilitated with the help of a single Employee directory.

5. **Centralized, easily accessible knowledge repository** has been created at Sindhudurg, which has helped in preserving GRs, circulars and other important documents in an organized fashion in KMS (Knowledge Management System).

6. In addition to the above, long terms results of the eOffice have been listed below:
   
i. Seamless integration of various other applications with eOffice
   
ii. Creating a clean e-environment for the employees
   
iii. Simplifying the future with good infrastructure and increased awareness on computers
   
iv. Building a Citizen interface to facilitate the whereabouts and action taken on grievances, applications, petitions, RTI, etc.
   
v. Paving a way for the transition to a Paperless/Less Paper Office

Sindhudurg today has the rare distinction of being the first district in the country to have successfully integrated the entire revenue administration from the Tehsil level to District Collectorate. The two centuries old institution of District Collector has moved into a new era of Governance and Sindhudurg leads this monumental change.

IV. Lessons Learnt

1. **Phase-wise implementation:** eOffice roll out should be planned in such a manner that it is implemented either department wise or subject wise. In department wise approach, departments should be categorized in terms of different phases of implementation and ‘Go Live’ dates for each phase should be declared in advance. E.g. In Mantralaya, 1st Oct 2013 for 19 departments, 1st Nov 2013 for 10 departments and 1st Dec 2013 for remaining 10 departments were declared ‘Go Live’ dates in terms of first, second and third phase implementation respectively. The alternate way is to implement eOffice for only a selected number of subjects in all departments so that file movement takes place end to end and atleast employees start getting hands on experience on eOffice.

2. **Make Top Officials the Nodal Officers:** Top officials should be assigned the role of eOffice Nodal Officers. They should review the progress of eOffice implementation in their respective departments. E.g. In Mantralaya,
3. **Top-down approach:** eOffice cannot be implemented if it is not driven from the top. A bottom-up approach is not the right fit for the smooth implementation of eOffice. It may be noted that if Secretaries of each department instruct their staff to take up eOffice working style religiously, it is much easier for the operations team to drive the project in a lesser time frame.

4. **Issuance of GRs and circulars:** The apex body in an organization must issue Government Resolutions and Circulars which define digitization strategy to be adopted and the necessary actions to be undertaken by organizations as initial steps towards eOffice. To facilitate the implementation of eOffice in the state government offices and departments, Chief Secretary’s Office had issued a GR on 20th August, 2013 which is available on the official website and provides guidelines to the organizations interested in implementing eOffice for undertaking requisite preparations. Similarly many circulars were issued to departments as measures to implement eOffice.

5. **Discourage use of printers:** Printers should not be used by departments unless due to emergency. There are several ways in which printer usage can be reduced in a Government set up. E.g. ‘paper less environment drive’ was initiated by Director-IT as a result of which all staff members discarded unwanted papers, thus ensuring a clean and paperless desk; printers were also with drawn from departments which had an excess number of printers and the same were redistributed to the ones with lesser than sufficient number of printers.

6. **Change Management and capacity building:** Changing mindsets of Government employees at all levels to stop using a 200 years old physical file movement system has been a major challenge. Re-engineering of mind set of employees is necessary in order to drive eOffice environment. In this regard, regular training programmes need to be conducted. Initial trainings should be imparted to fresh users for demonstrating eOffice suite in detail while refresher trainings should be imparted to ensure that all queries of users, who have started using eOffice, are addressed.

7. **Setting up of an eOffice Support Team:** An eOffice Support Team along with Facility Management Services team should be put in place for providing eOffice handholding and support services. There should also be an eOffice Support Help Desk which the users may contact via email or phone for reporting eOffice related issues.

8. **Readiness Status and Gap Analysis:** Departments should ensure that they meet the pre-requisites in terms of infrastructure (comprising scanners, computers, etc) and employee readiness status (comprising DSC issuance and eOffice login issuance) before implementing eOffice. A proper gap analysis report must be maintained and all the gaps must be filled before implementing eOffice.

9. **Parallel movement of physical files should stop:** It was often noted that eOffice was used as a file tracking system for physical files only (which can be marked as ‘received’ in the eOffice application) while physical files are actually processed. Since eOffice, in its real purpose, involves movement of only electronic files, departments must ensure that a cutoff time is set before moving into eOffice. This cutoff date should signify the date after which no physical file moves along with electronic file.

10. **Financial Provision for IT upgradation:** Since technologies keep changing rapidly, it is imperative to ensure sufficient financial resources for upgradation of IT Infrastructure including computers, scanners, bandwidth of network connectivity, etc.

**V. Outcome**

The interventions and the initiatives taken have resulted in a lot benefits which can be listed as under:
1. The drudgery of employees has reduced.
2. The administration has become more accountable and transparent.
3. The working environment has become friendly to citizens.
4. The public participation programmes have become more successful.
5. The Sindhudurg district has become a role model of Administrative Excellence not only in Maharashtra but the entire Country.
6. The various changes in the internal office processes are highlighted in Table 2 and the figures signifying current status of eOffice are shown in Fig 3 & Fig 4:

### Table 2: Change in the processes

<table>
<thead>
<tr>
<th>Process before eOffice</th>
<th>Process after eOffice</th>
</tr>
</thead>
<tbody>
<tr>
<td>In an office like Mantralaya moves at least between 10-15 users in an official channel. Being a physical format, there are at least additional 10 unproductive touch points.</td>
<td>No unproductive touch points, files go directly to the person involved or to the registry electronically.</td>
</tr>
<tr>
<td>Files take days to reach across offices/locations</td>
<td>Files are forwarded instantly with a single click</td>
</tr>
<tr>
<td>Files can be tampered</td>
<td>Files recorded once, can never be tampered</td>
</tr>
<tr>
<td>It was not possible to find out the exact location of the files</td>
<td>File tracking can be done by anyone and all the information is available at finger tips</td>
</tr>
<tr>
<td>Monthly arrear reports are prepared manually and take at least a week. There is no mechanism to validate the reports</td>
<td>Monthly arrear reports can be created instantly. In addition, pen dency reports can be pulled any time.</td>
</tr>
<tr>
<td>Preparation of leave orders take anywhere from days to months</td>
<td>Leave orders are issued instantly</td>
</tr>
</tbody>
</table>

![Fig 3: Current status in Mantralaya](image1)

![Fig 4: Current status in Sindhudurg](image2)

### VI. Sustainability of the project

eOffice is a longterm sustainable project of Government of Maharashtra. Key requirements for sustenance of any project are as below:
1. Funding: 0.5% of each department's budget is given for eGovernance initiatives of the departments. Funds from this allocation can be spent by departments on eOffice.

2. Infrastructure: Directorate of IT is supporting all the departments by providing the necessary infrastructure. Many other Mission Mode Projects such as eDistrict, SWAN, Crime and Criminal Tracking Network and System (CCTNS), etc. are underway across departments which will also fill the infrastructure gaps for departments in remote locations. Strategy has been formed that all state government instances will be set up in State Data Center, which is maintained by DIT. For other offices and autonomous bodies, eOffice will be deployed in the respective data centers. For all other offices, hosting will be done at National Data Centre.

3. Leadership support: As stated in above sections, eOffice is a flagship project with support from Hon'ble Chief Secretary and Hon'ble Chief Minister. With the directives from leadership and support from DIT and local departments, eOffice has long sustain ability and bright future.

4. Implementation Support: DIT is providing support to each district and department by providing manpower at various capacities
   a. District and Divisional Consultants by DIT to support the initiative at district level
   b. Departmental consultants by DIT to support the process study and implementation of initiatives in the state.
   c. Additional District Project Managers by DIT, stationed at districts to support initiative in the district.
   d. In addition, NIC in Maharashtra has expanded the eOffice team in the state to support this initiative across the state.

5. Ownership transfer to departments: From the time of inception of the project, project team ensures the participation from all the relevant stake holders from departments. Departmental users are made part of the implementation, process study, data gathering, configuration, status tracking etc. All users trained and nodal officers and champions are identified and empowered to be self-sufficient in resolving minor issues related to eOffice. Arrangements are being made with NIC to provide a continuous support during implementation and long term product support after implementation.

VII. Achievements

- With close to 6,000 users in one instance, Maharashtra Secretariat is the largest ever eOffice implementation so far in the country. All levels of users from assistants, clerks to Secretaries, and Hon'ble State Ministers and cabinet ministers and their staff have been brought on board
- 35 district collectors, 8 divisional commissioners, and deputy divisional commissioners exchange files with Mantralaya instantly. IAS officers across the state exchange files via eOffice. Even officers apply for leaves remotely using eOffice
- e-Office at Mantralaya has recently won ‘Gold Award’ under the category ‘Best Green IT initiative of the Year’ at the first Express IT Awards
- e-Office at Mantralaya has won the Jury’s choice award for best G2G initiative of the year by eMaharashtra
- e-Office at Mantralaya has been awarded Order of Merit by Skoch
- e-Office at Sindhudurg has won Skoch Order of Merit and Platinum Award at Skoch Digital Inclusion Awards Ceremony
- e-Office at Sindhudurg has also been featured as Case Study in the PC Quest Magazine.
- e-Office at Sindhudurg has won the 1st place in best G2G initiative of the year by eMaharashtra
- Paperless Sindhudurg had been selected for presenting in 15th Thinkers and Writers Forum by Skoch
- Paperless Sindhudurg has won CSI Nihilent Excellence Award
In India, in spite of the remarkable success of its pharmaceutical industry, the provision of affordable medicines to people remains a daunting task. Several research studies show that expenditure on medicines in India accounts for about 50 to 80 per cent of the total cost of treatment. At least three-fourths of the total out-of-pocket expenditure in the country is spent on buying essential drugs and medicines many of which are highly overpriced.

Some alarming facts -
- As per WHO 65% of the Indian population lacks regular access to essential medicines.
- The expenditure on health is the second most common cause for rural indebtedness.
- Expenditure on health is responsible for 2% shift from APL to BPL every year.
- Over 23% of the sick don’t seek treatment because they are not having enough money to spend.
- Expenditure on drugs constitute about 50-80% of the health care cost.
- Over 40% of hospitalized patients have to borrow money or sell their assets to get them treated.

Recognizing the need to address these crucial roadblocks on the way to providing affordable, good quality and timely healthcare to people, the Government of Rajasthan launched the “Mukhyamantri Nishulk Dava Yojana” (MNDY) for providing essential medicines free of cost to all patients visiting government health facilities. Similarly "Mukhyamantri Nishulk Janch Yojna" was launched to provide basic diagnostic services free of cost to all patients. The schemes are a venture for increasing the accessibility to essential medicines and diagnosis facility thereby improving health of state’s population.

Universal in Nature

The benefits under the aegis of MNDY & MNJY have been extended to the entire 7 Crore population of the state. The aim is to provide free medicines to all so that no patient is deprived of treatment on account of lack of medicines. No BPL Card, ration card, not even any Id proof is required for availing benefit of the schemes, he may not be a citizen of the state, so that there is no barrier to access. The only qualifying criterion is that one has to be a human being.

Under the scheme currently about 600 commonly used essential medicines, sutures & surgical items (which can treat majority of illnesses) are being made available to all patients visiting OPD and IPD at all (approximately 17,000) government healthcare institutions.

The scheme is being implemented at:-
- 22 Medical College attached Hospitals
- 56 District Hospitals / Sub-divisional Hospitals / Satellite Hospital
- 428 Community Health Centres
- 1844 Primary Health Centres
- 12701 Sub-centre & others

Distribution of drugs to patients is ensured through approximately 17000 free Drug Distribution Centres (DDC) established across all healthcare institutions of the state.
Drug availability at various levels.

<table>
<thead>
<tr>
<th>Level of care</th>
<th>Institutes</th>
<th>Drug</th>
<th>Surgeries</th>
<th>Suture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tertiary</td>
<td>Medical College Hospitals</td>
<td>550</td>
<td>70</td>
<td>72</td>
</tr>
<tr>
<td>Secondary</td>
<td>District / Sub-dist / Satellite Hospitals</td>
<td>400</td>
<td>60</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>CHCs</td>
<td>350</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Primary</td>
<td>PHCs/Dispensaries</td>
<td>200</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Sub Centers</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The Mukhyamantri Nishulk Dava Yojana was launched to address accessibility and affordability issues related to essential medicines. The framework comprises of the following components -

A. COMPONENTS TO MAKE DRUGS AVAILABLE IN GOVT. HOSPITALS

1. Establishment of an autonomous centralized procurement agency
2. Identification of drugs for free essential drug list (EDL)
3. Procurement of all essential and life saving drugs through a two-bid transparent e-tendering process
4. Drug Warehouse at every district
5. Empanelled laboratories for quality testing
6. System for transportation of drugs

B. COMPONENTS TO CHANGE PRESCRIPTION BEHAVIOUR OF DOCTORS

1. Sensitization and orientation about rational use of drugs (RUD)
2. Write prescription on self carbonated prescription slips
3. Diagnosis must be written
4. Write Generic / Salt names
5. Use out of Essential Drug List
6. Follow Standard Treatment Guidelines
7. Constitution of Drug and Therapeutics Committee
8. Prescription Audit.
9. Report on Adverse Drug Reactions (ADRs)
10. Patient counselling

ADVANTAGE OF ECONOMIES OF SCALE

Being a central procurement agency RMSC has the benefit of the “Economies of Scale” wherein procurement of medicines at lowest rates can be ensured due to the bulk central purchase orders. This results in additional, easy and early purchases of medicines, equipments and instruments. Due to bulk purchase & transparent tender procedures, the State government has saved on time and money.

The table below reflects the cost of some commonly used medicines – tender price of RMSC and that of equivalent market brands.
COST COMPARISION

<table>
<thead>
<tr>
<th>Disease/ use</th>
<th>Name of Drug</th>
<th>Pack Size</th>
<th>Equivalent Popular Brand</th>
<th>MRP (Market Price)</th>
<th>RMSC Tender Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain killer</td>
<td>Diclofenac Sodium Tablets IP 50 mg</td>
<td>10 Tab strip</td>
<td>Voveran (Novartis)</td>
<td>Rs. 31.73</td>
<td>Rs 1.24</td>
</tr>
<tr>
<td>Cholesterol lowering</td>
<td>Atorvastatin Tablets IP 10mg</td>
<td>10 Tab Blister</td>
<td>Atrova (Zydus)</td>
<td>Rs. 103.74</td>
<td>Rs 2.98</td>
</tr>
<tr>
<td>Heart disease</td>
<td>Clopidogrel Tablets IP 75 mg</td>
<td>14 Tab Strip</td>
<td>Plavix (Sanofi)</td>
<td>Rs. 1615.88</td>
<td>Rs. 8.54</td>
</tr>
</tbody>
</table>

FLOW CHART FOR DRUG DISTRIBUTION UNDER MNDY

NEED FOR IT APPLICATION

It is a huge logistic exercise to order, receive, store, quarantine, quality check, quality clearance & issue 600 drugs to 17000 places & give it to 2.8 lac patients every day. The challenges of supplying so many drugs to many hospitals for so many patients could only be handled by "COMPUTER JI." Thus a IT based online advance Drug Inventory Management Application was developed for providing complete supply chain management solution for the drugs, sutures and surgical items under the scheme, through web based "e-Aushadhi" Software. The solution provides drug inventory management services to various district drug warehouses, medical colleges, hospitals, community health centers (CHC), primary health centers (PHC) and drug distribution centers (DDC) of Rajasthan from where the drugs are issued to the patients, who are the final consumers in the chain. e-Aushadhi has been implemented across 5000 locations spread over various geographical locations in Rajasthan.

e-Aushadhi is a supply chain management application deals with Purchase, Inventory Management & Distribution of various drugs, sutures and surgical items to patients, the final consumer of the supply chain.

