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# Contents

# Background Papers on the Sessions

# De-mystifying IndEA for Easier Implementation in India

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## Abstract

Enterprise Architecture is the eGovernance flagship initiative being implemented across the world to not only make a lucrative mark on the EGDI but also to achieve the United Nation's assigned Sustainable Development Goals (SDGs). (United Nations, 2016) The aim is to achieve One Government platform which is transparent, accountable and collaborative with Information and Communication Technology (ICT) as a catalyst.

While the world follows an already set framework model proposed by The Open Group Architecture Framework (TOGAF). India has taken a step forward to make its own set of eight-layer reference model called the India Enterprise Architecture (IndEA). The initiative aims to create One Nation, One Platform – for a cashless, paperless and faceless services for the citizens.

With the vision, the basic structure and framework in place the government has now envisioned to implement the whole framework at the national level. (Saha, 2017) However, before putting forward with any new initiative, the need of the hour is to keep in check the readiness of the nation state and its citizen adaptability. Along with it, a major shift in focus also needs to be taken in regards of the functioning of the country's current policies and initiatives and how well it aligns with the vision of IndEA.

**Keywords** - eGovernance Development Index (EGDI), Enterprise Architecture, Sustainable Development Goals (SDGs), Information and Communication Technology (ICT), The Open Government Architecture Framework (TOGAF), India Enterprise Architecture (IndEA).

## 1. Introduction

### A. About

Based on the survey conducted in 2016 by the United Nations e-Government the emphasis was laid upon, one: whole of Government, two: Policy Integration and three: use of Big Data Analytics. (Ministry of Electronics and Information Technology, 2017). The findings are thus observed as the important means to achieve the Sustainable Development Goals (SDGs). Whole of Government Approach aims to provide integrated services across economic, social and environmental dimensions and also proposes collaboration between various sectors, sub-

sectors and activities. Policy integration, on the other hand, enhances this inter-linkage between different areas of policy, whereas, Big Data Analytics helps in gaining deep insights in complex issues such as that of policy formulation and decision making. These three make-ups for the globally significant trends pushing the world forward to break away from traditional sectoral trends and step into re-architecting the Government as one single enterprise.

India, following the same lines has a noteworthy history and attachment with the eGovernment development. However, it is a matter of concern that the country has been lacking with only ten points in the global average of eGovernment Development Index (EGDI). (Ministry of Electronics and Information Technology, 2017). The National e-Governance Programme in 2006 gave a push to the eGovernance projects in India and under the flagship of Digital India 2014, it created a large vision. In order to strive and live up to the mark on the global EGDI, India needs to step up from its individual projects and architect towards building one vision of Digital India.

India Enterprise Architecture or IndEA was then put forward by the working group of National Enterprise Architecture by the Ministry of IT, Government of India. It is introduced as a concept of ONE Government – a Government that is least visible but is most effective, a Government that is 'not fragmented by narrow domestic walls' but presents a single interface to the constituents, a Government that is citizen-centric, efficient, transparent and responsive. To facilitate this concept the framework for IndEA is derived and based upon the latest EA framework called "The Open Group Architecture Framework" or TOGAF. TOGAF Uses clearly defined terminology which enables simple communication between departments and a sizeable reduction in the likelihood of wasteful errors hence making implementation easier and simplified. IndEA aim is to establish the best in class architectural governance using ICT infrastructure to make and implement a comprehensive framework. It shall be an inclusive model, which is to say, it will provide an integrated, consistent and cohesive approach to strategic goals, business services and technologies. (Ministry of Electronics and Information Technology, 2018) Thus, further providing with a ONE Government experience to the citizens and business through cashless, paperless and faceless services. The primary requirement of IndEA is to assist various government organizations, ministries, state governments and departments to adopt a structured and formalized approach in developing their Enterprise Architecture.

The paper has been further divided into seven sections, Literature Review, Objectives of India Enterprise Architecture, Structure of India Enterprise Architecture, Implementation of India Enterprise Architecture, Enterprise Architecture initiative, Key Concerns, Way Forward and Conclusion. Beginning from the already available literature on the Internet, and collating its data for analysis. We then move forward into understanding the key objectives as aimed for and structure which is to be put in place for IndEA. Implementation of IndEA focuses upon decision and policy making procedure involved in designing the framework of the IndEA, along with the current initiatives taken up by the Government at State and Rural level. We also try to map out various Enterprise Architecture initiatives across the world, under Enterprise Architecture Initiatives. Lastly, the paper tries to bring out critical analysis

of the IndEA as policy. The major focus of the paper is on the analyzing of the data curated in order to bring out the key challenges we face in regards to implementing IndEA as a national level project and what can be its way forward to overcome the mentioned hurdles.

### B. Scope of the Study

The contribution of the study is not just to identify the key problems/challenges to IndEA both from user's and implementor's perspective but also to present a doable innovative way forward in present scenario of the country.

### C. Methodology

The present, current study is an extensive analysis of literature review related to various aspects of Enterprise Architecture including Open Government Architecture Framework and related business model. The information has been primarily gleaned from government domain; public academic paper/studies available in the public domain.

### D. Present Study

This study delineates on the usage of India Enterprise Architecture that has been conceived, designed, maintained and implemented by Ministry of IT, Government of India for engaging with its citizens and

creating transparency and accountability of the government. The study specifically focuses on the critical analysis of the implementation of the IndEA framework from the developer's end i.e. the government and from the user's end i.e. citizen centric approach.

## 2. Literature Review

Before penetrating into the said theories of Enterprise Architecture, we dug deep into its already mentions in various literature pieces. The literature pertaining to the broad areas of immediate relevance viz. Enterprise architecture system and description, implementation strategy and benefits have been reviewed to understand the overall landscape of enterprise architecture and appreciate the concept of IndEA.

### ● Enterprise Architecture: system and description

Enterprise Architecture could be best defined as a conceptual blueprint which helps in defining the structure and operation of an organization. The practice involves analyzing, designing, planning and implementing enterprise analysis to successfully implement in that of business strategies. This idea has come into being as organizations, products, customers and technologies continue to change at an increasingly rapid rate and managers look for ideas that will allow them to understand how business and IT within their organization, fits together. (Pereira & Sousa, March 2005) To this end, Enterprise architecture became the newest solution that helps organizations align their business architecture and applications architecture. Enterprise Architecture or EA is an organizational representation to enable

planning of organizational changes by mapping current and future business objectives, goals, visions, strategies, informational entities, business processes, people, organization structures, application systems, technological infrastructures etc. With a strong EA function, decision makers can see the assets in the organization, understand interdependencies and map these to business architecture. This allows organizations to achieve enhanced resource optimization, business process improvements and rapidly fill the gaps in organizational ability to attain business goals and achieved a synchronized, enterprise-wide perspective.

