



Augmented Transformational Methodologies for Effective e-Governance

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Abstract

e-Governance is emerging as a basic management tool for sustainable development in public service paradigm. The digital transformation required for this setup can be achieved by flexible usage of selective and adaptive measures. The methods of ICT tethered with providers, consumers, medium and other deployed arenas are acts for effective e-Governance. Also it emphasizes the presence in globalized communities substantiated with active role in technology augmentation and institutionalization.

In that line, this article discusses the stack of technologies in e-Governance with respect to infrastructure, literacy, delivery and security strategies with help of digital scientific paradigms to deal with issues associated with ensuring interoperability and integration across these sectors and handling of rapid proliferation in these domains.

Introduction

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

Government infrastructure⁴ spans through at different levels, viz. central, provincial (state), regional and local. Issues for government units exist due to both of heterogeneous resources and legacy applications. Examples of these applications range from better access to information on available services to complete online processing of requests for permits, certificates, payments, issues of privacy and electronic voting, etc. Ensuring to identify the technical solutions for issues with minimal redundancy in service. Rapid advances in technology have allowed more advanced

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equipment and applications. It needs matching tools to cope-up with the vision and dynamically dealing with the issues.

The policy framework¹ of IT activities in governance comes as IT act 2000/08, which in a way grants Egov rights to the citizens of India besides encouraging e-commerce and regulating policies e-Systems. Other laws include there to providing preventive vigilance and penalties to activities with copyright act 1957 and Aadhaar act 2016. Overall, the attempt is to provide a standard legal framework for customers, 3rd parties, business partners, regulators, users and other stakeholders in the context of IT based transactions.

The current government related stakeholders³ of E-governance are NIC, UIDAI, NeGD, SeMT, State IT wings, CGG, eGCA and District IT cells. The infrastructure spans across as National Information Infrastructure (NII) like National, State and Mini Data centers, connectivity through SWAN, NKN, NICNET, NOFN, SATCOM. Cyber protective agencies like CERT-In, NTRO, IB wing are part of regulative processes. More integrated projects⁷ are already in place like MMPs, Megh Raj, CSCs, SDSs through Egov planning of NeGP, NeST and Digital India Platform (DIP).

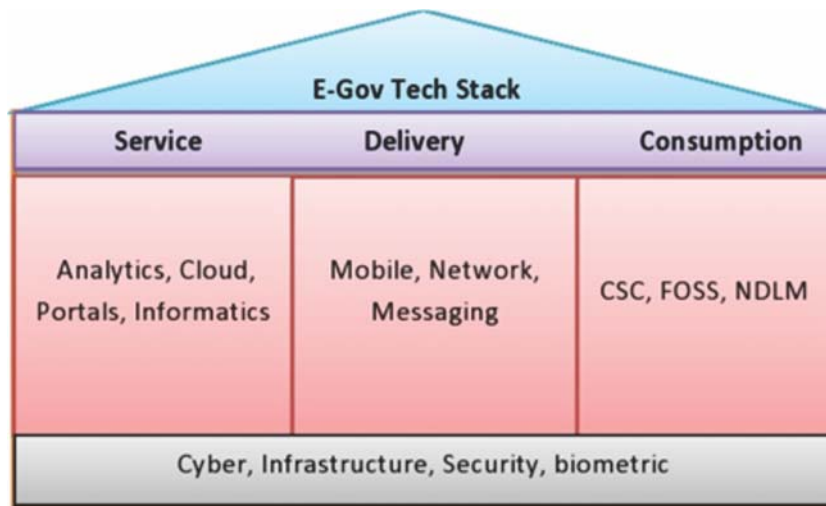


Figure 1: Fragments in Electronic Governance [Own creation]

Transformation Strategies

Various technologies of IT are intricately bounded for e-gov domain. Also standards of governance might dovetail with fast pace of technology changes and aspired goals. Hence, technology updating and isolation requires for selective and adaptive measures. Effective Service, Conductive Delivery Channel and Optimal Consumer societies are allies to the system of E-governance. Technologies for these as depicted in Figure1 are elaborated further.

A. Augmented services

The Egov model of delivery need to deal with diverse and variable set of requirements of citizen centric and other government applications. These applications can be integrated to cloud model for better throughput by incorporating multi-tenancy and orchestration of these services. Various cloud prototypes are there for implementing Egov services like public, private, hybrid model, Infra, platform, software model, overlay model which are delivered with 'as a service'

version of deployed applications. Cloud helps to pool out the ICT resources for all Egov services for efficient utilization. It prohibits manual maintenance costs incorporated in traditional model of deployment. It requires to adopt matching model of cloud version for a particular use case, in-order to establish efficient Egov arrangement within the governance.