"e-Aushadhi" gives detailed information from the stage of procurement of the drug to its consumption by each counter. The application has modules useful for day to day activities of drug stores like demand generation, purchase order generation, challan process, quality control and separate module to generate...
various kinds of reports for the use of higher management for better tracking the position of drugs, provide replenishments of drugs as and when required and take strategic decisions. It provides transparency in the process of procurement, supply and distribution of drugs.

Key features & benefits of the Application "e-Aushadhi"

- Allows searching for a specific drug or material
- Ease of Indent and Purchase Order generation
- Online Indenting from DDWH to Head Quarter
- Online Purchase Order generation to suppliers
- Online issue of Drug based on Drug Purchase and Availability.
- Provision to maintain expiry date / shelf life for an item wherever applicable.
- Quality Control for Drugs
- Ability of online tracking of Drug Inventory in all Institutions.
- Better planning, execution and control demand and supply throughout the state.
- Ability to generate customised Reports
- Various alert generation facility with different colours e.g. expired items, re-order level etc.
- Ability to locate drugs using a number of search criteria.
- Provision to link all drug warehouses hierarchically to understand their physical as well as functional structure
- Inter Drug ware House Drug Transfer
- Integration with Arogya Online (HMIS application) in District Hospitals.
- Store, Maintain, Update, Search & Display information related to drugs through centralised Database server across multiple stores.

Current features which are in Used

- Online Functioning of Procurement Department at HQ
- Online Functioning of Finance Department at HQ
- Online Functioning of Quality Control Department at HQ
- Online Functioning of Quality Audit Department at HQ
- Online Functioning of District Drug Warehouse at each District Level
- Indent generation at DDWH level
- Compilation of indents at HQ Level
- Purchase Order Generation (PO) at HQ level and scheduling to DDWH
- Challan Receiving at DDWH and stock updation
- Maintaining Daily stock Register/Ledger
- Ability to search items using a number of search criteria like identification id, item specification, equivalent / related item etc
- Online Issuance of Drugs to all sub stores
- Number of reports at HQ and DDWH Level
- Online stock monitoring at HQ level
- Online Drug Receiving from DDWH & dispatch to Labs for Quality Check
- Third party Receive & Issue at DDWH level
- Keeping track on supply and supplier performance
- Supplier Payment is linked to supplier Performance

Features which will be used in future

- Ability to generate indents automatically based on reorder, minimum, maximum planning
- Online functioning of Sub store and DDC counters (RMSC have to provide Hardware and network)
- Various information may be provided at Portal of RMSC
- Keep track of patient Drug consuming history linked with CR number

Operational Advantages

- Brings Transparency & Smoothness in the Process of Drug Inventory Management and Distribution
- Minimum IT expertise required for Implementation
Technical Advantages

- Cloud Based Architecture
- GS1 Compliance to CIMS Standard
- Highly Secured
- Highly Configurable
- Fast Roll Out
- 24*7 Support with Cloud Computing
- Work Flow Enabled Integrated Solution

Benefits

- Better Planning, executing and controlling
- Online Tracking of Drug Inventory
- Streamlining of Inter-District Drug warehouse Transfer
- Efficient control of Inventory
- Multi user, Multi location storage
- Comprehensive Help
- Customizable Reports

IMPACT OF MNDY

Increase in access and equity of the underserved and Reached out to the unreached

After implementation of scheme, number of outdoor and indoor patients has increased significantly at government hospitals. Since the launch of the scheme the data is as follows-

Total number of beneficiaries - 14.68 Cr. patients
More than 2.8 lac patients are being benefitted every day.

<table>
<thead>
<tr>
<th>Before</th>
<th>After MNDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 Lac patients</td>
<td>80 Lac patients</td>
</tr>
<tr>
<td>per month</td>
<td>per month</td>
</tr>
</tbody>
</table>

Decrease in out of pocket expenditure

There is huge amount of reduction in out of pocket expenditure in the treatment of common man as all costly medicines are being provided free of cost.

- Everyday we are giving drugs to more than 2.8 Lac patients
- The average cost per patient is around Rs.15
- Otherwise the cost of drugs purchased from the market use to cost around Rs.300 to 500

Savings to Government

- Amount spent on costly medicines by RMSC- approx. 507 Cr.
- Market price of these medicines – approx. 3000 Cr
- Savings of approx. Rs. 2493 Cr. to the State Government which can be spent on developmental works or creation of other community facilities.

Our motto

**ALL ESSENTIAL MEDICINES & ALL BASIC DIAGNOSTIC TESTS ARE AVAILABLE AT ALL PUBLIC HEALTH INSTITUTIONS AT ALL TIMES**

So that No Human Being dies for Want of Treatment
Abstract
Perhaps Information and Communication Technology (ICT) is now the part of the fabric! Shall we not reflect on the exceptions where ICT has not entered? Isn't it a part of everyday life and everyone’s life? It has significantly influenced the quality of governance in contemporary time. The major tenets of good governance - transparency, accountability and participation are all taken care of by the application of ICT. Infact mobile phones are the most effective mechanism to achieve some of the major developmental goals. This paper seeks to analyze how the scope of development shaped up since last two decades and what are the operational modalities to achieve them? Further it focuses on some of the efforts taken by Indian states to ensure better Maternal and Child Health (MCH). It also compares the challenges in the present health delivery mechanism and how mobile technology could fix those challenges. Health is one component of public service delivery which this paper looks on since it is a merit good and has positive externalities. The paper is a modest attempt to analyze how mobile technology is poised to help in achieving the Millennium Development Goals (MDG’s) related to health in India.

Keywords: ICT, e-governance, e-health, and MDGs

Introduction
The trajectory of development witnessed a paradigm shift from being just focused on quantifiable targets to having emphasis on quality of life that is the essence of human development approach of 1990’s. This decade of 90’s is remarkable not just because it focused on human development indicators, leaving aside income growth, as a parameter of development rather this era also marked structural adjustment or what we call as LPG (Liberalization, Privatization and Globalization) in India. There was a major influence of Information and Communication Technology (ICT) and the whole modus-operandi of government changed. Philosophically the focus shifted from government to governance. Perhaps the essence was a reiteration that what was required was more governance and not government.

What was being focused by Amartya Sen and Mahboobul Haq in pioneering out the concept of human development indicators was quite novel. Prof. Sen mentioned that human development is concerned with “advancing the richness of human life, rather than the economy in which human beings live, which is only a part of it.” This statement highlights that if we talk about human beings not everything is quantifiable but it would be important to focus on those issues. Further what Haq mentioned was “The basic purpose of development is to enlarge people’s choices.” Further the premise that was set in adherence to this was that the basic purpose of development is to ensure that there is an enabling environment that would help people realize their infinite and ever changing choices.

Health is one such domain in which the role of state is vital essentially because there is huge information asymmetry prevalent and not all people could afford it. In the latest revisions to the notion of poverty the Multidimensional Poverty Index (MPI), Oxford Poverty & Human Development Initiative (OPHI),
reiterates that income is just one dimension of poverty. MPI focuses on factors which essentially form the base of poor people’s experience of deprivation and poor health is one amongst them. Further health is considered as a merit good since it has positive externalities and people do not realize at that time that what benefits derive from being healthy since it has long term orientation. With regard to former, positive externalities, the benefits of being healthy say immunization are not just restricted to the person who is immunized it benefits the society at large. For the latter as Haq has mentioned people often value those things which do not show up at all or atleast immediately. But the two qualities of health that is huge information asymmetry along with poverty and it being a merit good essentially calls for a substantive role of the state. Nonetheless non-state actors could dovetail the efforts of the state actors.

International Scenario on Health

Millennium development goals (MDGs) are eight quantifiable goals to be achieved by 2015. The MDGs are established in millennium summit of United Nations, in 2000 and the goals are eradicate extreme poverty and hunger, achieve universal primary education, promote gender equality and empowering women, reduce child mortality rates, improve maternal health and combat HIV/AIDS, malaria, and other diseases, ensure environmental sustainability and develop a global partnership for development. India is a signatory to the MDG’s.

1000 days initiatives

1000 days from the start of pregnancy to child’s second birthday is important period for every child. Right nutrition during 1000 days is crucial for child’s overall development which encapsulates child’s ability to grow, learn and rise out of the poverty. It can also help in shape society’s long term health, stability and prosperity.

India’s Scenario on Health

Irrespective of the international recognition of these development goals India has been actively focusing and placing its efforts to ensure universal access to health. Several programmes since independence have been focusing on maternal and child health (MCH). Prominent amongst them being JananiSuiraksha Yojana, now a component of National Rural Health Mission (NRHM). But various factors which challenge the achievement of low IMR and MMR are essentially related to inequities on income further opportunity cost of that time, geographical disparity, initial endowments, and huge information asymmetry. Moreover there is high out of pocket expenditure.

The gravity of the situation could be gauged from the fact that in India, 309,000 babies die each year on the day they are born which accounts 29 per cent of global total. The focus of government especially of the 12th Five Year Plan has been inclusive growth and moreover from a human rights perspective also more emphasis needs to be placed on checking any mortality which could be prevented. Mother and child make up nearly 3/5 of India’s population that includes women in reproductive age 15-49 and children up to five years. Poor maternal health impacts productivity, their families’ welfare and socio-economic development. Nutritional problem is severe among pregnant women in developing countries and women with poor nutritional status are more likely to deliver low birth weight (LBW) infant. LBW babies and children whose earlier years are faced by hunger or disease face various challenges, both physical and cognitive, throughout their lives. Prevalence of anaemia among Indian pregnant mother is 47.9 per cent and it is a major reason for high MMR.

(4) 1000 Days. (2013) 1,000 Days | Why 1,000 Days. Retrieved November 29, 2013, from www.thousanddays.org/about/
Pregnant mothers and children up to five years are more susceptible to infectious diseases, need exists to ensure the health-care service to them, since it has positive externality. Ban Ki-Moon, Secretary General of UN, rightly said “Reproductive health and rights are integral to sustainable development and poverty reduction.” (UN on World Population Day, 2012).

**Health Indicators India**

Infant Mortality Rate (IMR) is 42 and varies from Rural (46) and Urban (28) as well amongst states. States which have high IMR are Madhya Pradesh, Assam, Uttar Pradesh and Odisha 56, 55, 53 and 53 respectively and some state like Goa, Manipur, Kerala and Tamil Nadu has IMR 10, 10, 12 and 21 respectively.

MMR stands at 212 according to SRS 2011. The target for it is to reduce it by three-quarters between 1990 and 2015. The MMR in 1990 is estimated to be 600 per 100,000 live births as per the latest UN inter agency estimates. This means that MMR in India is to be reduced to less than 150 per 100,000 live births by 2015. As per the estimates available from the Office of Registrar General of India, the MMR declined from 254 per 100,000 live births in 2004-06 to 212 per 100,000 live births in 2007-09 observing an average annual decline of 5.5 per cent.

**Relevance of e-Health via Mobile Phones**

The reason current health intervention is capping on mobile phones is due to its ubiquitous nature, their affordability and ease; already existing mobile phone technology which could be tapped to provide effective health care services. Further what is observed is that there is increased public acceptance in the usage of mobile technology; further its geographic reach is massive irrespective of rural or urban area. It not just ensures that the interventions are timely provided further it helps in influencing the behaviour. Further yet another forte of mobiles is that it could be tailored according to the needs of the community say the language of message. Mobile tele-density in India stands at 68.72%. According to the latest figures available mobile subscribers stood at 864 million in India out of them approximately 70% are active subscribers.

**E-Governance Initiatives on Health (e-Health)**

*eMamta* is a novel initiative of Gujarat which has integrated Information and Communication Technology (ICT) in the provisioning of primary health care. It’s a Citizen centric service delivery model aimed at securing safe motherhood and child survival. The focus of the programme is integration of ICT with the aim of ensuring institutional deliveries which would contribute towards checking maternal and child mortality. It enhances information management as is being indicated below.

![Identification of recipients](image1)
![Non recipients of health services](image2)

![Linking the beneficiaries to appropriate health care services](image3)

![Effective Monitoring & Evaluation](image4)

It’s a mobile phone based innovative technology implemented in May, 2010 and has helped in taking health care to door steps of needy people. In Gujarat, rural health workers go to every house in the villages to collect data of pregnant women, infants and children up to 5 years of age and they send it to the State Rural Health Mission (SRHM)


which has a centralized data repository. Bihar and Chhattisgarh also implemented the mother and child tracking projects under national e-governance plan.

**Amma Lalana**, an e-governance project in Andhra Pradesh, tracks health status of all pregnant women and infants and aims in reducing MMR & IMR and encouraging institutional delivery. This project helps women to use public health service and creating awareness as well as monitoring the health care service.

**DrSMS**, Kerala, is a citizen centric e-governance project piloted in Kozhikode District, in 2008 and now it has been extended to all fourteen districts. It provides comprehensive information on health-related resource via short message service (SMS). SMS with requested facility or service send to the specified number will receive details of nearest health facilities.

### Relevance of e-Health

Many existing problems in the existing health system can be solved by e-health initiatives. The e-governance in health sector will effectively improve the service delivery and administration and it will help in future healthcare planning. The service delivery problems like delay in communication, information asymmetry, and lack of awareness could be solved by ehealth and improve the service delivery by ensuring better utilization of service such as pre-natal and post natal checkups, immunization, lab tests, follow-ups and to make people aware of various government schemes like JananiSukraksha Yojana, Family planning, Health Insurance, Integrated Child Development Service (ICDS) and so on. The common administrative problems like monitoring grass-root workers, coordination between various departments and communication delays within organization can be solved by eHealth; and e-governance in health sector also helps in making administration into more accountable, transparent and citizen centric administration.

The ehealth will help us in planning for the future health care planning. We will get real time data regarding maternal and child health and other health related data which is important for framing future health policies. We can make federal or central data Centre by interconnecting various State’s e-health initiative.