The whole framework was a response to business technology with the introduction of computer system. The need was of a long-term strategy to sustain, which now has evolved further to the entire business and not just IT. Ensuring that the whole business is follows the path of digital transformation and technological growth.

The field of enterprise architecture was essentially started in 1987 with the publication in the *IBM Systems Journal* of an article titled "A Framework for Information Systems Architecture," by J.A. Zachman. (Zachman, 1987) In that paper, Zachman had laid out both the challenge and the vision of enterprise architectures that would guide the field for the next 20 years. Taking a cue from this development several companies, over a period of time, developed their own versions of EA program most notable being Technical Architecture Framework for Information Management (TAFIM) in 1994 by the US Government Department of Defense, Federal Enterprise Architecture Framework (FEAF)[1] in April 1998 by the CIO Council and the latest one being The Open Group Architecture Framework (TOGAF). (Roger Sessions, ObjectWatch Inc., 2007)

These EA frameworks, though different in terminologies, share a common concern for the various components of the enterprise that should be captured and analyzed. These components include business processes, human roles and actors, physical organizational structures, data flow and stores, business applications and platform applications and communication infrastructure (International Organisation of Standardization, 2011-12) which can be classified into four broad heads namely

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[1] FEAF was later renamed to Federal Enterprise Architecture in 2002 after FEAF moved from CIO Council to Office of Management and Budget (OMB)

strategic direction, business, system and technology architecture. EA architectures become valuable management tool as they essentially help in analysis of component relationships through these architectures. (OpenText, 2011)

- Implementation Strategy

There are several steps for an optimized implementation of organization wide enterprise architecture. The steps essentially begin with understanding how it can address important enterprise wide concerns such as meeting stakeholder needs, pursuing new strategic initiatives, aligning IT resources with business needs, or reducing duplication of systems, processes, or data. OpenText whitepaper (2011) has advised understanding the various

benefits that EA provides and learning the architecture components and relationships that must be analyzed in order to achieve specific objectives. This requires analyzing architecture on two dimensions namely timing of the benefit received and the type of value. Based on this analysis EA benefits can be realized in any of four different categories: Operational Efficiency (current benefits for cost reduction), Process Effectiveness (current benefits for revenue generation), Opportunity Creation (future benefits for revenue generation) and Automation Efficiency (future benefits for cost reduction). The next step requires mapping of these strategies onto the EA heads described earlier.[2] The mapping shall enable decision makers to identify gaps in opportunity creation, system enhancements and infrastructural changes required. Through this implementation methodology, EA will facilitate rapid change in an organization's business processes and, in the information, applications, and technical infrastructure that support them. It can be a valuable management solution for addressing important enterprise-wide concerns, like assessing the impact of business changes, aligning long-range business plans with system plans, and focusing on the strategic use of technology.

Traditionally, the role of an Enterprise Architecture was of a holistic company-wide approach that strategically aligns the IT plans with that of the company's business strategy, processes and information assets. However, in the contemporary times, the importance of EA as a unique view to the company has been realized. The Enterprise Architecture team is now being well positioned to evolve into design of a digital architecture. The aim is now to prove its ability to also establish itself as an effective business relationship and driving effective business and technology decisions. On a competitive edge, it is observed to be as a problem-solving unit, designing and developing of various digital platforms and applications, architecting incorporation of internal and third-party system and also develop mobile applications.

- About TOGAF

Over a period of time, newer frameworks of Enterprise Architecture have been developed and the latest one in the series is TOGAF or The Open Group Architecture Framework. TOGAF helps organize a developmental process via a series of systematic approach which aims at reducing errors, maintaining timelines, staying on budget and aligns IT with business units, which helps to produce quality results.

In context of TOGAF, architecture is defined as a "fundamental organization of a system embodied in its components and relationships between them and the environment while incorporating principles governing its design and evolution". (Visual Paradigm, n.d.) These principles of architecture are provided by TOGAF as an enterprise architecture methodology so as to improve business efficiency which follow a 7-layer content model. The seven layers include introduction, architecture development, ADM guidelines and techniques, architecture content framework, enterprise continuum & tools, TOGAF Reference models and architecture Capability Framework.

The TOGAF Standard has had several versions since its inception with the latest one being Version 9.2 which is an update to the TOGAF 9.1 standard. It provides improved guidance on

correcting errors thereby improving the document structure and removing obsolete content. Key enhancements made in this version include updates to the Business Architecture and the Content Metamodel. All of these changes make the TOGAF framework easier to use and maintain. Just like the previous version, this version also stands on four pillars namely Business Architecture, Applications Architecture, Data Architecture and Technical Architecture.

# 3. Objectives of IndEA

India's aim is to develop *one government*. In order to develop that the IndEA framework aims to provide a federated architecture approach and recognizes the need to encompass new and existing eGovernance initiatives.

To be able to deliver the same it has laid down some objectives which focuses on documentation and sharing of architecture best practices in order to collaborate more. In order to kick start enterprise architecture initiatives, it necessary to provide with proper guidance in the development of the same. The primary objectives of IndEA are to (Ministry of Electronics and Information Technology, 2017):

- Capture and codify current knowledge and experience in a consolidated form for ready reference to anyone who is interested to understand this subject

- Kick start enterprise architecture initiatives across India, covering entire state governments and other government / public sector entities

- Enrich the procurement process and provide greater leverage to government enterprises in managing their vendors

- Document issues and concerns contextual to India, in manner such that the finer nuances of governance are captured and factored in

- Support India's transition towards digital governance and knowledge economy as envisaged in the Digital India initiative

The implementation has to be done in such a way that it helps to capture the key elements of architecture and inter-relationships between them to factor in the finer nuances of the government.

Lastly, but not least, Enterprise Architecture has to be envisaged in alignment to that of India's transition towards digital governance and knowledge economy.

## 4. Structure of India Enterprise Architecture

India Enterprise Architecture (IndEA) is an essential stepping stone of a design framework for any government agency or organization. IndEA however, is not an enterprise architecture in itself but contains unique reference model dealing with domains of Enterprise Architecture and developing Enterprise Architecture for Government Agency/ Department.

Similar to other globally known architectural frameworks, the structure of IndEA consists of a number of Reference Models. India Enterprise Architecture follows an 8-layer reference model and framework key principles, as follows (Saha, 2017):

● **Performance Reference Model**: It provides a uniform mechanism to measure the effectiveness and efficiency i.e. methods of outcome assessment.