The selection a particular cloud model in Egov depends upon the following factors as location, automation, category and authority. As Government in India is spread across diversified groups, viz. central, states, districts, blocks and villages, the applications designed for a particular group need to implement matching cloud model. Another factor includes customization of one application for different groups dynamically and deploy it as a one instance. The Egov applications developed by multiple parties at different levels at center and states need to be consolidated into single multi-tenancy model so duplication of efforts can be minimized.

By means of all these factors, it has been noticed that services generated at different levels need to be consumed at diversely placed resources. All these virtual Egov communities need to interact for a collaborative model of computation for constructing and consuming different data generated at different levels using custom routines of cloud.

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

“Mi” Represents the number of the Main node i. “Ri” Represents the number of Rear node.

“N1” Represents the number of user requests. “N2” Represents the number of resources available.

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

“ij” lists the relation of node j in job i. “Pij” Lists the parents of node j in job i.

“Rf” Multitenancy factor.

for each job request i do

Select Mi tree nodes as Mains;

Select Ri nodes as Rears;

for each assigned Mains i do

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

Assign the multiple Parents for each node i as Pij and Lij at multiple levels of the rears;

end for

end for

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

The processing for given service runs on Mi + Ri nodes; After Processing completes at each node results are sent

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

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

Collection of the results from super rear node.

for each node j in $M_i + R_i$ do

identification of current rear P_{ij}

if $j = \text{Rear}$ then

P_{ij} current parent in P_{ij} 1 to L_{ij} or super rear having the result

else

P_{ij} current rear in P_{ij} 1 to L_{ij} having the result

End if

end for

De-allocation of nodes/Termination of service.

for each node j in $M_i + R_i$ do do

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

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

This algorithm⁸ works to wrap out the distribution and collection of workloads assigned to the cloud⁵. It works by identifying the units of computation at different locations and try to organize the overlay upon it. It does not depend upon the intermittent failures between different data centers by maintaining the nominal replication or tenancy factor.

1. Service Security: Egov targets the creation of an ecosystem which enables advancement to the existing digital infrastructure and facilitates prompt digital services. This requires the huge analysis of IT methods, in order to address the gaps created with respect to Cyber risk and security. They are many levels to address these spaces as preparation, identification, approach, preservation, examination, analysis, and reporting. Here follows detail of all operational factors of network, infrastructure and software components of typical pan domain Egov setup.

- Risk Management Establishment, roll-out of a risk management framework, procurement and implementation of an automated Governance, with compliance enables the system to have a clear visibility on the risk profile of the entire IT infrastructure. It manages key risks with optimized processes and controls also conduct of periodic and automated risk assessment. Implementation of appropriate policies, procedure for the treatment of various identified risks will be implemented through central and distributed measures as the framework would be created centrally and would need to be implemented across all locations.
- Business Continuity and implementation of automated Governance on ISO 22301:2012.
- Capacity Management Learning Management System (LMS) Integration, sourcing and delivery of technical content, Assessment, training and up-skilling are necessary to counter emerging challenges and cybersecurity concerns with changes in technology. Skilled manpower is better equipped at managing life cycle of any incident, knowledge about system Access, terminated users retaining access, accidental provisioning of privileged access, circumvention of business rules using excessive access, knowledge

about system vulnerability, identification of insecurely developed applications and unpatched systems, configuration of detection systems and network architecture to disallow the propagation of malware, unauthorized access mitigation, third party misuse and error, people behavior patterns, compromising through social engineering, unknown roles and responsibilities.

- Vulnerability management vulnerability scanning, application security, database security malware analysis are key components here. It will uncover the actual risk posture of IT infrastructure (servers, devices, applications) and timely closure of the discovered vulnerabilities. It oversees overall security posture of system with centralized management.
- Resolution Management Incident and problem management, incident ticketing. SIEM eases the work of classifying and prioritizing the incidents. It uncovers the actual risk posture of IT infrastructure deployed for the service with central capability.
- Asset Management Works as asset inventories supported with manual procedures and in the isolated databases of multiple tools with central management by enabling visibility across different modules. It creates the stack of identifiers with naming criteria of individual category and placement. A quick identification of security admin of a resource is guaranteed by this.
- Identity Management ensure mapping of administrative nodes with their digital identity, allows right people have the right access at the right time for the right reasons and makes segregation of duties.
- Cloud Security formalize guidelines for implementing and enforcing security within a cloud operating environment. Development of secure deployment program based on the leading standards to support multi-tenant security practices.

B. Augmented Delivery

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

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

Fetch data to send from form or webservice

Compress the data

Determine the SMS Sender & Recipient

if Send to == Logger Server then

Encrypt the compressed data using Selective Hybrid

Cryptosystem

Calculate $X='D'='Y'$ $X'+'Y'=160$ $'NS'='D'='X'$ to distribute the data among 'NS' SMS's

Construct the MetafirstSMS from X & Y and NS

Send the MetafirstSMS

Send the ONS0 SMS to the Logger Server as SecureSMS

else

Call the JS code to direct the AJAX request.

end if

if Receiver via == Logger Server then

Decrypt and decompress data using Selective Hybrid

Cryptosystem

Collect the MetafirstSMS and retrieve X, Y & NS.