The existing problems in the existing health system along with intended benefits from e-Health are mentioned below in the table.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Problems in Health Sector</th>
<th>Relevance of E-Governance/m-Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rural-Urban divide</td>
<td>Technology has no barriers.</td>
</tr>
<tr>
<td>2</td>
<td>Information asymmetry</td>
<td>Ubiquitous on reach and tailored information and language.</td>
</tr>
<tr>
<td>3</td>
<td>Follow-up treatment and tracking migrant mothers and child</td>
<td>Tracking would essentially ensure compliance of the patients</td>
</tr>
<tr>
<td>4</td>
<td>Health facilities favors rich</td>
<td>Affordable and hence inclusive.</td>
</tr>
<tr>
<td>5</td>
<td>Monitoring and evaluation</td>
<td>Centralized database ensures better M&amp;E</td>
</tr>
<tr>
<td>6</td>
<td>Delays in service delivery and corruption</td>
<td>More accountable, transparent and speedy delivery of services.</td>
</tr>
<tr>
<td>7</td>
<td>No database on priority of the cases</td>
<td>Database which would facilitate prioritizing.</td>
</tr>
<tr>
<td>8</td>
<td>Schedules not followed</td>
<td>Alerts to field workers regarding schedules.</td>
</tr>
<tr>
<td>9</td>
<td>Data related to health</td>
<td>Real time data regarding MCH which could help better frame policies.</td>
</tr>
</tbody>
</table>
Conclusion

Contemporary time the focus has been on quality of life and its richness, enlarging people’s choice, inclusive growth and sustainable development this essentially requires better health and nutritional status for women and children. There is broad recognition of the importance of MCH as can be gauged from the MDG’s 4 and 5 particularly and MDG’s 1 & 3 also. For India with such a wide network of mobile consumers what would be required is to utilize this to achieve welfare of all. The limitations enlisted in the previous sections of the current health sector essentially also points out where m-Health could impact the most. HDR 2001 explicitly mentioned the role which technology could play with respect to improving human lives. This would essentially call for iteration of lot many policies of government to be in compliance with the latest trends in ICT. This paper highlights some of the initiatives taken independently by state governments but they have the potential to be scaled up and ensure that each and every human life have the means for realizing what they value i.e. capability.
Time to move to e-Governance Competency Based Professional Development for Government Employees

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Abstract
The Government of India has embarked on a massive and challenging e-Governance journey, through its National e-Governance Plan (NeGP). e-Governance is looked as a major government transformational initiative that will touch the central, state and local governments across the country. This paper looks at a holistic capacity building within the government as one of the key enabler for e-Governance. The author brings out relevance of training and training needs analysis as a product of an e-Governance Competency framework. The paper suggests a framework to address the e-Governance eco-system around two key aspects. Firstly around e-Governance project life cycle and second, around the government hierarchy. The author further recommends certain guiding principles for applying the competency framework.

Keywords: e-Governance, Training, TNA, Competency, framework, project life cycle.

Context:
The National e-Governance Plan (NeGP) is one of the flagship programme of Government of India and is being implemented since 2006. The programme gains tremendous importance from the point of leading the country towards good and effective governance with a service oriented approach. The spread of these initiatives is vast, in terms of administration and geography, cutting across central, state and local governments. One of the critical success factor for implementation of such big programme is capacity building across the e-Governance eco-system for meaningful design and implementation of these initiatives. Training is one of the crucial components of capacity building at all levels of political, policy and at implementation level officers within the Government.

e-Government initiatives, of whatever type, are complex mixtures of technological, managerial, process and policy related challenges, and the risk of not understanding and addressing these complexities is costly failure [Pardo, 2000]. The policy guidelines under NeGP and recommendations from various conferences and forums suggest the need to impart training based on holistic approach to Government employees from policy to implementation level. These training should address developing the desired knowledge, skills and attitude required for e-Governance project implementation.

The Training Needs Analysis (TNA) is essential to map capacity building efforts required at various levels and to design and develop specific training programs. The TNA is a management tool to identify the inputs required for ensuring desired level of performance thus achieving end goal. “Needs assessment is the systematic effort that we make to gather opinions and ideas from a variety of sources on performance problems or new systems and technologies. [Allison Rossett, 1987].

A systematic, comprehensive TNA is done by understanding the expected and existing job/functional profiles at each level in an organization, present level of competencies of the employees working at different level, peer expectations, reporting officer expectations and thereby identifying the gaps around various competencies. “Not more than 6-10 % of expenditures in training actually result in transfer to the job”. [Broad and Newstrom, 1992]. Some of the key challenges or inherent constraints in applying TNA techniques upfront in government, especially for e-Governance project related trainings are listed:

• Non-availability of enforceable job/functional profile for employees
• No-commitment of availability of the right employee to be deputed on e-Governance projects
• No-commitment of the length of stay of a good employee deployed on e-Governance project implementation.
• No-commitment of the length of stay of the project champion, mission leader.

The views expressed in this paper are completely of the author and not of the organization he is working.
• Employees who are trained may not be deployed to work on e-Governance initiatives.
• Employees already working on e-Governance projects may not be deputed for training due to shortage of resources.
• No dedicated training officer to work on a systematic capacity building or specific training plan.
• And so on…..

One way to understand the training needs is through a structured manner where one shall opt using an e-Governance project competency based framework. There is no known global e-Governance project competency framework and also there has been no such attempt in India. According to a survey conducted by EIPA [2005] among the members of EPAN e-Government working group, Leitner [2006] concluded that there seems to be no common understanding of what skills and competencies are required for e-Government initiatives. Also based on the findings of this survey, he added that there appears to be a need to identify, define and classify the different skills and competences required by e-Government; and also needs to assess the skill requirement for the different communities of public servants who are relevant to e-Government service.

Competencies are the skills, knowledge, abilities and personal attributes that are essential to perform certain functions and which are critical to succeed in specific roles. They are what are expected of an individual in areas and levels of performance. A competency framework defines the knowledge, skills, and attributes needed by the people working in an organisation or particular profession. In context of this discussion note, the competency focus is more on being able to envision and conceptualize a specific opportunity for improvement (in efficiency, effectiveness and/or service levels); frame that into a change initiative, and then successfully implement. The first level of competency framework may focus on the e-Governance project-based initiatives, not the general environment that has to be addressed through broader measures including recruitment, general orientation, awareness building and specific “front line” training when implementing a new ICT-based application.

An effective competency-based professional development includes the following components:

1. Adoption of a common set of competency standards defined by employee role in e-Governance project life cycle.
2. Employees identifying areas where they need competency improvement.
3. A rich and varied set of aligned resources are provided to the employees to fill those competency gaps which could include class room training, e-learning, workshops, coaching, mentoring, or peer learning.
4. Peer support or mentoring is offered to help employees carry forward the training learning to the field.
5. Improved employee competencies are verified through assessments, or observation.
6. Employee competency development is refined in a continuous improvement cycle.

The competency matrix can be blended across two dimensions as illustrated in the figure 1 and figure 2 below.

![Figure 1: e-Governance project life cycle](image1)

1. Hierarchy based government structures at the central and state government levels who shall be involved in various phases of e-Governance project life cycle.

![Figure 2: Government Hierarchy and structures](image2)

The competency-based professional development matrix derived out of the above two dimensions can thereby becomes the backbone for identifying and developing subsequent training programmes. The difference is that employees build their competencies when and where needed, so there is no need to study or learn what they already know. Emphasis is on application, performance and understanding, not
simply on the recall of knowledge. The said competency framework/matrix should also be able to act as an important instrument to support the government for assessing the competency level of the external resources to be deployed from external sources during the various phases of the e-Governance project. The author suggests a 5 Level Competency Model and new Competency framework that connects to the e-Governance eco-system.

As one moves from 0 level to level 4, the authority and maturity increases and according the role in the e-Governance project life cycle improves. The competency levels can be described as basic, capable, accomplishment, and authoritative. The descriptors for the same levels are illustrated below:

**Level 1 – Basic:**
- Has a basic knowledge, with a simple understanding of terminology and concepts.
- Has some experience of Practical application.
- Would be able to carry out standard activities, under guidance and supervision.

**Level 2 – Capable:**
- Has the knowledge and experience essential to carry out standard activities unsupervised confidently and consistently.
- Is likely to need to seek advice before carrying out complex or non-standard activities.

**Level 3 – Accomplishment:**
- Has the knowledge and experience of this topic to carry out complex, specialist or non-standard activities confidently and consistently.
- Is aware of alternative options and approaches.
- Can provide guidance, instruction and advice to others on this topic.

**Level 4 – Authoritative:**
- Is widely recognised as an authority, both by others within the organisation and/or by external peers for the knowledge and experience they demonstrate on the topic.

The recommended e-Governance Competency & Training Framework is an attempt to focus on defining the core competencies, sub-competencies and thereby the learning objectives under each sub-competency. These can be achieved various blended training delivery models. The sustainability has to be developed by developing the policy and guidelines for implementation of the framework. Such initia-
tives require a strong institutional structure who not only governs the framework compliance, but also the on-going improvements in the competencies.

Some of the Competency Framework studied are listed below:

1) UK Civil Service Human Services Civil Service Competency Framework 2012 – 2017. The competency framework sets out how we want people in the Civil Service to work. It aligns to the three high level leadership behaviours that every civil servant needs to model: Set Direction; Engage People and Deliver Results. The framework outlines 10 competencies, which are grouped into 3 clusters as set out above introduced in all departments in April 2012.

Under this framework 10 core competencies have been defined:

i. Seeing the Big Picture  
ii. Changing and Improving  
iii. Making Effective Decisions  
iv. Leading and Communicating  
v. Collaborating and Partnering  
vi. Building Capability for All  
vii. Achieving Commercial Outcomes  
viii. Delivering Value for Money  
ix. Managing a Quality Service  
x. Delivering at Pace  

The sub-competencies under each of these core competencies have been defined. As an illustration for the first competency, Seeing the Big Picture, the sub-competency as defined for the director general and director include:

a) Develop an in-depth insight into the dynam ics and issues surrounding the Department and Government, including political, eco nomic, social, environmental and technologi cal impacts.  
b) Clarify and shape the Department’s role and purpose in delivering Civil Service priorities for the public and economic good  
c) Focus on own immediate area of concern and not see interconnections across Civil Service  
d) Articulate the Department’s business model and help people see their role within it  
e) Create clear long-term strategies focused on adding value to the citizen and making real, lasting change beyond the Civil Service.

2) Another interesting framework is the ICT competency framework for teachers recommended by UNESCO. This Framework is arranged in three different approaches to teaching (three successive stages of a teacher’s development). The first is Technology Literacy, enabling students to use ICT in order to learn more efficiently. The second is Knowledge Deepening, enabling students to acquire in-depth knowledge of their school subjects and apply it to complex, real-world problems. The third is Knowledge Creation, enabling students, citizens and the workforce they become, to create the new knowledge required for more harmonious, fulfilling and prosperous societies.

3) As part of a research project, the European Union defined a COMPetency Assessment & Training for the Uptake of eGovernment Services by Public Authorities.

The author developed a e-Governance Competency & Training Framework (eGovCTF), especially in context to the Indian scenario. The same is illustrated in Figure 4.

![Figure 4: e-Governance Competency & Training Framework - eGovCTF](image)

Some of the guiding principles for the e-Governance Competency & Training Framework (eGovCTF) are listed below:
1. Adoption of a common set of competency standards defined by government structures and employee role in e-Governance project life cycle.

2. Employees assessing themselves and identifying areas where they need competency improvement and training.

3. A rich and varied set of aligned resources are provided to the employees to fill those competency gaps which could include classroom training, e-learning, virtual classroom, webinars, workshops, mentoring, or peer learning.

4. Re-usability of training content from Government and private institutions, Industry.

5. Improved employee competencies are verified through assessments, or observation.

6. Employee competency development is refined in a continuous improvement cycle.
A Conceptual Framework for Interoperable e-Government System in India

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Abstract — Worldwide Governments are taking efforts for their interoperable e-Government system to provide single window service to its stakeholders. These e-Governance initiatives are similar, but in India it will be more complex than in the developed countries due to the multi-tire administrative structure, diversity of culture, and different process management methods in various governmental departments. Government of India has taken several initiatives to leverage e-Governance in the country with high importance given to citizen-centric service delivery. The interoperation among administrative structure of a country complies one stop service delivery. The e-Government interoperability fulfills this interoperation. The e-Government is an IT platform for people to consume public services. The application of Service Oriented Architecture within an Enterprise Architecture paradigm in the e-Govt system is a solution to bridges the business and IT resources. In view of this, this paper proposed a conceptual framework for interoperable e-Govt system in India. This is helpful to arrive at a mature e-Govt system in India that is expected in near future.

Keywords- e-Governance; e-Government Interoperability; Service Oriented Government Enterprise Architecture Framework; e-Government Interoperability in India

1. Introduction

Traditional governments started using modern Information and Communications Technology (ICT) in their governance process, resulted the electronic government (e-Govt)1 and the electronic governance or e-Governance (e-G)2 [6][13]. It aims to provide effective and efficient services to its stakeholders in a single window. It is evolving through different maturity stages, from disseminating the digitized information to integrate these information silos [14]. The final stages of e-Govt require an interoperation in the governmental departments and are apparent with the e-Govt Interoperability (e-GI)3 [9][15]. The e-GI is the ability of diverse e-Govt systems to work together [9]. This can be achieved through two methodological tools Government Interoperability Framework (GIF)4 and National Enterprise Architecture (NEA)5 or Government Enterprise Architecture (GEA)6 [9][15][22].

The developing Nation like India with diversity of people, demography, cultural backgrounds, and income has a very complex administrative structure with departments or government agencies at central, state and local level. Accordingly, e-G is a complex process and the distance from e-Govt to interoperable government is too long and more complex [24]. There are many e-G initiatives in India, but they are islands of attempts at different administrative levels resulted with multiple systems with duplication of data and efforts [26][31]. The ICT department of India view that Enterprise Architecture (EA) is a solution to integrate these information silos [11][33]. In view of this, India step forward with various triumphs in the e-GI arena as a part of their National e-Governance Plan (NeGP)7 [10], still more efforts are needed to place an EA. It requires a strong policy changes and mindsets of administrative people in different levels of government structures.

EA deals with the infrastructure and business components of an enterprise and doesn’t do much on business functionality or services within an enterprise system [32][17]. The Service Oriented Architecture (SOA)8 has the ability to interoperate with other system components within a single and cross ownership boundaries [2]. Consequently, the application of SOA technology in EA paradigm executes an interoperable e-Govt system [17]. This paper presents a conceptual framework for interoperable e-Govt system using the EA and SOA paradigm in the existing Indian scenario. This framework leads to a Service Oriented Government Enterprise Architecture (SOGEA)9.

The paper is organized as follows. The second section briefly explains the GEA Framework and subsequently the related works. Then the proposed framework for interoperable e-Govt system in India is presented. This section explains the main components of the framework in detail, the SOGEA within this interoperable framework. Paper concludes with the potentials and pitfalls of the proposed system and a conclusion of this work.