● **Business Reference Model**: Focuses on the business vision i.e of the functions and services which is then required to fulfil the vision of IndEA. Integration of services and re-engineering are thus the main objectives.

● **Application Reference Model**: The main aim is to provide a foundation of function and automate these services under the Business Reference Model.

● **Data Reference Model**: Collaboration and sharing of information is the key to any successful organisation. Following the same lines, the model aims to identify, discover, describe, manage and protect data to share and reuse it within the various levels of the government.

● **Technology Reference Model**: Enterprise Architecture framework is built upon the ICT based application, thus, to produce cost effective framework digital collaboration and association is a must.

● **Integration Reference Model**: Key objectives of IndEA includes that of making up a transparent system which could be achieved through the Integration Reference Model. Moreover, it eases the different layers of government to work and collaborate together.

● **Security Reference Model**: India being at the peak of cyber threat, multiple services being provided via online services and web thus become susceptible and an easy catch for various digital threats. Which later poses a huge threat to the e-Governance activities. Thus, the model defines best practices for the security of IndEA and its assets.

● **Architecture Governance Reference Model**: It guides in establishing and laying down the foundation design of IndEA and its principles. The sole responsibility is that of build the processes and structural relationship to ensure that the whole framework is in alignment to that of the business vision.

## 5. Implementation of India Enterprise Architecture

The implementation of IndEA requires the organisation (here the government department/ministry to cross four major milestones. These include 1) assessing the capabilities and readiness of the organization for undertaking an EA initiative and subject to a positive result 2) customizing the IndEA Framework for the domain / enterprise being addressed 3) converting the Reference Models (discussed in previous section: Structure of IndEA) into a set of Architectures and 4) implementing the Enterprise Architecture, in a closely coordinated and sequenced manner. These four steps are elaborated below:

## EA Capability Assessment

EA Capability Assessment involves measuring the capabilities of the enterprise along four dimensions – ***People, Process, Technology and Resources.*** The ***people*** dimension requires assessment of whether there exists the right motivation and skill set amongst the multi-sectoral team which should consist of senior administrators, senior enterprise architects and senior program managers. The assessment on the ***Process*** dimension is about knowing the readiness of the organization to take game-changing decisions, adopting global best practices, a keenness to enhance the citizen-centricity, efficiency and transparency and above all, an ecosystem empowered to take quick decisions in the overall interests of the EA program. The assessment on the ***Technology*** dimension involves gauging the technological maturity of the enterprise, in terms of the availability of enterprise-wide infrastructure and systems, well-established network of service delivery channels and a clear roadmap for adoption of emerging technologies. The assessment on the ***Resource*** Dimension is looks at the existing budgetary resources, the recent trends of IT spend of the organization and the political commitment to provide the necessary budget support as needed.

## Customization of the IndEA Framework

IndEA Framework is generic by design. It cannot be used straightaway by any enterprise. The framework has to be customized to fit the broad requirements of the business vision and objectives of the enterprise. The following questions need to be addressed to enable such customization. A consultative process has necessarily to be followed which should consist of questions like the business

vision proposed to be supported by the EA initiative, the major stakeholder groups to be targeted, top services to be designed and delivered, timeframe in which tangible results of EA have to be demonstrated, budget available with the implementing authority and technology expertise/ resources available to undertake the exercise

## Implementing IndEA

The Reference Models of IndEA are abstract by nature and provide guidance for the design of the detailed Enterprise Architectures to an organisation. However, they cannot be made use of directly. Hence, the implementation guidelines of IndEA have given a minimum set of output parameters that form the basis for the next phases of procurement and application development.

Once the design and development of Enterprise Architecture is completed as outlined in the earlier section, a major milestone is crossed. Realizing the Architecture is more about Governance, Procurement and Program management. The method(s) of implementation vary widely across enterprises, depending on the ecosystem of governance and the current stage of evolution of e- Governance in the enterprise. However, the key steps as advised by the implementation document are to start the ground level implementation with a small footprint. This could invariably include the Core Platform including a few integrated services. Once the initial realization is completed and the benefits of EA begin to be felt by the stakeholders

(like more efficient integrated services, interoperability, easy access to enterprise data etc) the ground for the rollout would have been well laid out.

## 6. Enterprise Architecture Initiatives

● Indian Initiatives

Enterprise Architecture is a relatively newer concept for India, not widespread, howsoever, there have been advances in the same field in order to adopt enterprise architecture within the Indian government. Some of the notable ones are given as follows (Ministry of Electronics and Information Technology, 2018):

### 1. Panchayat Enterprise Architecture Framework

India follows a three-tier institutional structure of Panchayats, which offers India's rural villages an opportunity to participate in the development of their locality through their involvement in preparation, execution, monitoring of development plans and programmes. Moreover, it also provides citizens with a platform to directly interact with their elected representatives to ensure an effective communication of ideas, effectiveness of services and expenditure of public funds. Thus, symbolizing, Panchayats, as a symbol of decentralisation of governance and grassroot democracy.

The key identified objectives of e-Governance of enterprise architecture that also forms the pillars of the PEAF in Panchayats includes that of:

● Providing aid to decision making to the Panchayats

● Providing the means to improve the internal efficiency and management of Panchayats

● Better and convergent delivery of services to citizens

● Encouraging transparency, disclosure to citizens and open to social audit

### 2. Enterprise Architecture in the Ministry of Drinking Water and Sanitation

The Ministry's aim is to provide drinking water and sanitation to rural masses of the nation. In order to achieve that, the government has initiated welfare programmes at national level namely, Swachh Bharat Mission and Gramin and Rural Drinking Water Programme. Objectives of both is to provide facilities by providing financial assistance to the State Governments.

The main aim here is to implement a strong and effective e-Governance system in order to improve the effectiveness and efficiency of the whole programme to achieve its goals. For the same, MoDWS Enterprise Architecture, thus, defines framework methodology giving out a comprehensive view of the enterprise from various perspectives in alignment of the IT systems. The purpose is to optimize the fragmented processes, both manual and automated into one integrated environment which is highly responsive to changes and delivers in

support of the business strategies.

### 3. e-Pragati: The Andhra Pradesh State Enterprise Architecture

Andhra Pradesh is the first state to develop a state-wide enterprise architecture. The aim is to guide and accelerate the state government's journey by integration of operating models enabling departments to collaborate and deliver personalized services via multiple channels. Here, the citizens are an active participant to an outcome-driven, transparent and accountable government.

e-Pragati intends to transform to a citizen-centric approach, largely focusing on:

a. **Single Entry, Multiple Use:** Details of a citizen if available with the government is accumulated through e-Pragati so that citizens do not have to provide them multiple times to avail services

b. **No Wrong Door:** Citizens view the government as ONE entity

c. **Disintermediation and Reintermediation:** Collaboration of multiple departments is taken as a priority while functioning, without the citizen having the need to approach the related departments individually

d. **Derive Insight, Deliver Foresight:** Predict services and make available of those services that citizens need or are eligible for and provide service delivery proactively

e. **Citizen Core, Mission Focused:** Group services for categories of citizen stakeholders (e.g. farmers, students, patients, pensioners, senior citizens, civil servants, defence personnel etc.), possibly around life-cycle events and deliver them in a unified manner through government missions.