Combine the big text from collected parts.

else

Call the JS code to callback the AJAX response.

end if

This algorithm⁶ as depicted in Figure 2 works by defined encryption, compression and negotiating methods at both server and client places. A generic client runs at user mobile, interprets the request and responses and processes the required methods to form the alternative channel for regular web requests to cloud. The intermediary server (Logger) will do the due process at server side.

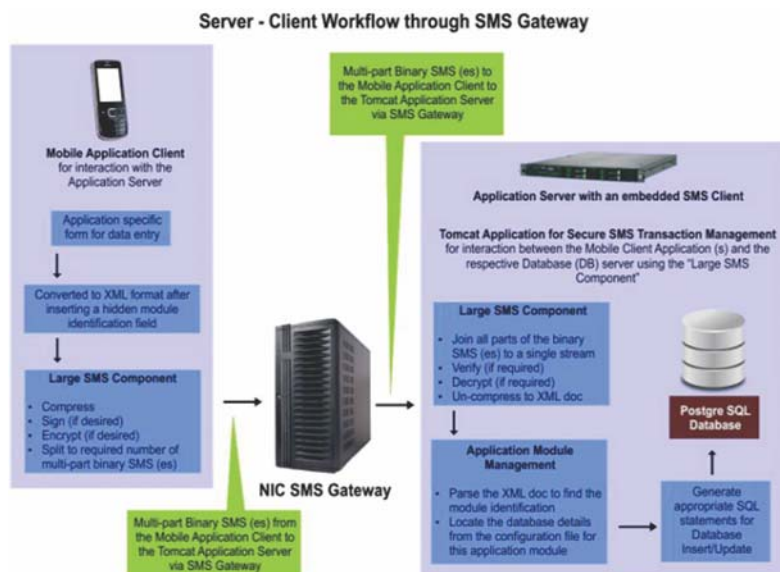


Figure 2: Service Delivery via Alt channels [Own creation]

C. Augmented Societies

Massive Open Online Courses, National Digital abhiyan mission like initiatives enable masses to empower themselves with use of ICTs. Trend toward ICT applications is towards open source and interoperability. This allows for improved reach in digitally divided societies. By reducing learning curves and shortening of the time of technology generation, ICT based solutions are progressively simplifying the applied contents of education, health-care, agriculture, and environmental governance services. Scale up education and incubation of ICT solutions, including through partnerships with the business sector Public-Private Partnerships (PPPs) for ICT-enabled systems enables digital dividends [9] to these societies. The fragmentation of many small demonstration projects need to be transformed into pan India national level programs. Infrastructure need to be expanded and upgraded for public reach.

D. State Role

The role of state needs to be tuned in line with data and services of e-Governance pattern and it's potential to increase efficiency and enhance citizens' relationship with their governments. Governance effort is directly proportional to the number of objects (Billions of People, Trillions of things like land, building, etc. they use) to be governed. The Center acts as non-partisan group that examines the convergence of data, technology and public policy, publishing legislative data, developing a statewide e-government strategy, and developing an open data system/ policy enabling development of human and business capital. Technology overlaps with states role and acts as a public service mediator like such as distributed ledger technology.

In fact, computational complexity of governance is not even linear; it is exponential. If we include government and citizen satisfaction as an outcome also, the problem belongs to the classical mathematical problem called "stable marriage problem" having computational complexity "NP Complete" (That means the problem has no solution mathematically). A possible well tested mathematical model is domain decomposition as we do in distributed computing or discretization of the structure to large number of elements before applying Finite Element Method for analysis of engineering structures. What it means is to partition the object domain to smaller manageable autonomous units and do the governance locally and then apply appropriate ICT enabled controls at the interfaces between partitions.

This implies that for a large Country like India having diverse behavioural and cultural heritage full/ recursive federalism (both spatially and functionally) upto the village/ habitats level (even upto individual level called self governance) is a practical/ manageable solution for doing effective governance. Technology, in specific, works as helper/ enabler to solve the problems that keep so many people out of the formal economy and system.

Conclusions

Combining new institutional set-ups with transformational technical solutions to manage the governmental activities at all levels, it is required to promote a better approach of public service delivery in diversified conditions. By re-engineering with out-of-box IT apparatus in e-Governance practices with flexible methods discussed can lead to achieve sustainable development goals and digital transformation.

Governance (e-governance, m-governance, etc.) is not only mathematical/ computational problem to be computerized to solve quickly for a faster outcome as well a sociological problem and should be handled through a social structure to build self-governing human beings.

The holistic design and state-of-art IT systems helps the processes of effective E-governance mechanism as an object of Digital Governance systems.

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