1 e-Govt - e-Government
2 e-G - e-Governance
3 e-GI - e-Govt Interoperability
4 GIF - Government Interoperability Framework
5 NEA - National Enterprise Architecture
6 GEA - Government Enterprise Architecture
7 EA - Enterprise Architecture
8 NeGP - National e-Governance Plan
9 SOA - Service Oriented Architecture
10 SOGEA - Service Oriented Government Enterprise Architecture
II. The e-Government Interoperability

The e-GI is the ability and agreement between the fragmented administrative reforms of government system to communicate each other. Guijarro defined the e-GI as the “ability of two or more diverse e-Government systems or components to meaningfully and seamlessly exchange information and use the information that has been exchanged” [15]. This leads to the interoperation across e-Govt system, thus seamless information flow across government is possible. The e-GI is not a single step process, it is evolved in a numerous incremental activities span over time and a noteworthy infrastructure of people, process, technology and knowledge required being in place [8]. It can be accomplished through the methodological tools GIF and NEA [9][15]. The GIF is a catalogue of standards and guidelines that should be adopted by different e-Govt agencies for the interoperation. NEA is a national wide architecture, consists of a comprehensive description of key elements and its relationships of Govt enterprise [9], [18].

i. The e-Government Interoperability in India

GoI started its e-G implementation in 1999 with important policy initiatives and go ahead with the introduction of national strategy as the NeGP in 2006 [25]. NeGP stipulated a model for e-G initiatives with the evolutionary stages like Information, Communication, Transaction, and Transformation [4]. India has crossed the first two stages i.e., almost all the government departments/ ministries have hosted their websites and the stakeholders can collect information, contact officials and can communicate to the Govt through these windows [19][29]. Currently India is on the verge of the third stage and planning for the final stage transformation or integration [11]. In the third stage the scattered systems at different levels (vertical) of Govt have to be integrated i.e., an inter-and-intra-departmental transaction have to be taken place in the transformation stage, different functions in services (horizontal) of isolated e-Govt systems have to be integrated [20][27]. The final stages demand a seamless information exchange across governmental departments and thus require the e-GI.

There are several initiatives by different e-Govt agencies in the central, state and grass-root level and many of them providing excellent services to their stakeholders [7][26][29]. To share these islands of excellence across the country, e-GI is required. e-Govt agencies are developing their own software systems to provide better services to their stakeholders, without knowing other department’s systems and also without considering the integration. As a result multiple applications are generated and the duplication of data and efforts increases the cost and complexity [23][31][33]. The solution is the reusability of the software components in the e-G applications of different e-Govt agencies. It is possible only through e-GI.

GoI step forward with various initiatives in the e-GI arena as a part of NeGP. India envisages a set of core policies and infrastructure facilities to provide an integrated service delivery [11]. As a result there are numerous ventures as follows. India developed a national web portal called NeiPortal; India Development Gateway (InDG) and the state portals [27]. Set a national e-GIF called Interoperability Framework for e-Governance (IFEG)11 in India, which is a catalogue of standards, policies, specifications and guidelines for governing the information flow across various Govt sector agencies. Set various policies and standards like, national policy on open standards; standards for technical areas and non-technical areas 0. India implemented Common Support Infrastructure such as State Data Centers (SDC), State Wide Area Network (SWAN) and Common Service Centers (CSCs) [10] and then set up the Gateways for connecting e-Govt services on multiple technologies/ platforms under different administrative domains. Such gateway are National e-Governance Service Delivery Gateway (NSDG)12, State e-Governance Service Delivery Gateways (SSDG)13; and Department/ Ministry/ Domain specific Gateways (DSDG)14[35].

Standardization is a valid entry point into the EA journey for many countries [21]. GOI envisages NEA as a tool for e-GI [11]. India also starts its journey to EA by setting the interoperability standards through its IFEG. Thus execution of EA paradigm is possible in India with the existing amenities which are mentioned above. But a strong policy changes and mindsets of administrative people in different levels of governmental structure is urgently needed. A comprehensive framework for e-GI in India is adequate in this context. Thus, in this paper we propose a conceptual framework for the interoperable e-Govt system.

III. The Government Enterprise Architecture Framework

An Enterprise is a cross-organizational entity that supports a defined business goal. The interdependent entities like people, process, and technology are work together and share information for a common mission [8]. The structural design of an enterprise is called Enterprise Architecture. It comprises the enterprise components or business components with its properties and relationship [21]. EA has been evolving since the early 1990s [24] and it is a tool for integration, interoperability, and standardization issues [3][22]. There are many perspectives and views on single enterprise architecture and this leads to individual domain-specific holistic description called layers such as Business Architecture, Application Architecture, Data Architecture and Technical Architecture [21][3][8]. Architects use any appropriate framework to design an enterprise. An Enterprise Architecture Framework (EAF) is a means for structuring and classifying information of an enterprise in the form of

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11 IFEG - Interoperability Framework for e-Governance
12 NSDG - National e-Governance Service Delivery Gateway
13 SSDG - State e-Governance Service Delivery Gateways
14 DSDG - Department/ Ministry/ Domain specific Gateways
architecture models and views [8][7]. The framework does not contain the EA itself, EA is distinct from EAF [16]. Many organizations can use the same EAF, but each EA with its content is organization-specific [8][21].

A government can be considered as a multifaceted IT oriented enterprise [22][24]. The framework for e-Govt means that the logical structure of the e-Govt system and is called GEAF [22]. A proper EAF can be used for the e-Govt to fit all the elements together and work well with minimal investment. Department Of Defense Architecture Framework (DODAF), The Open Group Architectural Framework (TOGAF), Federal Enterprise Architecture Framework (FEAF) etc. [16][17][24] are the frameworks developed for e-Govt system in different countries. The GEAF includes all the elements of a Govt enterprise like strategic plans, business processes, resources, systems, infrastructure, architectural domains, principles and guidelines for the inter-operations etc. It facilitates Govts and departments to provide citizen-centered service delivery [21][24].

IV. Related Work

Globally there have been several attempts to analyze applicability of EA and SOA to the e-Govt system in recent years. We considered such a literature which highlighted the Indian context. Some of them analyzed the existing EA concepts and methodologies and proposed a framework for the e-G in India [24][3]. EA mainly focuses on defining business components, addressing integration patterns, and deals with infrastructure including servers, databases etc., of an enterprise [21]. It doesn’t do much on business services [16]. Hence, EA alone is not enough for a multifaceted service-centric system like e-Govt.

Some literature propose SOA instead of EA for the e-Govt [7][12]. SOA is not concerned with the development of business architecture in an enterprise. Instead, it uses the outcome of business processes and other business architecture artifacts as input to identify business services. IBM proposes the concurrent use of comparable technologies EA and SOA in an administrative system. From their practical experience, they concluded that this resulted overlapping of architecture domains but tricky use of this is most beneficial [17]. We highlighted this opening in our proposed framework.

V. Proposed Framework for Interoperable e-Government System in India

i. Background

The administrative structure of India is far different from other countries. It is more complex with multi-tier constitution of departments or Govt agencies at central, state and local level [25]. Even though, GoI wholeheartedly tried for a hi-tech Govt system in a step-by-step manner. GoI envisages EA paradigm is a tool for the e-GI to deliver integrated e-G services through a single window [11][33]. EA mainly focuses on defining business components, addressing integration patterns, and dealing with infrastructure. It doesn’t do much on business services. Hence, EA alone is not enough for a multifaceted service-centric system with multilevel Govt agencies under distinct ownership like e-Govt [18]. SOA is not concerned with the development of business architecture in an enterprise. Instead, it uses the outcome of business processes and other business architecture artifacts as input to identify business services [17][30]. SOA has the potential for organizing and utilizing distributed business functionality that may be under the control of different ownership domains [2][1]. SOA technology is required for the service management within e-Govt enterprise structure [32]. So that EA based e-Govt system can make use of SOA as a sub domain to exchange value between independently acting participants.

ii. The Proposed Framework

The proposed framework is a GEAF for India, intended for interoperable e-Govt system in India to deliver integrated services to its stakeholders. This conceptual framework includes all the elements of a Govt enterprise. This elucidates the cross-organizational interdependent entities and their relationship of an IT oriented, service-centric Govt enterprise system. The components of GEAF work together and share information for a common mission and a defined business scope [28]. The entities of e-Govt system operate together towards the delivery of services to its stakeholders [18]. This addresses the interaction between service consumers and service providers in different administrative level to deliver efficient and effective governmental services to its citizenry.

The proposed framework exhibits in figure 2. It makes use of SOA as a sub domain in an EA based e-Govt system. The kernel of this framework is a SOA based portal which is a platform for all the stakeholders to interact with logically diverged e-Govt agencies across the country.

![Diagram of Proposed Framework](Image)

**Figure 1. Framework for Interoperable e-Govt in India**
The Components

The main components of the proposed framework are:

- Stakeholders
- Service providers
- Architectural domains
- National Portal
- Service Delivery Gateways

1) The stakeholders: The main stakeholders of e-G system in India are citizen, business, employees and governments. Thus the main functions of e-Govt are the communication between government and these stakeholders i.e. G2C, G2B, G2E and G2G [4][11]. The communication channel is internet and they can requests the services through a common platform, a national portal, as the web-based services. The stakeholders are the service consumers.

2) Service providers: The entire government agencies under centre, state and local administrative body in the country are the service providers in this GEAF [33]. The Govt agencies provide the services by the request of stakeholders through the national portal.

3) Architectural Domains: GEAF generally consists of individual architectural domains like Business Process Architecture, Services Architecture, Data and Information Architecture, and Technology Architecture [3][17][21]. Business Process Architecture concerns about listing various operational procedures of services, enable communication across departments, defines cross-agency services, and standardizing the processes for interoperability and reuse. Services Architecture concerns about defining set of services, their relationship and dependencies and the processes to be followed for each services offered by the different Govt agencies. It also defines the application architecture of each service for different tiers as modules. Data and Information Architecture concerns enlisting all the data elements associated with services, the data and metadata associated with this and also the standards based open data systems facilitate integration and interoperability. Technology Architecture defines the software and hardware technology platforms based on standards for flexibility, interoperability, security, and modularity and also describes how technology is supporting the delivery of service components and relevant standards for implementing the technology. The architectural domains can be the reference models over the periods [3][12][17][32].

4) National Portal: A SOA based national portal is an easy means for availing government services [7][27][32]. This portal is the logical front-end of the overall GEAF and act as the mediator between the service consumers as stakeholders and service providers as e-Govt agencies [27]. SOA based portal help to provide integrated Govt services by quickly combine, build and deploy new services across different departments. This provides a platform for plug-in reusable components which are defined and published as service repositories [32].

India developed a national portal (e-India portal) is currently a router to other websites [10][11]. This is static in nature so that they do not allow online transactions. But the proposed portal provides a single window online access to the information and services of e-Govt agencies, at different levels in a multi-lingual form. It is expected to become central repository over 5000 government websites of various categories of content namely forms, acts, rules, services, schemes and documents. Currently, the National Portal Coordinators (NPCs) are nominated from each of the State to contribute the contents [11][10]. The e-India portal can be uplifted to online portal in the matured e-Govt system.

5) Service Delivery Gateway: The heart of GEAF is a Government Service Bus (GSB) [3][12][32], which is a platform for standard based information flow between different Govt agencies in the country. It should have the ambience for a multi-platform backbone of the government portal and facilitate the interfaces for messaging, communication, and security of the portal. The foundation for a GSB is a services gateway and acts as a service broker between service consumers and providers [32]. It provides access to all known services of various administrative departments through the national portal. Thus a gateway helps to provide single window access for a consumer who wants to invoke the services from any of the providers.

Gol initiated e-G service delivery gateways to accomplish a standard based interoperability among heterogeneous entities in the centre, state or local bodies of the e-Govt [10][11]. It acts as messaging middleware and intelligent hub and can provides seamless interoperability by exchanging data and information between e-G application silos. It routes service requests from stakeholders to the service providers and return services back to the stakeholders as web services. NSDG acting as a nerve centre for multiple service providers at the centre, state, and local governments, i.e. all e-G gateways in the country working together as a single network under this central gateway. SSDG provides standards-based message switching, seamless interoperability and exchange of data across independent and diverse entities of the states. DSDG facilitate the interoperability within a local administrative body [35].
functions [2]. So that services combine business functionality with implementation, including the artifacts needed and made available as IT resources [1]. The e-Gov system is a space in which people, processes and machines act together to deliver the capabilities in the form of services for particular needs. As a result the SOGE is an abstract realization of the elements and their relationships needed to enable SOA-based e-Gov system that is shown in Figure 3.

This architecture is a solution to bridges the area between business, and IT resources with its artifacts which are distributed across ownership boundaries in the e-Gov system. So as to addresses the interaction between people and distributed systems using electronic means. The stakeholders are the persons as a citizen, employee, entrepreneur or Govt official. They consumes services directly and initiating the interactions. There are several human, automated or semi-automated agents support a service consumer. Consumer Layer in the SOGEA acts as an interface of these agents. Geographically distributed Govt departments under diverse ownership boundaries are the service providers.

Service is delivered through the identification, design, implementation or organization, and utilization of service components. The central, state and local administrative level e-G services contain many common or public processes. Currently these are duplicated in multiple applications. In the proposed system, these generic processes could reuse with the help of central service registry. Service mediator invokes and uses other services in order to fulfill the needs. It might use a service registry to identify possible services. The Service Integration Layer in the framework aims the mechanism for service management. The enterprise includes the workflow management system for sequencing activities of business functionalities. The Business Service Layer in the SOGE system fulfills this.

v. Potentials and Pitfalls of the Framework

This framework act as a platform for connected government and it leads to citizen-centricity and service-centricity. By this Gov can align its IT resources to its strategic plan for enabling citizen services. This results reduced costs and complexity and also enabling business flexibility and process optimization. This framework helps to integrate present e-G applications developed by distributed administrative domains across centre, state, and local governments. The repetition of the same processes in these applications causes the duplication of data and efforts, and it can be avoided by a central repository of reusable components in the SOA based portal. The portal based service delivery reduces service life cycle delivery time i.e. the stakeholders can avail the services from their homes or offices at any time. This leads to avoiding awkwardness of waiting in a long queue in front of the government offices.

Many developing countries successfully implement the Enterprise Architecture paradigm in their e-Gov system. In India it is not an easy task because of many reasons including the lack of documentation in existing system and segregation of responsibility into different levels of federal government [24]. The interoperability in the e-Gov system can be attained by the adoption of EA concept, even if, the service-centric enterprise like Govt entail a SOA technology for their service management. There are many challenges while using SOA in Indian context [23]. The initial cost for implementing SOA in large scale is very huge [7] and metadata management is very complex. Adopting a new paradigm gets a lot of resistance from the respective departments because they already running successful applications and have loathe in the supremacy of centre over the states in terms of decision making. Even though, India can diligently step forward for a connected e-Gov system by a strong vision and policy changes in the country.

VI. Conclusion

India has a very complex administrative structure with diversity of people, demography, cultural backgrounds, and income, with departments or government agencies at central, state and local level. There are many e-G initiatives in India, but they are islands of attempts at different administrative levels. The e-GI is a need to integrate these information silos to get a single access point for e-G services. India advances with many e-G initiatives and envisages integrated service delivery. Govt lay down foundation for interoperable e-Gov system with a set of core policies and infrastructure facilities. At this context we proposed a comprehensive conceptual framework for the interoperation between governmental agencies across the country. The proposed framework highlights the concurrent use of EA and SOA in the e-Gov system to achieve interoperability and avoid duplication of efforts. This framework helps to reach the transformation stage. A mature e-Gov cannot be achieved in a single steps, it will take years of effort. India expected this by 2020.
Globally organizations are embracing a service-oriented culture within the enterprise paradigm for delivering quality services. The future work will be based on this for delivering integrated e-G services by combining the reusable service components.