### 4. Smagra Vedika

Telangana Government has developed its own software of integrated platform with databases of various departments and to track citizen details for the same. Developed by the Information Technology, Electronics & Communications and Planning Department allows the state to integrate and cross check citizen data among all government departments without finding the need to rely upon the Aadhar Platform. (Nanisetti, 2019)

### 5. Meghalaya Enterprise Architecture

Recently, taking a step forward the Government of Meghalaya have implemented the Official Web Portal of Government of Meghalaya. (Now Avail Govt Services on Single Website, 2019) Following the vision of creating, One Nation, One Platform the state government, under the Digital India Flagship has thus launched its official website. The web portal, further, integrates, the individual departments and agencies such as that of Tourism, Online Services, Schemes, Government Department data, Acts, Documents and links into one single platform for the ease of the citizens. The website was launched on July 31 2019. (National Information Centre; Government of Meghalaya, 2019)

- Similar Global Initiatives

Similar to the lines of IndEA, several world economies already have an enterprise architecture in place. Some of the global best practices are given as follows (Liimatainen, Hoffmann, & Heikkilä, 2007):

1. **United Kingdom:** Modernizing Government program works across organizational boundaries

2. **Canada:** Government On-Line Initiative, aimed to bring together 170 different Government

   websites

3. **Finland:** W-O-G Approach concentrates on horizontal activity in 4 priority areas namely

   employment, entrepreneurship, information society and civil participation

4. **USA:** Integrates the collaborative efforts of the departments and agencies of government to

   achieve unity of effort toward a shared goal.

5. **Mauritius:** Whole of Government Strategy Map (WOG) enables government agencies to "think across organizational boundaries" and work in a collaborative mode across portfolio boundaries. **7. Key Concerns**

TOGAF currently, is the most popular Enterprise Architecture today and also provides India Enterprise Architecture as the building base. (National eGovernance Division, 2019) However, even with its increasing popularity and key benefits it is yet to still make a leap. Over here, we try to understand the roadblocks and shortcomings of the framework proposed by TOGAF, followed by model of IndEA.

- Implementation of TOGAF

TOGAF in itself is not a solution to all the problems, rather should be seen as a way forward or a beginning in order to provide framework. Countries who have so far implemented TOGAF had critiqued the entire basic structure the framework stands on.

First, most TOGAF recommendations are found to be inapplicable and inadequate, universally. (Smith, 2018) Second, when we talk about its step-to-step implementation most EA practitioners report it to be unfitting as per their requirements. (Kotusev, 2016) Common problem faced in the implementation includes defining the 'hows'. Where it is quite easy to describe as to what TOGAF stands for and what it aims to do, the problem comes in the way of defining as to how to implement it.

Third, changes brought about in TOGAF v9.2 does not addresses the fundamental problems of the mechanistic planning as advocated. (Enterprise architecture is not TOGAF, 2016)

Since, IndEA structure is built and highly inspired from TOGAF model we are likely to incur such hurdles.

- Implementation of Enterprise Architecture

Vish Viswanathan, Managing Principal of C C and C Solutions based in Sydney, Australia has a similar perspective and taste. (Bloomberg, 2014) He herein, critics not only the implementation of TOGAF in various countries and organizations but also their readiness to do so. Especially in the case of developing countries and some developed countries Enterprise Architecture is observed as the solution to the inability of the government to perform well. Thus, promoting EA frameworks like TOGAF and IndEA as a one-time investment model. More than the framing of the model the key issue and challenge lies in the implementation of the model. The rules and guidelines aren't set universally for every other country, but, therefore, every nation needs to realise its unique requirement and then make changes to the model accordingly. It is a rigorous process and a continuous way forward that needs to be implemented. And this can only be achieved if we at an individual level are capable of it.

At the end of the day, Enterprise Architecture models such as that of IndEA and TOGAF are only a set of rule book which depends heavily on its application of its users and the organisation. Failure of Enterprise Architecture is not the failure of the model but that of the management that is in action. While there have been issues with the understanding and implementation of the said framework, it still is a dream project in countries like India.

- Challenges to IndEA

    *a. Readiness*

Our first challenge as an Enterprise Architecture practitioner is to understand our readiness as a nation. The model proposed encompasses eight different, yet interdependent reference models.

Before understanding our readiness of Enterprise Architecture, we need to fragment out each particular model to understand its aims and deliverables. (Saha, 2017)

One, Performance Reference Model, which talks about defining methods for outcome assessment to IndEA. The main question here arises is that of how well do we define it in alignment of our current Sustainable Development Goals. What parameters do we define and how do we define parameters of judgement of the impact of IndEA in such a vast population and geographic space? Two, Business Reference Model, is highly dependent on the practical application of the enterprise architecture. The need of the hour is to make sure of the readiness of the departments and ministries. The whole framework of IndEA is based on the business model. It is not only the readiness of the central government but shall also question and challenge the readiness of different government bodies and their capabilities. Are we as an individual enterprise ready to sustain our development and growth to bear the fruits of maximization of benefits? Unlike the IT model it cannot be left independent of its functioning and requires rigorous implementation and application.

Third, currently the implementation of IndEA has been observed at state level only. However, what we need to focus is on the collaboration that needs to be done for the smooth functioning. Which is to say, the centre and state needs to work in a single language and in harmony for better implementation of the technology and for it to work independently. No technology independence can be achieved without the intelligence not being able to communicate among themselves.

*c. Upgradation of Already Existing Units*

Fourth, applications which are already in place independently either needs to be upgraded to be in alignment of the IndEA framework or the framework itself needs to be implemented or structured in a way to incorporate the already existing tools available with the government. Thus, again defining and standardizing our readiness in the implementation of the IndEA framework. Fifth, data collection, management, archival and use as per the National Data Policy is the most important and prominent key of the whole enterprise. In a vast geographic nation like India, with a population of more than a million collection of data has always been a challenge. However, with the implementation of Open Government Data this problem has been curbed up to a proportionate level. Yet, the challenge lies of readiness and classification of data into open data and classified data. How do we define such data and its parameters? While the collection is done by respective ministries and departments however, technology infrastructure, security and communication with the trusted application stands as a challenge at the national level.

*d. Data Security and Privacy*

Sixth, challenge and criticism have come through in regards of data security and privacy. To which lately, the state government has faced multiple backlashes in terms of data privacy. Various independent researchers and privacy experts and have raised the concern in regards to the usage of the ability given to the state government, as in the case of IndEA structure lately been in implemented in Telangana. However, this was a state example but when we talk about India as a whole, we need to realize its vastness and the type threats like cyber-crimes and breach of information it brings along.

When we talk about data, we need to realize that all dots are connected and once you lift anyone dot the whole thread of information gets lifted up. Data privacy is a dynamic challenge faced by the

government itself. Thus, an accountable agency needs to be given this responsibility which has the sufficient expertise.

*e. 4A's: User Experiences*

Where there are implementation challenges from the developer's end, there are some other major problems and setbacks faced at the user level as well. Such hurdles comprise of the implementation at the root level. It includes that of the 4 A's; Availability, Accessibility,

Adaptability and Affordability.

## 1. AVAILABILITY AND ACCESSIBILITY

India Enterprise Architecture aims to build a one nation, one government. When we talk about government, we need to understand the basics of it i.e. by people, for the people and of the people. In large scale countries like India, wherein the population is humongous the issue of last mile connectivity stands as the first roadblock. While we may implement new frameworks and strategies we need to focus on its impact to the grassroots level as well.

## 2. ADAPTABILITY

What we require is not only the way of implementation and how to implement it but also for the citizen to be aware about it. No change in the history could be ever brought alone, change makers needed the support of the masses in order to bring the change we wish to see in the world.

## 3. AFFORDABILITY – High Capex and Opex

When we talk about new policies and changes, we need to think about the expenditure in terms of the priority need and the budget. Generally, in developing countries like India a lot of amount gets out only in investment without any said or less outcome possible.

## 8. Way Forward

TOGAF has gained a lot of attraction majorly because it is better to do something than just to do nothing. And thus, when we talk about its key concerns and criticism, we too need to find solutions to put forward in order to sail through it.

For us to advance as a fully functioning enterprise architecture, our first undertaking should be able to prepare our self as one platform, which is to say, to be able to make our departments individually so strong and sustainable to be able to implement Enterprise Architecture.

### a. Developing Goals: Short Term and Long Term

First, the aim should be to plan out the targets clear. Rather than making unrealistic goals and practices our way forward in terms of short-term goals and long-term goals should be well defined. Second, rather than directly jumping on the Enterprise Architecture bandwagon, we need to realise our already set capabilities and how can we enhance ourselves more in individual capacity. For instance, UN Sustainable Development Goals could be defined as our long-term goals and short-term goals could be then defined based on lessons learnt from the feedback of our individual capabilities and readiness of each department.

### b. Country Dashboard

Next in line, is to be able to make a country dashboard. Wherein, we focus on geographical progress of each and every parameter, development in terms of index-wise view, scheme

wise view and lastly, focusing on portfolio view so that senior government officials can readily and easily make calls for revenue and budget. The same could be applied in terms of business model view, wherein, practical business functions and services needs a better understanding. Again, when we talk about individual capabilities, we need to understand the individual concepts of Enterprise Architecture our self before conceptualizing and putting it out in a framework. For that the first step is to understand the business structure of any organization. Which will come from the better understanding of horizontal and

vertical view of schemes and programs across geography, departments and developmental sectors. Next, portfolio analysis is required for revenue and budget planning, the information then will be fed from the project and program management system. In order to maintain this system and flow, what is required is the basic principle of business management which is an agile workflow. Our policy making strategies need to be enhanced in order for it be rigorous and agile.

### c. Developing Tools in Alignment of IndEA

Second, in order to implement IndEA as discussed above we need basic tools. India as a developing nation and a top competitor in the field of IT have made its own advancement. The need now is to incorporate those ideas and tools in alignment to that of the needs of IndEA. Collaboration and teamwork are the two core features of any EA, along the same lines, IndEA should focus on standardizing the processes across all levels in terms of the functioning and services. Where we want our departments to be self-sustainable, we also want them to achieve a teamwork process. Central and state government along with different agencies need to come up with transparency model between them and an enhanced communication system.

### d. Domain Specific Applications

Third, applications need to be made domain specific i.e. healthcare, agriculture, education etc. and general utilities like Aadhaar authentication, eProcurement, ePayment, Biometric attendance etc needs to come under one umbrella. Rather than focusing on new ways to develop these applications, we should focus on already existing initiatives made by the e-governance and transformation programs made by the state and central government.

### e. Standardization of Already Existing Tools

Again, going back to the standardization, our current tools for the same implementation could be standardized for one integrated use where one application can talk to another one and use the data as per the guidelines, thus benefiting us more. For instance, eGovernance applications built by NIC and UMANG already have sufficient know how and problems faced in implementing applications on a single platform. Learning from these initiatives should be the building block to create the IndEA application architecture. NIC and UMANG should be given the responsibility to expand and accelerate the existing platforms to scale to IndEA needs. Standardization, technology independence, reusability of code and hot plugin architecture of applications.

Similarly, Open Government Data initiative implementation could be used effectively to formulate data, organize, manage and analyze. Rather than giving the government the authority of the data, the role of Open Government Data should be enhanced and put forward wherein the data is first curated by OGD from respective departments, and as for the IndEA a separate department should be made. Who retrieves data from OGD as per the requirement and thus also adhering to the data protection and policy?

### f. Resolution of the 4A's

For our dream project to actually turn out into reality, we need to first focus on said 4 A's in order to surpass our hurdles. One Nation, One Government (One Platform) can be achieved initially by making the set changes and policies as citizen centric, centered and inclusive. For any new wave to make a change it needs to hit down to the roots as well, and should be the main agenda. For a better Adaptability, an agile policy making approach should be put forward and openness to newer collaboration shall be welcomed. Awareness programs not just in terms of news flash but also making citizens ready to adopt such new technology advancements and sensitization towards the initiative.

## 8. Concluding Remarks

With the current pace of changing business and technology EA is in high demand, which requires our practitioners to indulge in a lot of agile thinking. As recommended, there are three basic approaches to applying TOGAF in a better and effective way. Firstly, approaching the baseline first and understanding it. Secondly, make sure of the target outcomes and what needs to be focused on. And lastly, focusing on its continuous and vigorous implementation in order to maintain a cycle of continuity.