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Websites


ABSTRACT

An Entrepreneur Memorandum (EM) is to be filed with the District Industries Center (DIC), by a Micro, Small or Medium enterprise, as the case may be, under sub-section (1) of section 8 of the MSMED Act, 2006. Currently, EMs are filed physically at the DICs by entrepreneurs in Odisha. Several challenges have been identified with respect to the manual process followed at DICs for issuance of EM-I acknowledgement. Separate files are maintained for both EM-I and EM-II applications of a single enterprise. This leads to inability in tracking implementation of intent of investments; i.e. conversion of EM Part – I to EM Part – II. The DICs do not adhere to fixed time scales for issuing the EM-I acknowledgement and it is not possible for the investor to track the status of the EM-I application. The entrepreneurs need to visit the DICs physically to submit the EM-I application and many of them do not look forward to dealing directly with DICs as they are not perceived to be very investor-friendly. MSME Department, Government of Odisha intends to have the provision for online filing of EM-I form by an applicant with the aim of achieving of following objectives.

- Encourage higher rates of EM-I registration to enable more MSMEs to become organized and eligible for benefits under various Government schemes
- Make the process of filing of EM-I form easier for the applicant through anytime-anywhere registration
- Real-time status tracking to make it more transparent for the applicant
- Track the conversion of EM-I to EM-II

Index Terms – DIC, EM-I, EM-II, MSME.

INTRODUCTION

MSMEs are integral to the growth of the Indian economy. To spurt their growth and development the MSMED Act was introduced in 2006. Several states in the country have taken initiatives as well to promote MSMEs. In the State of Odisha, there are provisions for attractive incentives governed by clear policies. Owing to the recognized importance of the MSME sector in the State’s economy, it has witnessed an average investment growth of 10% in the last six years.

A detailed study was carried out on business process reengineering of MSME and DICs. The objective of this exercise was to understand the current processes followed by MSME and DICs to support the MSME development. NIC evaluated the efficacy of the key activities and processes with a view to recommend process improvement, eliminate redundant activities and rationalize the manpower needs of MSME and DICs. “Encouraging online filing of EM and automation of EM filing system” is one of the key improvement areas highlighted in the report.

After submission of “Business Process Reengineering and Manpower Planning for DICs/RICs and Directorate of Industries” report to MSME Department and subsequent discussions with the officials of MSME Department, Directorate of Industries, NIC prepared a Business Requirement Specification Document. Based on this document Software Requirement Specification, design and develop the Software application for online registration of EM-I was carried out.

CONSTITUENTS OF ONLINE EM-I AND EM-II

- User Registration: Entrepreneur who desires to apply EM-I has to visit http://msmeodisha.gov.in and Register him/herself. During registration an identity proof is asked i.e Voter Id / Passport / PAN Card etc. A user id will be created along with an initial password. This has a provision of sending the same to
the mail and through SMS.

- **Help Desk**: A help desk has been established to help the entrepreneur for asking any queries to GM,DIC / NIC or Directorate. The query if not relevant to the concerned officials they can forward to the competent authority. Selected queries can be posted as FAQ by the directorate.

- **Management of Govt and Local Holidays**: A module is made available for the DIC/directorate to capture the government holidays and local holidays so that during approval of EM-I it checks for the same.

- **Managing the Role**: Role is also defined for the users so when one officer proceeds on leave he delegates the role to other official so they can use the system for approving EM-I.

- **Role of the DSC**: DSC have been issued to all the 31 DIC officials, so for approving any EM-I system checks for the DSC and if it matches then GM,DIC can approve the same.

- **EM-I Filing**: The user has to fill up the form ONLINE which is of four pages and also he has to upload the relevant documents i.e partnership affidavit, Signature of applicant etc. Once he fills up the application the entrepreneur is able to take a final printout of the application and a reference number is generated.

- **Approval of EM-I**: The module is meant for GM,DIC (31 DICs for Odisha) where they can login and a dashboard is available. They can visit the applications submitted and check for the relevant documents (documents are appropriate or not). If any of the documents found to be incorrect then they can send it back to the Entrepreneur. EM-I can be approved through system by GM,DIC or else system generates approval after 1 day.

- **EM-II Filing**: The Entrepreneur can file the EM-II through the portal http://memeodisha.gov.in and to facilitate the entrepreneur user manual and ONLINE tips are available.

- **Verification of Documents**: The documents uploaded by the entrepreneur is verified by the DIC / RIC using their credentials. Entrepreneur usually has to submit the Documents supporting the Type of Organization, Electricity Bill, Raw material bill, First Sale Bill, Identity Proof. Once the same is verified then the officer has to fix the date of inspection.

- **Status Tracking**: The entrepreneur can check the status of the EM-I or EM-II which he had submitted and can know whether it has been verified or pending due to non-availability of the documents.

- **Inspection of Industry**: Once the document is found to be in order the GM,DIC / RIC fixes a date for inspection which is intimated through the application. After inspection the Inspecting Officer comes back and submits the inspection report ONLINE and depending on the same EM-II is issued.

- **Issuance of EM-I and EM-II**: The entrepreneur can download the EM-I and II from the portal once the activity is completed.
PROCESS FLOW
The Process of Filing of EM-I and EM-II has been represented diagrammatically below.

EM-I

The applicant who intends to file the EM-I form, has to submit the filled up EM-I form physically at the concerned DIC office. In case of micro and small enterprises 3 copies of the memorandum is to be filed, whereas in case of medium enterprises 4 copies of memorandum should be filed. The EM-I is basically intend at the expression of interest to setup a micro / small / medium enterprise in Odisha. So this is basically at the conceptual level. When the entrepreneur setup the organization he is also interested in availing subsidy and it was practically full of

- Program Management
  - Planning: MSME, Odisha decided to go for ONLINE of EM-I and EM-II. In order to achieve that, a meeting was organized to understand the requirement and how to achieve the goals in stipulated time period. After discussion as the existing procedure does not talk about the transparency and the process adopted is different places it will be wiser to engage a consultant to study the system as is process and place it for Re-engineering the same. For the same Govt of Odisha hired Earnest and Young for the job.
  
  - Risk Management: Initially in order to outline the process existing a lot of discussions took place. The As is process was shared and presented to all the GM, DICs and their opinion was recorded. Several VCs were conducted to understand the process adopted at DICs and how to overcome the differences and adopt an uniform procedure. The IPR 2007 was taken as the base document. After convincing through the VC a conclusion was drawn regarding the procedure to be followed at state level. Lots of thought were given regarding how all the stakeholders will interact with the portal in order to achieve the goal. The entrepreneurs should be able to track their applications and also the motive is to encourage the entrepreneurs for filing.

EM-II

- Stakeholder Management: There are different stakeholders viz. Entrepreneurs, MS MEDI, Directorate of Industries, GM (DIC / RIC).

- Performance Management: It was decided that 1 day time will be given for approval of EM – I else automatic approval will be adopted and EM-I will be issued. And for
EM-II, 15 days were allowed as inspection has to be completed within that.

- **Organization change management**: The changes in the entire process was well informed to the stake holders through the VC and conducting awareness campaign. The top were also informed by involving them in the process.

- **Communication Management and Governance**: The top management was well informed to the stakeholders through the VC and conducting awareness campaign. The top were also informed by involving them in the process.

- **Process Reengineering**: Earlier, the entrepreneur had to run to the DIC office to collect the EM-I form and submit at DIC office. This process was changed to ONLINE mode where the form can be filled up by the entrepreneur. The GM, DIC has to verify the documents and approve, reject or keep in hold ONLINE. In the case GM, DIC does not go through the ONLINE mode or does not verify it then the EM-I is automatically generated within 24 hours.

- **Training and Capacity Building**: Training is the important aspect of any project. So the following was arranged for the stakeholders.
  - 9 No of Workshops at Balasore, Bhubaneswar, Sonepur, Sambalpur, Rourkela, Dhenkanal, Cuttack, Ganjam and Koraput has been conducted to create awareness among Entrepreneurs GM, DIC and NIC Officials about ONLINE application.
  - 2 No of Workshops were conducted for GM (DIC / RIC)
  - 5 No of VC has been conducted to give training to DIC officers.

- **Operation and Maintenance**: The Application has been developed in such a way that it can be used by other states without any problem and security aspect has also been taken care of through DSC.

**CHALLENGES FACED**

The following challenges were faced by NIC team during the designing and implementation of the eGovernance initiatives at DIC / RIC:

- **Change Management and Mindset**: The biggest challenge in the entire endeavour was to change the mindset of the officers and of officials of various DIC / RIC. There was severe resistance in the beginning from the staff.

- **Standardisation of documents and Process Re-engineering**: The process re-engineering was another big challenge due to the manual processes and various formats in various activities.

- **Developing a generic model to cater to the varied processes across DIC / RIC**

- **E-Readiness Assessment of stakeholders**

- **Resistance to change from Stakeholders** as Entrepreneur usually donot file it. Instead, the consultant use to file EM-I and EM-II

- **Project sustenance & Ownership**

- **Government Process Reforms & Issue of Govt. Orders**

**SERVICE DELIVERY**

As the entire process is ONLINE the service delivery mechanism has been thought of prior to implement the application. Any project bound to fail in case the service delivery mechanism has not been thought off. Here, as this is web enabled application any entrepreneur can access the application from any internet point and also the same can be accessed from any CSC which are 6000 in numbers in Odisha. This will also create a business opportunity for the
CSC owners. There are consultants who are primarily engaged for filing the application on behalf of the entrepreneur. It also has been proposed to open one counter at each DIC / RIC which will facilitate the ONLINE filing process.

BEST PRACTICES FOLLOWED

A few best practices methods have been followed for the successful design, development and implementation of the project which are listed below

- **Business Requirement Specification**: The BRS was prepared and shared the ideas with all the stake holders.

- **Advertisement**: Advertisement in the media was given indicating the date from which the manual application has been closed and the ONLINE will be accepted.

- **User Manual**: User Manual was prepared and placed on the portal to act as a helping instrument.

- **Brochure**: Brochure was prepared and distributed to different stake holders.

- **Awareness Campaign**: 9 awareness campaigns were organized at 9 different parts of Odisha where all the stake holders were invited to share their views to improvise the system and understand the process adopted.

- **Feedback from Workshop**: Different views of the stake holders were recorded and discussed in the core committee and they were implemented. The same was also communicated to the stake holders.

ROAD MAP

The objective of the whole process is to simplify the process of filing of EM-I and convert them to EM-II. And after the successful implementation of ONLINE of EM-I and EM-II the next step is to bring the following value addition to the project.

- **Subsidy ONLINE**: To simplify the process for applying for subsidy ONLINE in order to facilitate the entrepreneurs availing the same.

- **e-Market**: Looking at today's trend NIC has proposed to create a digital market for EM-II product and services. NIC, Odisha and MSME are coming together to launch a e-Market Space for them. This will be the place where the Entrepreneurs and the consumers can meet and the demand and supply can be taken care of. The Portal will be used for placing direct orders with the entrepreneurs and the entrepreneurs will dispatch the products / services as per the requirement. This will encourage the entrepreneurs to file the EM-II more.

CONCLUSION

The ONLINE of EM-I and EM-II has created an impact that EPM has come forward to create the database of their own as EPM Rate contract is allotted only to the EM-II holders. This also guides the no of EM-I converted to EM-II. The DC, MSME has recently shown interest to implement the application in other states. So an action plan for the above is submitted to them.

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Replication of Enviable e-Governance Initiatives: Restrict PPP

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Abstract – The world has witnessed an unprecedented turn around in the field of public administration with the acceptance of New Public Management and introduction of e-governance. On one side relatively new ideas like PPP, user charges, etc. are gaining popularity, on the other side, the importance of ICTs is being increasingly recognised and applied. The most publicly visible way for the ICTs to improve the public sector is through its ability to reduce the time and effort required to comply with the government rules and regulations and acceptance of payments pertaining to the usage of utility services. e-Seva is a popular project of the Government of Andhra Pradesh (GoAP) evolved to realise the goals of Good Governance using e-governance as a tool and PPP as a Model. e-Seva introduced in 1999 is a One-Stop Shop for Government to Citizen (G2C), Government to Business (G2B) and Business to Citizen (B2C) services. From November 2011 onwards, eSeva is being gradually replaced with Mee Seva, with an enlarged scope and upgraded technology.

Hypothesis / Assumption
1. Holistic acceptance of PPP is a hindrance in replication of best practices in e-Governance initiatives.

Research Methodology
The verification of hypothesis is based on secondary data as cited under references/endnotes.

II FROM e-SEVA to MEE SEVA
Richard Heeks who is considered as e-governance Guru (Authority) says that typically e-Government involves a life cycle of five stages. a) project assessment b) analysis of current reality c) design of the new system d) system construction and e) implementation and beyond. e-Seva in this context refers to phase ‘a’ and ‘b’ of the cycle. Mee Seva’s development and construction refers to phase ‘c’ and
Phase 'e' has two components (i) implementation and (ii) beyond. Successful implementation and enviable growth is first component of phase 'e'. Replication of Mee Seva to other states would be the second component of the last phase.

Five parallel developments responsible for the up-gradation of e-Seva into Mee Seva are discussed in the following lines:

1) An average growth rate of just 3.52 per cent was a matter of concern and therefore e-Seva had to offer something more for its survival. Moreover, according to a research study some of the e-Seva Centres in a few districts were not performing well.

2) Though e-Seva succeeded in easing of bill-payments, it was still serving as a post-office, accepting application, sending by post/courier to the concerned office, receiving back and then handing over to the citizens (e.g. Birth Certificate). In many ways the power of ICT (Information and Communication Technologies) was not utilised to the optimum for various government records like land, registration, etc., Citizens had to make many rounds of the government departments in order to get needed documents.

3) Government of Andhra Pradesh has taken up a number of e-governance initiatives which became popular at the National level, Online Scholarship Management System, Arogyasree, etc., to name a few. The National e-Governance Plan (NeGP) takes a holistic view of e-Governance initiatives across the country, integrating them into a collective vision. Andhra Pradesh, to make its initiatives in accordance with NeGP vision, had already put in place Andhra Pradesh State Wide Area Network, AP State Data Centre, e-Seva Centres, AP Online Centres and Common Service Centres. Having done all these, GoAP felt that it was time to knit all this together to harness the benefits for its citizens.

4) Welfare activities of the state grew substantially and there was too much pressure of work on the departments directly or indirectly associated with the administration of the welfare programmes. For example, application for scholarships required an income certificate issued by the Revenue Department resulting in an unmanageable load on the officials concerned.

5) In a democratic set-up the credit of any successful project/scheme goes to the party in power and/or to its leader. In the case of e-Seva the project was always attributed to the then ruling party and its leader (Telugu Desam Party and N. Chandra Babu Naidu). Over the period, the position has changed and the present ruling party and its leader (Indian National Congress (I) and N. Kiran Kumar Reddy) perhaps wanted to have a project more useful and more attractive than e-Seva, the success of which could be attributed to the present ruling party and its leader.