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# Meghalaya State-wide Enterprise Architecture, The Journey So far……

e-Governance in Meghalaya has progressed over the ages, if the stages of progress as per UN eService Maturity Model are charted out, it is visible that during the late 80s and early 90s the state was in Stage I, doing a lot of Computerization projects. Somewhere between the late 90s and early 2000, it had reached Stage II, where the focus was Automation. Now it is currently in Stage III where the focus is on adoption of more standards, and output, a stage where the Government is engaging in two-way communication with the citizens, including requesting and receiving information. While the state has developed several systems to automate key government processes, the resulting landscape is not optimal, as they are characterized as being siloed, having low interoperability, and not resilient enough for quick changes. This is what the state aspires to be, i.e. to reach Stage IV, the connected government stage. This stage is Transformational in nature, where e-Services and e-solutions cut across the departments and ministries in a seamless manner. Information, data, and knowledge are transferred from Government agencies through integrated applications. The shift in focus, from a Government-centric one to a citizen-centric one, where eServices are targeted towards citizens through life cycle events and segmented groups to provide tailor-made services.

Meghalaya has a population of 29,56,690 covering an area of 22,429 sq. km, predominantly an agrarian economy, with a 70-80% rural population, It is having three predominant tribes, with different cultures and language, it is having a literacy rate of 75.48% and has achieved about 80.14% village electrification, its per capita GSDP of INR 88,497, all these have to be factored in for eServices, while also trying to balance with the rising expectations of citizens, and the need for the government to deliver the intended outcomes in minimal time and within the defined budget, all these while also ensuring accessibility, availability, quality, and affordability of services to all segments of the population.

Government Enterprise Architecture (GEA) is defined as, a whole of government approach to supporting government ecosystems by transcending boundaries for delivering services in a coordinated, efficient, and equitable manner.

The above-mentioned reasons have necessitated the need to have a Government Enterprise Architecture in place, a blueprint that will help align the people, process and technology. It will provide guidance and support to the Government of Meghalaya, and also ensure that Meghalaya maximizes its return on IT investment in a way that will help them serve its people better.

During the month of August 2018 two events took place: A 2 day workshop on Enterprise Architecture for the North Eastern States was organised by the NIC Meghalaya in collaboration with the North Eastern Council from the 9th – 10th August 2018, preceded by the launch of the 'Digital North East Vision 2022' which was released in Guwahati on 11th August 2018; it is envisioned as an integral part of Digital India programme, that will leverage digital technologies to transform the lives of the people of North East India, enhance ease of living, and ensure inclusive and sustainable growth. These events inspired Enterprise

Architecture in the State.

A Request was made by the Hon'ble Chief Minister Government of Meghalaya to the Union Minister MeitY during the NE Vision 2022 for development of a State-wide Enterprise Architecture, that brought about a high-level meeting chaired by the Hon'ble CM of Meghalaya, Shri Conrad Sangma, on the" Preparation of State-wide Enterprise Architecture for Meghalaya and its implementation", convened on the 29/10/2018, and facilitated by MeitY and NeGD, during which the Hon'ble Chief Minister consented to go ahead with the development of the Statewide Enterprise Architecture based on IndEA, in the North East. Three committees have been constituted for its development, the Leadership Committee, Steering Committee, and the Project Implementation Committee Objectives

To develop a Statewide Enterprise Architecture for the Government of Meghalaya so as to achieve the following:

**For citizens and businesses-**

  i.     Faster and transparent delivery of digital services to citizens.
  ii.    Realise One-Government experience.
  iii.   Enable participation and positive engagement.
  iv.    Minimize digital divide.
  v.     Enhance ease of doing business.
  vi.    Embrace disciplined approach to measure impact and outcomes.

For Government Departments-
  i.     Greater efficacy in government functioning and resource utilization.
  ii.    Wider participation and inclusion of citizens in governance.
  iii.   Innovation in service delivery.
  iv.    Foster openness and transparency.
  v.     Internalize data driven culture and sharing.
  vi.    Secure information sharing.

MeghEA is conceived to support the following digital government goals:

  i.     A planned state government transformation initiative which demands efficient coordination between strategies, policies, processes, services and organizational capacity to absorb change.
  ii.    Enhance service delivery across the state government in order to create services that are citizen-centric, cross-departmental, end-to-end and outcome based.
  iii.   Rationalize data across the state government to enable an integrated perspective, facilitate open data and transparency, and departmental collaboration and compatibility.

iv.   Coordinate all ICT initiatives under one umbrella to get a better holistic perspective, boost IT planning effectiveness and optimize costs and investments for better returns.

v.    Implement and ICT enable state government process reengineering to provide multi-channel service delivery in a manner that increases digital take-up and completion rates.

vi.   Ensure that state government applications and systems provide end-users with information they need to make decisions and influence government operations.

vii.  Improve the execution capability of policies and other interventions to achieve better planning and anticipate budgetary impacts on the government and enabling ICT systems.

viii. Adopt new and emerging technologies to augment state government efficiency and thereby attract investments.

ix.   Craft an ecosystem for the digital economy to boost shared prosperity, by leveraging ICT for employment and growth.

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# IndEA: NIC's Experiences & Road Ahead Insights from EA & IndEA Adoption by NIC

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## Abstract

India Enterprise Architecture (IndEA) Framework seeks to streamline, standardize, and optimize the e-Governance efforts across the country. Government of India notified it as a national standard on October 9, 2018.

National Informatics Centre (NIC) is among the first government organizations in the country to utilize Enterprise Architecture (EA) approach. NIC utilized TOGAF for developing architectures for Panchayat domain and Drinking Water & Sanitation sector in 2015, experiences from which went into the drafting of IndEA under the chairmanship of Shri J. Satyanarayana, Former Secretary, Ministry of Electronics and Information Technology (MeitY). NIC has since applied IndEA guidelines & approach in several of the projects, many of which received awards from the Open Group for Innovation and Excellence. NIC also took the initiative to establish Enterprise Architecture Resource Division (EARD) which undertook awareness and training activities to build understanding and skills on EA/IndEA.

Being at the forefront of EA adoption, NIC has learnt several vital lessons. Lack or absence of most important characteristics, viz. a) Use of Key Performance Indicators, b) service-centricity, c) focus on interoperability and data standards, and d) configurability of resultant solutions dilutes any attempt to be compliant to IndEA framework.

As the momentum for EA/IndEA grows in the country, several challenges add to the difficulty of its wider adoption. At the same time, various opportunities exist to create higher value too. Capacity building, use of agile approaches, establishment of unified, analysable architecture repository and focus towards the use of architecture for the achievement of outcomes would be vital to further advance of the adoption of IndEA.

## Keywords

## Introduction

The e-Governance initiatives in India have acquired new momentum with the launch of the Digital India program by the Central Government. To streamline, standardize, and optimize

the e-Governance efforts across the country, and promote the adoption of Government Enterprise Architecture (GEA), the Central Government constituted a Working Group that developed a holistic framework named India Enterprise Architecture (IndEA) [1]. IndEA Framework was formally notified by the Government of India as a national standard vide notification number 8(22)/2016-EG-I, dated October 9, 2018 [2].

EA methodologies in general, and IndEA in particular, provide a framework & structured approach to government organizations to align their business practices and supporting ICT systems to their vision, mission and objectives. Over the last few years, EA has seen increasing adoption by central ministries, state governments & their departments in India.

NIC is among the first government organizations in the country to utilize EA approach. Beginning with the use of The Open Group Architecture Framework (TOGAF) to model the vast domain of Panchayat in 2011-12, NIC has consistently pursued the agenda of EA. It contributed to the drafting of IndEA and has subsequently utilized the framework for several of the critical projects, applying IndEA principles and guidelines to the best of NIC's understanding and as permitted by the circumstances of the projects. Many of these projects have received awards from the Open Group for Innovation and Excellence.

Being at the forefront of the EA adoption in the country, NIC has learnt several vital lessons. Subsequent sections of this paper summarize the projects & initiatives that NIC has undertaken on EA, describe the insights generated from these experiences, and provide NIC's recommendations on further advancing the use of EA & IndEA Framework.

# NIC's EA Projects & Initiatives

## Before IndEA

Even before IndEA was published, the Government sector had started utilizing EA approach for large transformational engagements. NIC developed EA for Panchayati Raj and Drinking Water & Sanitation domains, under the leadership of Ministry of Panchayati Raj and Ministry of Drinking Water & Sanitation (MoDWS) respectively.

1. Panchayat Enterprise Architecture Framework (PEAF) (2012): Reference for development of enterprise systems supporting activities of Panchayati Raj Institutions of the nation
2. Drinking Water & Sanitation Enterprise Architecture (2015): Reference to guide the development of all e-governance applications supporting automation requirements of the Ministry of Drinking Water & Sanitation

## Utilizing IndEA

After IndEA was published in 2017, NIC reinforced its commitment to leveraging the EA approach for guiding e-Governance enablement in various sectors. Leveraging IndEA, NIC has undertaken following EA centric projects over the last two years:

1. LandHub Enterprise Architecture (LEAP): Blueprint for development of BhuSeva Software application for Government of Andhra Pradesh. It gives an integrated perspective of the services and enables quick alignment of all the stakeholder-departmental IT systems to cater to the reforms in Government Processes and for effective citizen servicing.
2. University Enterprise Architecture Framework (UEAF): Reference for development of EA and an ERP system for universities and other institutes of higher education in India
3. State Public Service Commission Enterprise Architecture Framework (PSCEAF): Reference for development of EA and e-Governance systems for State Public Service Commissions in India
4. NIC Enterprise Architecture (DigitalNIC EA): Blueprint to align the information systems and IT management tools in NIC with its vision and strategies
5. Document Registration System Enterprise Architecture Framework (DRSEAF): Reference for development of Enterprise Architecture and automation system for Document Registration using the principles of one nation, one platform
6. Lal Bahadur Shastri National Academy of Administration Enterprise Architecture (LBSNAA EA): Blueprint to evolve existing ICT systems towards a more integrated platform for the Academy's activities, thereby increasing return on investment from ICT

NIC also analyzed the service profile of Government of Meghalaya as a preliminary activity to the preparation of Meghalaya Statewide Enterprise Architecture, which was utilized to chart out a vision for the MeghEA initiative.

Other than these, State Finance Management Systems (SFMS) Architecture is under preparation in close collaboration with relevant government organizations.

The details for these projects are available on http://nicea.nic.in/projects [3]. The resultant systems based on many of these efforts are already operational and prove to be more agile and vision-oriented.

# EA Capability Development

To benefit from and contribute to the EA adoption in the country, NIC took the initiative to establish an EA focussed organization unit in 2017– Enterprise Architecture Resource Division (EARD). EARD has undertaken several initiatives to guide other government organizations, and build NIC's competency in EA, viz.:

1. Conducted a series of training on EA/IndEA for selected NIC professionals,
2. Successfully engaged with LBS National Academy of Administration (LBSNAA) to deliver EA as one of the course topics for Foundation and Induction courses for IAS trainee officers,
3. Organized EA workshop for NE states,
4. Published papers at international (ICEGOV 2019, Australia) and national conferences
5. Undertaken talks and panel discussions at premier institutes such as MDI, Gurgaon, and
6. Operationalised EA resource website http://nicea.nic.in

# Learning from NIC's Experiences

Digital India, the flagship programme for transformation of the country to a digitally empowered society and knowledge economy, mandates ICT to be the core element. However, for the practical realization of these long-term goals, the digital initiatives should be in full alignment with the goals and visions of the government and should move towards establishing a whole-of-government ecosystem. This ecosystem view also necessitates that the solutions developed under these initiatives are sustainable, scalable and replicable. EA approach provides an excellent strategy to achieve this.

EA helps eliminate 'silos of systems' by ensuring full articulation of all levels of an enterprise, including the strategic intent, business processes, information (data) and the enabling applications & technology. EA helps to align organization's processes with its goals and ensures that in turn the data and software applications are fully aligned with the mandate.

NIC's experience with EA and IndEA has highlighted four key characteristics of beneficial EA projects for government organizations:

1. Emphasis on inculcation of citizen-centricity & outside-in perspective through a service focus.
2. Use of Key Performance Indicators (KPIs) to monitor and improve services
3. Use of meta-data, data & other technical standards to improve interoperability
4. Configurability & flexibility of the resulting solutions to cater to the variability in the domain and handle evolving requirements

The EA initiatives of central ministries, state governments, and their departments should focus to deliver better services and experience to citizens by building end-to-end digital services.

Inclusion of Performance Reference Model as a distinct domain in IndEA helps to put a focus on the use of Key Performance Indicators (KPIs) to monitor and improve Service levels and thereby increase citizen satisfaction with government services.

IndEA helps in painting the big picture of e-Governance. Meta-data, data & other technical standards that improve interoperability are critical components for an EA project to realize the benefits of a connected government.

Another beneficial aspect of the use of IndEA in NIC's projects has been the adoption of participative governance mechanisms in the usage and maintenance of defined architectures. By being inclusive, architecture governance ensures wider adoption and thereby ongoing upkeep of the architectural design.

However, as the momentum for EA / IndEA grows in the country, several challenges add to the difficulty in its adoption. At the same time, various opportunities exist to create higher value too.