Against this backdrop upgraded version of e-Seva, Mee Seva was launched in November 2011 in Chittoor district of Andhra Pradesh. In order to provide a unique identity, positioning and branding to the project it was decided to name this project as Mee Seva. ‘Mee’ and ‘Seva’ are two different words in Telugu. ‘Mee’ is a respectable way of saying ‘you’ like ‘Aap’ in Hindi and Urdu, ‘Seva’ means service. ‘Mee Seva’ is used here as a compound word to mean ‘at your service’. It may be clarified here that e-Seva centres, with the gradual expansion of Mee Seva are rechristened as Mee Seva Centres. Joint Collectors in the Districts earlier designated as Additional Directors e-Seva have been designated as Additional Directors, Electronic Service Delivery (ESD) in their respective districts. Office of the Director Electronically Deliverable Services (e-Seva) is now known as Director of Electronic Service Delivery (ESD).

III BASIC FEATURES

Under Mee Seva the entire solution right from the collection of application till the issue of final certificates has been made electronic. It is possible to track request at any stage of its life cycle and can be monitored at Mandal, Division or District level. There is no requirement of physical interaction, whatsoever, between the user and the issuing authority. Under this unique initiative various utility documents like birth, caste and income certificates...
are issued in a very less time, which earlier used to take 10 to 15 days.

Mee Seva has adopted the concept of central pooling of all records, digitally signing them with the digital signature certificates of the authorised officer, storing them in the database and making them available when required by using a web-service. Mee Seva optimises the use of the State Data Centre (SDC), State Wide Area Network (SWAN) and Common Service Centres (CSCs). These were treated under the Centre's NeGP initiative.

Mee Seva Centres are maintained, operated and run by Authorised Agents (private partner) who are appointed and managed by Authorised Service Providers (private partner). The user fee model, adopted under the theoretical legitimisation of New Public Management, allows ploughing back the revenues for maintenance, development and upgrading of services. This has helped in not only early recovery of the initial investment but also allows decent returns for all the stake holders. 20 per cent is shared with the respective departments to maintain the databases, necessary infrastructure, and capacity building. Director Electronic Service Delivery gets 15 per cent to maintain Mee Seva infrastructure/application. 10 per cent is shared with Authorised Service Providers for monitoring and infrastructure. The majority share of 55 per cent is shared with Mee Seva Centre which is the cutting edge between the citizen and the government. The sharing of user charges is shown in Figure 1.

IV Integration of Mee Seva with NeGP

The main feature of Mee Seva is its integration with National e-Governance Plan. In this direction Mee Seva utilises the infrastructural facilities already established as mentioned under basic features. It also utilises developments done under e-digitisation such as data digitisation.

Officials are given user credentials to monitor and process the transactions on the portal. Short Message Service (SMS) is used as a gateway for communicating with citizen/applicant after the request is approved. SMS is also used to report the transaction
abstract to state, district, division and mandal level officials on daily basis. Portable Document Format (PDF) is used for the certificates delivered through Mee Seva for storage in the central repository for access and cross verification and making them available when required. The functionality includes single source of digital signature repository and integration with cyber treasury for seamless transfer of transaction fees collected. Mee Seva Functional Architecture is given in Figure 2.

V SERVICES OFFERED and GROWTH

The total number of services offered as on 30th November 2013 are 192 of 19 different departments/organizations. Similarly, the total number of transactions were 822.72 lakhs, from January 2013 onwards. Nature of transactions is shown in the Figure 3.

VI SWOT ANALYSIS

SWOT Analysis is a valuable tool for organisational planning in management science. The acronym, as is well known, stands for Strengths, Weakness, Opportunities and Threats. If the SWOT analysis is used to critically evaluate Mee Seva and explore the possibilities of its replication to other states, the matrix arrived is explained in the following lines.

Strengths
- High mobile phone penetration.
- The Andhra Pradesh Information Technology (EDS) Rules, 2011 are in place.
- Different Organisation offering electronically deliverable services are brought under one umbrella.
- Political and administrative patronage.
- E-readiness in conformity with NeGP.
- Technology is government owned.
Weaknesses

- E-literacy is low
- E-readiness of different states is at different levels.
- Too much dependence on professional operators.
- Some service centres give a sick look due to poor maintenance.
- Enthusiasm on the part of computer operators is wanting due to poor working conditions.

Opportunities

- Large market – Many states do not have Mee Seva like technological architecture.
- Most states are eager to upgrade their respective citizen-centric e-governance projects.
- Central government willing to play supportive role.
- Supports economic prosperity and complements good governance.

Threats

- Private software partners may seek greater involvement.
- Linguistics aspects.
- Expanding corruption.
- General literacy is also low.

VII SUCCESS and REPLICATION

Different organisations in different states have adopted different technological platforms and arrived at their own solutions. According to SARC, many of the initiatives address concerns which are common across states, or across different departments or organisations but solutions have often been developed in isolation with very little commonality or coordination. This has led to duplication of efforts on the one hand and difficulty in networking among organisations on the other. Many of these programmes are vendor driven and not scalable.7

Important reason for this is blindly following the PPP model without visualising the far-reaching consequences. Non-replication of e-Seva, the project which won more than one time country's most prestigious award – “Prime Minister's Award for Excellence in Public Administration” is a typical example to support the argument. This concern has been taken care of in Mee Seva. It has successfully productised the applications.

Mee Seva also fulfils the two requirements which have been identified by the Second Administrative Reforms Commission (SARC) for success of e-governance projects.8

a) Political support from the highest level. In this case the Chief Minister gave top priority to the project and the Secretary IT&C, Department and his dedicated team played a seminal role in the execution.

b) Capacity building of the staff. In the case of Mee Seva the staffs of all the participating departments were given training.

VIII CONCLUSION

Although e-Seva was the most successful citizen-centric e-governance project of the state but it was not replicated to other states. In contrast, after one year of the launching of Mee Seva the state and the Union Government are showing keen interest to replicate the project in other states. This is because e-Seva technology was under PPP and issues related to Intellectual Property Rights come in the picture if the project is to be replicated elsewhere. Mee Seva software is developed and owned by IT&C department of GoAP and the government is therefore free to dedicate it to the nation and has assured to facilitate its replication elsewhere.

The aforementioned explanation strongly suggests to accept the hypothesis, “Holistic acceptance of PPP replication of best practices in e-Governance initiatives”. The substance of the argument is that PPP should not be considered as a panacea for all projects, more particularly those relating to core infrastructure building of citizen-centric area of e-governance. The model has to be used cautiously and that too in the areas where government genuinely lacks the know-how. PPP may be restricted to the delivery points where IT software issues are at the bare minimum.

Lessons

1) Total dependency on the private partners is hindrance in replicating successful e-governance projects as is evident from non-replication of e-Seva

2) Care has to be taken not to involve private partners in the core areas of e-governance by limit-
ing their role to the periphery.

**Choices/Alternatives**

1) It is suggested to have public corporations to administer and promote electronic service delivery at the states and national level. This would facilitate better coordination as the parties concerned will only be one state government and the other state government and/or the central government.

2) To achieve uniformity in technological platforms and administrative systems, these types of initiatives, at least the technological part, may be brought under the purview of National Informatics Centre.

As the structure of government and classification of departments is generally similar, across the country, replication of an initiative becomes feasible, provided there is productisation of applications. In the case of Mee Seva these aspects have been taken care of. Mee Seva has been adopted as a National model for delivering G2C services and the e-district MMP has been accordingly redesigned making it ready for replication all over India. The Department of Electronics and Information Technology, Government of India, has sanctioned grants to Andhra Pradesh to replicate Mee Seva in five states and convert Mee Seva into components to be placed in the national e-Governance application store for wider use. All this has been possible because the role of private partner in Mee Seva has been restricted to the periphery.

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Vision to Reality of Faster Dispensation of Justice through Inter-Operable Criminal Justice System- A Case Study

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Abstract- A number of eGovernance projects, over the years, have been initiated in the Country and many of these have been noticeable success stories. However, most of the eGovernance Projects focus on a specific sector or function of the Government. The Inter-operable Criminal Justice System (iCJS), implemented in the Himalayan State of Himachal Pradesh is one such system, which differs from other eGovernance projects in the sense that it has been built upon three successful National level eGovernance projects namely, Case Information System, Kanoon Vyavastha (improved upon Common Police Integrated Application-CIPA) and ePrisons to realize the vision of preventing crime, helping victims and rehabilitating criminals. This paper gives an overview of the iCJS project, its need, additional functionalities added in Himachal model, and critically analyses the status of implementation of the iCJS in the Himalayan State in the light of the difficult geographical terrain, longer travelling times, Internet connectivity issues and interests of individual stakeholder departments. It also outlines the technical and legal challenges, alternatives and future scope for enhancement in the light of the proposed Nation-wide roll-out of the iCJS within existing legal framework.

Keywords-inter operable, criminal justice system, implementation analysis, court, prison, forensic, police

1. INTRODUCTION

The Inter-operable Criminal Justice System (iCJS) is made up of two important words “inter operable” which means “able to use and exchange information” and “criminal justice” which is a generic term for “the procedure by which criminal conduct is investigated, arrests made, evidence gathered, charges brought, defenses raised, trials conducted, sentences rendered, and punishment carried out” [1]. In Order to ensure fairness in the procedure, different agencies are assigned different functions.

The Criminal Justice System in India comprises of the three important wings of the Police, Judiciary and Correctional Administration. The system followed in our country for dispensation of justice is the adversarial system of common law inherited from the British, in which timely availability of correct and old information plays a very important role in justice dispensation. Under the Constitution of India, Police and Prison are State subjects but the Supreme Court at Central level and High Courts at State level administer the judiciary. Although, Police and Prison are State Subjects, the organisational structure, administration and functioning of all the wings of criminal justice are governed by the Central laws such as Indian Penal Code, Criminal Procedure Code, and Indian Evidence Act [2]. The Courts, Police and Prisons have realized the role and importance of IT tools in automating their internal processes and developed their own software namely, Case Information System (CIS), Common Integrated Police Application (CIPA) / Core Application Software (CAS) of Crime and Criminal Tracking Network & System (CCTNS) and ePrisons. These software have been either implemented or are under implementation in the country. All these software use different technologies for data collection and reporting purposes.

The basic objective of the Inter-operable Criminal Justice System has been faster delivery of justice to the litigants in view of the large number of criminal cases pending in various Courts. The reasons for such delays are numerous, the most common being, besides the lack of resources and manpower constraints, the delayed and in-complete transfer of information from Police to Courts, Forensics to Police, Police to Prison, Court to Prison, Prosecution to Court and vice-versa in all cases. The Police, Forensic Science Laboratories, Prosecution, Courts and Prisons are the major stakeholders in the process of delivery of criminal justice in our country.

![Figure 1: iCJS software at http://admis.hp.nic.in/cjs](image)

We envisage that with the use of proper IT tools for data integration, electronic exchange of information will lead to better investigations, faster and fair disposal of cases throughout the country. The scope of iCJS, for the purpose of this paper, is restricted to the data being collected through various computerised systems, and does not include high-tech specialized equipment or gadgets, which may be at the disposal of the law enforcing agencies.
II. WHY ICJS
The need for an Inter-operable Criminal Justice System was felt in the United States of America after the September 11, 2001 when new emphasis on homeland security was felt and demand increased for information sharing across multiple agencies and the urgency of integrating justice information systems at Central, State and local levels [3]. In India, besides homeland security, another issue of delays in justice delivery processes is the main reason for visualizing the iCJS by linking related information from different domains. Different organisations within the Criminal Justice System have disparate roles and significantly different uses for IT but sharing of certain information with others improves the efficiency of every organisation within the system.

The main problem is the huge backlog of unresolved cases in courts which are more than one year old. This pendency is increasing over the years and resulting in increases in litigation costs, loss or diminished reliability of evidence by the time of trial and unenveness and inconsistency in the verdicts that ultimately are reached at trial. This implies that conviction rates go down and law abiding citizens start losing faith in the criminal justice system [4]. There were a total of 2.68 crore cases pending in the country in various Districts and Subordinate Courts, of which almost 70% (1.88 crore) were criminal cases, as on 30th September 2012. As compared to this, the State of Himachal Pradesh (HP) had a similar situation, with a backlog of 1,30,377 total cases, out of which 62% (79,390) were criminal cases. Himachal Pradesh was having a comparatively better than the national average. Against the nation-wide figures [5], Hence, the need for iCJS.

A related issue is that this delay in disposal of cases results in large number of under-trials being lodged in the prisons for very long periods. Many times, they remain in prison for a period longer than the maximum term permissible under the section applicable on the crime committed, if convicted in the trial. These under-trials, who are 64.7% of total prisoners as on 31st December 2011, are crowding the prisons, which are already 112% full to their capacity at the national level [4].

The status of prisoners in Himachal Pradesh is comparatively better than the national average. Against the total capacity of 1626 inmates in 14 prisons, there were 1617 prisoners (99%) lodged in prisons. Also, the number of under-trials was 717 (44%), which is considerably lower than the national figure [6]. However, the crime statistics show that a total of 15,937 crimes were registered in various police stations of HP in the year 2012 [7]. Comparing this figure with the total pending criminal cases in the State (79,390), it implies that the disposal rate is low because the higher figure of cases in courts means back-log pending cases older than one year. The less number of prisoners in jails could also be as a result of lower conviction rates due to delayed disposal of cases.

In view of the above statistics, we deduce that the iCJS system for speedier justice, using IT for integration of existing databases, is urgently required even in a small hilly State like Himachal Pradesh, where terrain is difficult and manual exchange of information consumes lots of time.

III. ICJS IMPLEMENTATION IN HIMACHAL PRADESH
The Himalayan State of Himachal Pradesh is sparsely populated, with a total population of 68.56 lakh, low population density of 123 persons per sq/km but a very high literacy rate of almost 83.78%1.

The ICJS model of implementation covers the Courts, Police, Prisons and Forensic Science Laboratory (FSL). The number of locations covered for each Organisation is given below, followed by the financial year (FY) wise transaction count of various SW:

| Table-1: Coverage of iCJS in Himachal Pradesh |
| Courts | 100 (in 10 Districts) |
| Police Stations | 114 (in 13 Police Districts) |
| Prisons | 14 |

| Table-2: Transaction Count2 |
| Year | Police | Courts | Prisons | FSL |
| FY 2012-13 | 5,135,93 | 8,23,237 | 14,000 | 15 |
| FY 2011-12 | 4,21,387 | 50,234 | - | - |
| FY 2010-11 | 4,20,905 | - | - | - |

The technology and software used in the implementation of all software that forms part of the iCJS are given below:

| Table-3: Software and Technology |
| Software/Technology | Kanoon Vyavastha / CIPA | Case Information System | eFSL (Forensics) | ePrisons |
| Database/Client Interface | PostgreSQL | MySQL/PHP | MS SQL Server/ASP. Net | MS SQL Server/ASP. Net |
| Data Consolidation Technology | Symmetric DS/Web based | Manual | Web based (integrated with KV) | Web (integrated with KV) |
| Data Consolidation Frequency | Whenever connectivity is available | Day-end (as & when required) | Real time (as & when required) | Real time |
| Information sharing | CIS, eFSL, ePrisons | KV, ePrisons | KV | KV, CIS |

1 Census of India 2011
2 Figures for last 3 financial years are available, in case SW was implemented at that time.

eSuperdari - software has also been developed for accepting online applications for release of seized vehicles/property, send arrest reports, release prisoner property.
We can see that, heterogeneous technology has been used in the development of National level SW of CIS, Kanoon Vyavastha (KV upon CIPA) and ePrisons. However, the modules developed locally in Himachal Pradesh, for core iCJS and additional modules of Forensics laboratories (eFSL) and online release of seized articles, are on same technology i.e. ASP.Net/MS-SQLServer. Data integration has been achieved by online transfer of locally stored data, as per availability of Internet connectivity (through BSNL, HIM SWAN, NICNET) in the case of CIS and CIPA (police station data). The remaining software of ePrisons and eFSL are web-enabled, implemented on the web as shown in the Figure-2 [8].

In Himachal, besides developing the eFSL software application for Forensic Science Laboratories and eSuperdari SW for release of case property, additional databases of land records, vehicles, driving and arms licenses have been integrated for improving the quality of investigations. The 3 forensic laboratories in the State received a total of 5317 cases for reporting during the year 2011-12 and 616 cases were pending as on 31st March 2012. Also, the scientists of these laboratories appeared in Courts for evidence in 236 cases [9]. Therefore, there is lot of potential for eFSL software in speeding up the reporting process form forensic laboratories to police. The personnel information and finance databases, in electronic format, have also been linked to the Kanoon Vyavastha interface for manpower and resource planning [8]. The improvements brought about by the iCJS system have been summarized in terms of the performance indicators, in Table-4.

![Figure-2: Conceptual diagram of iCJS implementation in Himachal Pradesh.](Image)

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Before iCJS</th>
<th>After iCJS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Complaint filing</td>
<td>NA (Not available)</td>
<td>Available</td>
</tr>
<tr>
<td>Action on complaint</td>
<td>A week onwards</td>
<td>Within 24 hours</td>
</tr>
<tr>
<td>Sending advance parcels information to Forensic</td>
<td>5 days</td>
<td>Instantly</td>
</tr>
<tr>
<td>First Information Report (FIR) copy</td>
<td>Day-end</td>
<td>Instantly</td>
</tr>
<tr>
<td>FIR details for court cases</td>
<td>Police dependent</td>
<td>Instantly</td>
</tr>
<tr>
<td>Forensic report availability</td>
<td>4-days onwards</td>
<td>Instantly</td>
</tr>
<tr>
<td>Citizen Feedback</td>
<td>Manual channels</td>
<td>Online</td>
</tr>
<tr>
<td>Prisoner dossiers</td>
<td>NA</td>
<td>Available</td>
</tr>
<tr>
<td>Savings of prisoner relatives</td>
<td>Lots of time+cost</td>
<td>Through Video Conference (VC)</td>
</tr>
<tr>
<td>Citizen access to crime data</td>
<td>NA</td>
<td>Available</td>
</tr>
<tr>
<td>Order/ judgments against an FIR/ prisoner/ accused</td>
<td>30 Days</td>
<td>Immediately upon Publishing</td>
</tr>
<tr>
<td>VC presence of under-trials</td>
<td>NA</td>
<td>Available</td>
</tr>
<tr>
<td>VC based interrogration</td>
<td>NA</td>
<td>Available</td>
</tr>
<tr>
<td>Access to online databases</td>
<td>NA</td>
<td>Available</td>
</tr>
<tr>
<td>GIS linkage</td>
<td>NA</td>
<td>Integrated</td>
</tr>
<tr>
<td>Contraband passing to prisoners</td>
<td>Possible</td>
<td>Not possible</td>
</tr>
</tbody>
</table>

A. Government Process Re-engineering:

There is no comprehensive law in existence for regulating and governing e-Governance, except few provisions of the IT Act 2000 as it was passed with an objective to create legal framework for e-contracts and recognition of e-records, whereas the issues related to consumption of data were not addressed. Thus using the existing legal framework, an effort has been made to introduce certain process changes in the Police, Prisons and Forensics SW. However, the process changes carried out are only those which could be effected without changes in the existing laws. These are classified as front-end and back-end, as given below.

i. Front Office Process Changes:

- Process to convert an online complaint registered under 163 CrPC into an FIR for cognizable

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1 As per discussions with departmental officials and users.
offences under 164CrPC at Police Station level is available.
- Process to transfer crime scene Parcel Information from Police Station to FSL is through SW.
- Facility of booking of online VC request with Prisoner by relatives/I Os in Police Stations.
- Online submission of request for release of case property, from Courts to Police and vice-versa.

ii. Back-Office Process Changes:
- Online transfer of FSL reports against crime scene parcels sent by Police through a web-interface.
- FIR data has been made available directly to the Courts from Police Stations.
- Court Orders/Judgements are now directly available to Prisons and Police Stations in their respective software against FIR number.
- VC based presence of under-trials in courts has been started.
- There is online availability of FIR in FSL in place of sending a printed copy along with parcels.
- Automatic SMS/Email/Software alerts are generated whenever some crime happens, missing person is reported, dead body is found, court case pertaining to an FIR is listed in the Court Cause list, orders or judgements pertaining to Case-FIR are issued by Court, prisoner release orders are received, prisoner release date approaches, prisoner movement on account of visit to Court, hospital, furlough, parole takes place.

B. Challenges:
Any initiative of iCJS kind, involving four major wings of the criminal justice system, faces a number of technical and legal challenges arising out the different objectives being pursued by every wing. Some of the challenges, faced and addressed in the implementation of iCJS in Himachal Pradesh are as following:
- The four applications are using two different OS, three databases and scripting technologies. Using Symmetric DS technology, data integration was achieved and a new central software interface was developed for iCJS MIS purposes.
- Departmental officials were afraid to link their data and intervention from the highest levels in the departments ensured that a pilot was approved to gain confidence of employees.
- There was resistance to doing complete data entry related to other domains. For example, the court officials were not following the standard format of an FIR while entering case information during filing stage. This created a problem of accessing the correct FIR details from police database because of incorrect FIR format in CIS SW. Only after demonstrating that such data would eventually be useful to all stakeholders, it was possible that all data entry could be ensured.
- The number of employees to be trained on the SW was large and was achieved by involving NIC District Centres and creating a pool of master trainers.
- Coordination among stakeholders was the greatest challenge as different stakeholders had varying objectives in using domain specific applications. Involvement of the top leadership was required to achieve synergy.
- The evidence Act does not allow recording of witness statement taken by police, thus police is using the recording of witness statement in 164 CrPC in heinous crimes as backup only to present to the court.
- The Information Technology Act 2008(Amended) does not provide the provision of using digital signature for submitting the police challan to court, thus using employee ID, providing various roles and privileges is, for sharing information among various wings.

C. Alternatives:
The iCJS, basically, shares information for better decision making as well as to avoid time delays, involved in manual information exchange. The two choices available for further improving its utilization are analyzed below:
- The first option is that the individual software applications can be modified to consume data of other domain. For example, whenever FIR details need to be entered in the Court software during filing of case information, all parameters of the FIR must be picked up directly from the KV database and populated through web-services. This scenario assumes good Internet connectivity otherwise the user may be held up during data entry stage.
- The second option is to re-develop all three software as a single software solution with single database. This will be a web-enabled solution only.

At present, the first option appears better because it can be implemented directly with minor changes and at a lesser cost. This is what the iCJS initiative of Himachal Pradesh also proves.

IV. KEY FINDINGS
The iCJS implementation in Himachal Pradesh is an eye opener in the sense that the initiative has actually been implemented by integrating data of all domains at a central location. However, there are certain factors responsible for its success in the State of Himachal Pradesh, which are listed below:
- The CIPA software was already implemented in all Police Stations of the State and a local solution was developed to build web-enabled software on top of CIPA software and data, named Kanoon Vyavastha.
Many other States in the country, which are not having CIPA data, are in various stages of implementing the CCTNS4 project, which may take some time.

- All Departmental solutions and iCJS SW are NIC developed either at Central or State level. Therefore, sharing of technical knowledge and up-grading specific SW solutions was not an issue among designers/developers.
- Top leadership of the respective Departments was personally involved in the project and many dedicated officers devoted their time in fine-tuning the final solution.
- The stake-holders understand the short-comings of this iCJS software but are waiting for major process reforms and approvals from higher Judiciary for consuming data/reports which are electronically signed, as per provisions of the Information Technology Act 2008.
- In its present shape, the iCJS is restricted to sharing of information in electronic form. But even this has helped to cut down the number of long languishing under-trials in prisons because of iCJS data mining. The ultimate aim is to start consuming the information of other domains in respective SW. The individual SW will need to be modified accordingly.
- Faster disposal of cases is resulting in lesser under-trials and no over-crowding in prisons, which is a major problem in most of the jails of the country. Reduction in languishing under-trials directly increases the trust of the citizens in the criminal justice system.
- Since iCJS has been built upon existing SW solutions, adherence to eGovernance Standards will require SW modifications.
- Citizen centricity, even though limited to Prisoner Video Conference with relatives, online traffic Challan payments and online complaint filing in Police, have been a major success. The Prisoner VC, introduced recently, is being used extensively, considering the small number of prisoners in the state prisons [6]. Considering that the cost of one visit by relatives of prisoners is about Rs.2,000 (including travel, stay, lost wages for the period of visit), and about 50 such visits take place in various prisons, the savings of citizens work out to almost Rs.3.5 crores annually.
- There is a lot of utility of new processes introduced under the initiative such as under-trial VC with investigating officers, online requests for release of seized articles, VC based evidence of scientists of forensic labs.
- Presently, electronically signed reports are being exchanged between Police and Forensic Laboratories only. In its final format, data security and electronically signed data exchange will be required.
- The integration of human resource, finance, land records, vehicles, driving and arms licenses is a unique feature. However, it may not be easily replicable elsewhere in the country considering the complications of these individual systems.
- The initiative, if implemented in its proper format of direct consumption of data of other domains in own domain SW, can result in huge savings of cost, in terms of paper usage and time, thereby increasing the carbon credit ratings. For e.g. 1.30 lakh pending criminal cases in 100 courts of the state, use about 100 pages annually in the form of case filing information, FIR copy, charge sheet, witness statements, FSL reports, cause list, orders, judgements etc. In case, all these documents are generated and transferred electronically in courts, the approximate paper savings will be 1.30 crore pages per year.
- High literacy rates, awareness and high ratio of rural population in Himachal Pradesh, necessitates that Government officials and citizens are open to use of IT to simplify and speed up their work.

V. RECOMMENDATIONS

The recommendations for improving the scope of implementation of the iCJS are listed below:

- As opposed to information sharing, data consumption, directly in relevant SW modules, must be a pre-condition, for which all stakeholders must agree.
- All reports being used or generated through the iCJS must be electronically signed.
- Process changes requiring updation of existing laws/acts/rules must be carried out beforehand, as per provisions of the Information Technology Act 2008 (amended).
- Extensive capacity building is required at all levels on the finer aspects of using IT tools and software for collection of meaningful data and its utility.
- Establishment of VC facility in forensic laboratories will ensure that scientists can give evidence from their labs in court cases, saving time and money.
- Video recording of court proceedings, witness and crime scene is an important area which needs to be addressed. This feature, will not only be a long term record of these events, but also a check on the officials or witnesses.
- Security of data, during transfer from one domain to another and safeguarding it from hackers during investigation process, needs to taken on regular basis.
- Prosecution functions must be addressed in a better manner, and existing modules which are not being fully used, should be made functional.
- Citizen interface needs to be developed under iCJS.

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As per website of NCRB, CCTNS Progress Dashboard on 15rth Nov-2013, [http://ncrb.nic.in/cctns.htm](http://ncrb.nic.in/cctns.htm)
VI. CONCLUSION

There can be no doubt that an Inter-operable Criminal Justice System is the need of the hour in today’s scenario where delay in delivery of justice is affecting millions of persons and access to the right information at the right time is critical for the effective operation of criminal justice agencies. The Government of India recognizes the seriousness of the situation and is proposing a standard iCJS for the Country as a whole and an expert Group has been constituted to study and finalize the SW solution. The iCJS implementation of Himachal Pradesh forms a reference point for this because a serious initiative has been taken up by the tiny Himalayan State and actually implemented in a raw form. Even making such an attempt to integrate the 3 wings of criminal justice system is commendable for Himachal Pradesh because of the inter-organisational issues and conflicts. There is definitely a lot more scope for enhancements and inclusion of additional modules. Some of the new processes may require changes in the existing Acts/Rules. The additional benefits to stakeholders, especially, the Police and Courts (reduction in overall pending cases and increase in conviction rates), will start accruing when electronically signed data is exchanged and consumed in the iCJS solution.

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High Performance e-Governance Websites - A Game Changer in Efficient Public Service Delivery

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ABSTRACT
There is a growing recognition of the need for using Internet as a means of delivering government services to Indian citizens in a timely, effective, efficient, accessible and transparent manner. Towards implementing this objective, the government departments are now offering information and transactional services through their websites on the Internet. This implies the websites of these government departments will be the primary touch point for the citizens. The responsiveness of these websites when a large number of users are concurrently using the system is one of the key requirements for gaining public trust and large scale acceptance of electronic mode of service delivery. This paper examines a number of websites in the Indian government domain to gain visibility on various aspects like typical composition of home pages, actual load times for end users and the state of adoption of software performance engineering related best practices. The results of this study indicate that there is an urgent need to include performance as one of key considerations while designing a government website. This paper also describes various simple mechanisms that can have a positive impact on the performance of these websites.

1. INTRODUCTION
India, as a global leader in IT services, owes a responsibility towards its own citizens to make their life easier and better with adoption of Information & Communication Technology (ICT) enabled delivery channels for various public services. Towards achieving this objective, Government services in India are being increasingly offered in electronic mode as part of the national e-governance program. The proposed national e-governance plan (NeGP) now consists of a wide range of citizen services being offered as part of 31 mission mode projects (MMPs). The transformation of government service delivery by bringing in accountability, efficiency and transparency using ICT is an essential requirement for overall socio-economic and digital inclusion.

The government departments at state and central level are now providing forms, documents, information and services through their websites available on the Internet. In this scenario these government websites will be the first touch point for citizens. There are over 5,000 websites related to Indian government offering informational and transactional services [1].

A number of independent studies have shown that faster websites impact an organization’s productivity, profits and brand image in a positive manner. A 60% faster Obama election fund raising platform resulted in a 14% increase in donation conversions [2]. Firefox increased the number of downloads by 15.4% after their average landing page loading time reduced by 2.2 seconds. This in turn translated to 10.28 million additional downloads per year [3]. The shopzilla.com website saw a 5% to 12% increase in top-line revenue after its average full-page download time reduced to 1.2 seconds from 6 to 9 seconds [4]. The study carried out by Microsoft Bing and Google Search also showed that slow pages result in loss of users and impact sales [5]. The average online shopper expects web page loading time to be two seconds or less, a decrease from four seconds in 2006 [6]. The negative brand impact resulting from the shutdown of Obamacare healthcare website due to performance issues in October 2013 is well known [7]. A significant portion of the time (80%) is spent on the front-end rather than the server for downloading all the components in a web site [11]. A study carried out on the home pages of the top 500 retail web sites showed that adoption of best practices related to performance has either decreased or reached a plateau [14].

The web analytics portal (http://www.webanalytics.gov.in/) mentions improving load time and light pages as a way of improving website rankings. A number of e-governance projects in India are being implemented with private organizations under the public-private partnership mode. These are governed by stringent service level requirements for the home page loading time.

It is clear that slow government websites can lead to loss of public trust and decrease the number of users being able to avail services offered by these websites in an effective manner. For example if the railway reservation website is slow, the number of people queuing in railway reservation centers may increase or resort to alternate unauthorized delivery channels [8].

The goals of our study are as follows:
- To understand the typical composition of the home pages of websites.
- To understand how these home pages load for actual end users using widely used browsers and connectivity options.
- To gain an insight on the adoption of software performance engineering related best practices.

Though guidelines have been framed for security [9] and usability [10] aspects of Indian Government web sites, these need to be enhanced with focus on performance. The intent of this paper is to increase awareness on the need to apply performance best practices as part of Indian government website design. The paper also describes various practical and easily achievable mechanisms that can make a positive impact on the performance of these websites, thereby enhance adoption of the electronic way of
service delivery. These mechanisms can become an integral part of the Guidelines for Indian Government Websites.

The rest of the paper is organized as follows. Section 2 gives a brief description of web page performance. Section 3 describes the methodology. Section 4 provides the results and findings of this study. Section 5 provides the summary, limitations of our study and suggestions for future work.

2. WEB PAGE PERFORMANCE

The public user interface tier of a government department is its website or home page. A home page contains multiple objects like the main HTML page, cascading style sheet (CSS), JavaScript (js), images (jpeg, png, gif) etc. These objects are downloaded from one or more domains. The time taken for a website to load is dependent on a number of factors like domain name server resolution time, secure socket layer (ssl) time, network latency, size of data to be transferred, server processing time etc.

The Webpagetest tool (http://www.webpagetest.org/) is used in this paper for measuring website performance. It is an open-source online tool for executing single user performance test for a web page. The tests can be run from multiple locations using real browsers (Internet Explorer and Chrome) and configurable bandwidth. A single user test and profiling provides valuable insights into the potential performance hot spots.

This tool provides a number of metrics for profiling. This includes web page content structure (DOM elements, number of referred resources and page size) and time measurements related metrics (first byte time, start of rendering time, load time and speed index\(^1\)).

This tool also assigns an A to F grade for the seven optimization factors namely first byte time, keep alive enabled, compress transfer, compress images, progressive JPEGs, cache static content and effective use of CDN\(^2\).

This tool also provides the Google Page Speed (https://developers.google.com/speed/) score and recommendations for improving performance of the web page under test. Google Page Speed provides an overall score from 0 to 100 (using a set of predefined rules) representing the usage of performance related best practices in the web page under test. The score considers only the network independent attributes of the web page. The response time of the web page will still depend on the other factors like available connectivity, server response time and the browser rendering time.

Yahoo YSlow (http://developer.yahoo.com/yslow/) also provides an overall grade and score for web page performance. The overall grade and score is calculated by summing the values of the score for each of the 23 predefined rules. The Webpagetest tool does not report YSlow scores.

A similar free tool is GTMetrix (http://gtmetrix.com/) that analyzes a web page performance using both YSlow and Google Page Speed. The Webpagetest tool was preferred to GTMetrix as it had more test locations, provided developer level interfaces and supported browsers like Internet Explorer and Chrome.

3. RESEARCH METHODOLOGY

This section describes the methodology used in this study. The tests in this paper were done using the Webpagetest tool described in Section 2.

Our study was conducted on 40 Indian Government web sites that included 22 Central Government, 12 State Government and 6 Local Government (Municipal and Panchayat) web sites providing various critical public services and important information. The sample included variety of domains such as Health, Taxation, Defense, Visa, Post, UID, Courts, Railways, Passport, Election Commission, Education and general public welfare. The selection of our sample was based on public visibility of the web sites and its relevance in the context of a public service delivery. This sample is a balanced mix of web sites serving as information dissemination platforms and/or providing transactional services. Table 1 provides the sources that were used to validate the selection of this sample.

Table 1. Sources for getting analytics related to Indian Government web sites

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://godirectory.nic.in/">http://godirectory.nic.in/</a></td>
<td>Official Government of India Web Directory by National Informatics Center</td>
</tr>
<tr>
<td><a href="http://diety.gov.in/">http://diety.gov.in/</a></td>
<td>Official website of Department of Electronics &amp; Information Technology Contains the list of Central, State and Integrated Mission Mode Projects</td>
</tr>
<tr>
<td><a href="http://etaal.gov.in/">http://etaal.gov.in/</a></td>
<td>Official website of Electronic Transaction Aggregation &amp; Analysis Layer. This website provides transactional statistics of various government services.</td>
</tr>
<tr>
<td><a href="http://www.webanalytics.gov.in/">http://www.webanalytics.gov.in/</a></td>
<td>Web Analytics Service by National Informatics Center, provides ranking of Top 20 Websites</td>
</tr>
</tbody>
</table>

Figure 1 shows the jurisdiction wise distribution of the sample whereas Figure 2 shows distribution domain wise.

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\(^1\)This is a custom metric from Webpagetest indicating how quickly the web page was rendered  
\(^2\)Content Delivery Network
Figure 2. Domain wise distribution of the sample web sites

Each home page was tested 30 times and the data from the first view was collected. The first view setting ensured that the browser cache got cleared between each test. Multiple runs ensured consistency in the data being collected. The tests were conducted between 25th November and 10th of December 2013 using the Webpagetest server in Indore, India and Tokyo, Japan. Indore was chosen as the primary test location since it was the only test location available within India and a significant number of users of these government websites are from India. Tokyo was chosen as a secondary test location to understand the behavior of increased latency.

The following browsers were used in this study:

- Indore: Google Chrome. Microsoft Internet Explorer was not available at this location.
- Tokyo: Microsoft Internet Explorer and Google Chrome.

The bandwidth was restricted to DSL 1.5 Mbps download and 384 Kbps upload speed. The following measurements were collected from the tests and analyzed in detail using descriptive statistics.

- DOM elements
- Number of referred resources
- Page size
- First byte time
- Start of rendering time1
- Fully loaded time4
- Page speed score
- Page speed recommendations
- Grades for the seven optimization factors

The total number of data sets collected was 1200. This included 30 runs of each website comprising of 10 runs on Google Chrome at Indore, 10 runs on Microsoft Internet Explorer at Tokyo and 10 runs on Google Chrome at Tokyo.

The descriptive statistics used in this study include average, minimum, maximum and percentiles.

4. RESULTS & FINDINGS

This section describes the results and findings of this study.

Finding 1: The average home page is 1072 KB in size and the average number of embedded resources in a home page is 52. 50 percent of the home pages are 662 KB or lower in size. 50 percent of the home pages have 45 or less embedded resources.

Figure 3 shows the home page size and Figure 4 shows the number of embedded resources for each of the web site. The average values are also shown.

Figure 3. Distribution of home page size

Figure 4. Distribution of number of embedded resources

This finding implies the following.

- There is a need to transfer significant payload between the browser and the server. A web site with a larger page size requires more transmission time as compared to a web site with a smaller page size at a given connection speed. The time required to transmit a 260 KB web page on a DSL connection with 256 Kbps speed is more than 8 seconds.
- There is a need to make a number of round-trips to the server for retrieving all the embedded resources. Each embedded resources like images, JavaScript, CSS etc require a round-trip. Analysis of our data showed that each round trip may lead to additional average latency of more than 150 milliseconds from the test locations. Latency is the time it takes for a packet to travel from source to destination. If the bandwidth usage is high, latency may also increase because of congestion.

1 This time is measured as the time from the start of the request to the time the first content is rendered.

4 This time is measured as the time from the start of the request to the time all content is downloaded.

5 Round-trip latency can be estimated as time to first byte – time for DNS resolution – time for SSL negotiation – server execution time.
Finding 2: 50 percent of the web sites have a Google Page Speed score of 55 or lower. 4 web sites have a score of 80 or higher. Figure 5 shows the Google Page Speed score for each of the web site. The score of 80 is also highlighted.

Figure 5. Google Page Speed score distribution

This finding implies the following.

- There is a need to improve the adoption of software performance engineering best practices while designing web pages. A higher score is preferred and a score of 85 or above indicates a higher degree of adoption of software performance engineering best practices while designing web pages. It is important to note that it is not always necessary that a web site with a higher score opens faster than a web site with a lower score. This is because the time taken for a web site to open depends on multiple factors like the available connectivity, server response time, browser rendering time etc.

- A significant number of web sites do not comply with one or more of the optimization factors used by Webpagetest for grading the web page performance. The factors that show partial compliance/non-compliance are effective use of a CDN (100%), progressive JPEGs (100%), cache static content (87%), compress transfer (85%), first byte time (79%), compress images (77%) and keep-alive\(^6\) enabled (15%). Figure 6 shows the percentage of web sites that show full compliance and partial compliance/non-compliance to each optimization factor.

Figure 6. Compliance to Webpagetest optimization factors

- A significant number of web sites do not comply with one or more of the fundamental predefined rules used by Google Page Speed for assigning a score to the web page performance. The rules that are not fully complied with leverage browser caching (77.5%), enable gzip compression(72.5%), combine images using CSS sprites (60%), serve scaled images (42.5%), optimize images (35%), minify HTML (27.5%), minify JavaScript (20%), avoid bad requests (17.5%), defer parsing of JavaScript (15%), serve resources from a consistent URL (15%), inline small JavaScript (12.5%), enable keep-alive (5%), inline small CSS (5%), minify CSS (5%) and prefer asynchronous resources (2.5%). Figure 7 shows the percentage of web sites that show full compliance and partial compliance/non-compliance to each predefined rule.

Finding 3: 69% of the request count and 75% of the transferred data size comprise of images. 21% of the request count and 16% of the transferred data size comprise of JavaScript and CSS. This is in conformance to statistics provided by http archive (http://httparchive.org/interesting.php). Figure 8 shows the content distribution by count and size for all the web sites in the sample.

Figure 7. Compliance to Google Page Speed rules

Figure 8. Content distribution by count and size

\(^6\) Enabling keep-alive allows for reuse of TCP connections.
This finding implies the following.

- A significant amount of data transferred between the browser and the server is made up of images, JavaScript and CSS.
- There is a need to make a number of round-trips to the server for retrieving all these embedded resources.

**Finding 4:** The average time for a home page to start rendering is 6.42 seconds. The average time for a home page to fully load is 13.99 seconds. 50 percent of the home pages start rendering in 4.02 seconds whereas the time taken to fully load is 10.68 seconds.

This finding implies the following.

- A large number of web sites fall short of meeting the 4 second expectation of the end users.
- There may be a loss of public trust and decrease in the number of users being able to avail services offered by these websites in an effective manner.

**Figure 9. Home page start rendering time**

**Figure 9. Home page fully load time**

**Recommendations:** The following is an indicative list of three broad level strategies that can be adopted for ensuring that web sites meet performance expectations.

- **Strategy 1: Reduce Payload** using mechanisms like compression of text content like HTML, JavaScript and CSS using gzip, compression and use of optimal images7 and minify content like JavaScript and CSS.
- **Strategy 2: Reduce Latency** using mechanisms (to minimize round-trips to the server) like consolidation of JavaScript and CSS resources into common files, removing redundant script downloads which may result when large teams work together on web page development, combining images using CSS sprites, leveraging browser caching, minimizing redirects (redirects result in extra round-trips to the server), enabling keep-alive, making small JavaScript/CSS inline and using a CDN to bring static content geographically near to the user. There is a need to explore the possibility of having an Indian government CDN which caters to the requirements of the government web sites on similar lines of web analytics, government cloud and e-governance app store [12].
- **Strategy 3: Improve Browser Processing** using mechanisms like progressive JPEGs [13], optimizing the order of styles and scripts (CSS at the top and JavaScript lower), serving scaled images, specifying image dimensions and using asynchronous requests8.

The following indicative guidelines can help bring a performance focus as part of government web site development. These guidelines can become an integral part of the Guidelines for Indian Government Websites after undertaking a more detailed study. The guideline type is either mandatory or advisory [1].

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Strategy</th>
<th>Guideline</th>
<th>Guideline Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>HTML content is compressed.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>JavaScript content is compressed.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>CSS content is compressed.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>JavaScript content is minified.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>CSS content is minified.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>JavaScript content is consolidated.</td>
<td>Advisory</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>CSS content is consolidated.</td>
<td>Advisory</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>There are no redundant JavaScript downloads.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>There are no redundant CSS downloads.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>The number of redirects are minimized.</td>
<td>Advisory</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Keep-alive is enabled.</td>
<td>Advisory</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Small JavaScript is inline.</td>
<td>Advisory</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Small CSS is inline.</td>
<td>Advisory</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Caching is enabled for static images.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Caching is enabled for JavaScript.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Caching is enabled for CSS.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>Progressive JPEGs are used.</td>
<td>Advisory</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>CSS are referenced at the top of the HTML document.</td>
<td>Advisory</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>JavaScripts are referenced at the bottom of the HTML document.</td>
<td>Advisory</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Image dimensions are specified in the HTML.</td>
<td>Mandatory</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Optimal image formats are used.</td>
<td>Advisory</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>Asynchronous requests are used to reduce full page refresh.</td>
<td>Advisory</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td>Advisory</td>
</tr>
</tbody>
</table>

**Validation:** These guidelines were successfully adopted in a large mission mode project (also part of the sample set) having a stringent response time service level agreement for web site loading. This resulted in a 20% improvement in both the start rendering time (2.76 seconds) and fully load time (3.73 seconds) of the web site. The current Google Page Speed score for this web site is 83.

5. CONCLUSIONS

The primary objective of this paper was to gain visibility into the adoption of best practices related to performance in Indian government web sites. This study becomes significant in light of the increasing number of initiatives being taken by Central, State and Local government agencies to bring in an era of government service delivery using the Internet.

In this paper, we analyzed in detail the use of performance best practices by considering 40 Indian Government web sites which deliver critical public services and act as an important information dissemination platform.

It appears that though we have made significant strides in providing comprehensive and high quality e-governance web sites, additional work needs to be done to achieve globally

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7 Photos: JPEG, PNG-24, Low complexity: GIF, PNG-8, Low complexity with transparency: GIF, PNG-8, High complexity with transparency: PNG-24

8 In a conventional web site, the complete web site content is reloaded from the server on a user action. An asynchronous request allows selective part of the web site to be reloaded.
acceptable standards of performance from an end user perspective.

The performance best practices suggested in this paper can be considered for inclusion within the guidelines and compliance matrix for Indian Government web sites.

The possible threats to the validity of our findings include limitations of the Webpagetest, setup used to gather the data and the sample size. The home page composition may have also changed from the time the tests were carried out.

Future work in this area can include increasing the sample size, considering additional attributes and development of an analytics platform to provide trends on statistics related to Government web sites.

6. ACKNOWLEDGMENTS
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7. REFERENCES