# Challenges

During its projects, NIC has identified four key challenges that need to be tackled to ensure higher adoption of IndEA. These are as follows:

1. Across the government organizations the understanding & capacity to develop and take advantage of architectural outputs & models is minimal. Unless this is resolved, the risk of creating shelf-ware documents that are not subsequently utilized would continue to be high.
2. Senior-level buy-in is essential to the success of any EA exercise, but at the same time securing it isn't easy. The benefits are not always clear and tangible, and are usually delivered only in the longer term. Lack of participation of the various stakeholders limits the usefulness of the resulting architecture, and restricts the delivery of benefits.
3. The nature of governance increasingly requires fast changes to ICT systems. Preparing and adhering to architecture proves to be challenging in an environment where urgent change is the norm.
4. The quality of architectural outputs remains hard to asses in the absence of objective criteria. Furthermore, as the strategic intent of each initiative is different, it is not easy to create a workable set of objective criteria to assess the appropriateness of architectural outputs.

# Opportunities

Despite the challenges, EA continues to be the most promising approach to manage the transition of the nation's e-Governance setup towards a more connected and agile environment.

Probably the most significant opportunity that IndEA provides to government departments is to help them become goal & performance oriented for their ICT initiatives, leading to a landscape of integrated systems that create higher level of value to the government in terms of realizing its goals. This orientation would allow departments to take a longer-term view of the development and evolution of their ICT systems, thereby resulting in more sustainable systems and a higher return on investment.

Various other opportunities exist for EA to create greater value for multiple stakeholders. Most important of these are as follows:

1. IndEA has put emphasis on inculcation citizen-centricity & outside-in perspective with a service focus. The EA initiatives of central ministries, state governments, and their departments should build on this focus to deliver better citizen experiences by building end-to-end digital services. Digital Service Standard (DSS) [4] would go a long way in complementing the IndEA Framework in fulfilling this opportunity.
2. EA should be utilized to help improve ICT investment planning and management by generating big-picture insights for the government organizations.

3. IndEA could better enable whole-of-government approaches through the creation of a unified and analysable repository of services, capabilities & systems at various levels of government.
4. Domain frameworks and reference architectures provide a useful mechanism to capture and manage structured dissemination of best practices and guidelines for adoption and use of ICT and emerging technologies.

# Way Forward

Various central and state government organizations have demonstrated increased inclination to utilize EA for furthering their e-Governance journeys.

To support the momentum EA has witnessed in the country, expand the adoption of EA practices, and increase the usage of IndEA and accelerate its development, following actions are vital:

1. Steps must be taken for raising awareness, understanding and capacity building at various levels of the central, state and local governments. Tailored courses, training, and certifications, which may be delivered by universities, technical institutes and designated government organizations, could be useful to this end.
2. Best practices & guidelines for applying EA/IndEA in specific scenarios should be prepared. Since EA approaches can be used to achieve various desired results, such as improving citizen service delivery, increasing adoption of digital and emerging technologies, improving interoperability and data management, and so on, it is crucial to provide more focussed direction about how EA should be best used in the context of the scenario.
3. Analysis of the benefits of existing architectures developed in various domains should be conducted, and successful practices codified into reference architectures for use in other initiatives.
4. Given the expectation of fast changes to ICT systems, IndEA Adoption Guide [5] should be evolved towards a more agile approach for preparation of architectures, and their use in guiding development and implementations.
5. Architecture content should be captured and stored in a unified repository using standard architecture modelling environment instead of word, excel, powerpoint or visio based documents. Use of modelling based repository will make architecture content analysable and reportable, thereby improve decision making through impact and what-if analyses. The repository should follow standard modelling notation to ensure better communication and collaboration across stakeholders.

# Conclusion

Through its various EA projects, NIC has experienced that IndEA can help eliminate 'silos of systems' by ensuring full articulation of all levels of an enterprise, integrating the strategic and business processes with the information (data) and the applications & technology that

enables them. Despite the challenges, EA continues to be the most promising approach to manage the transition of the nation's e-Governance setup towards a more connected yet agile environment. However, to support the momentum EA has witnessed in the country, expand the adoption of EA practices, and increase the usage of IndEA and accelerate its development, it will be essential to build capacity, focus on delivering outcomes, establish a unified repository, and focus on agility.

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| [2] | IndEA National Standard Notification<br>https://nicea.nic.in/download-files.php?nid=186 |
| [3] | NIC EA Projects<br>https://nicea.nic.in/projects |
| [4] | Digital Service Standard<br>http://egovstandards.gov.in/sites/default/files/Digital%20Service%20Standard%20Version%201.0.pdf |
| [5] | IndEA Adoption Guide<br>http://egovstandards.gov.in/sites/default/files/IndEA%20Adoption%20Guide%201.0_0.pdf |

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# Powering impactful change: Digital transformation and the role of enterprise architecture

The Digital era is well and truly upon us. Digital transformation is now an essential part of strategic thinking, be it for a country or an organisation. A confluence of factors ranging from technology ubiquity to demand for newer business models and delivery excellence is driving digital transformation. The imperative for transformation has never been greater and the advent of digital technologies make this a reality. The choice for countries and organisations alike is whether to be the disruptor and lead the change, or be disrupted and lag behind.

## Defining Digital Transformation

We define digital transformation as the continuous process of multi-modal adoption of digital technologies to fundamentally change the way services are ideated, planned, designed, deployed and operated such that they are personalised, paperless, cashless, presenceless, frictionless and consent-based. The construct of digital service is critical because governments and other organisations interact with citizens, businesses and other entities through services. Digital transformation in government has the potential to modernise government and public services, and raise the bar on citizen experience. As the vortex of change digital technologies transform government's economic, social and political mandates in unprecedented ways, accelerating country transformation.

Based on the underlying premise that digital transformation is more about strategic thinking and change and less about technology, successful transformation efforts depend on two critical dimensions: ubiquity and change. These are two very distinct dimensions of digital transformation maturity, each playing its own role with neither dimension being enough on its own. Ubiquity is the degree to which a country or an organisation is willing and able to roll out digital services at scale to cover multiple groups of stakeholders and structural entities, with varying requirements in an integrated and holistic manner, harnessing enterprise architecture; while change is the degree and the pace with which a country or an organisation is willing to make systemic change to deliver digital services to suit citizen or customer expectations in the ecosystem. Changes can be made to regulations, policies, strategy, structure, systems, skills, shared (goals), staff and style of governance.

## The Four Levels of Digital Transformation Maturity

A combination of the two dimensions yields four distinct levels of digital transformation maturity. Each dimension is different and each is important for different reasons.

Usually those countries and organisations that are weak on both dimensions are called digital laggards. These are entities which are primarily fragmented and disjointed in their approach, lack the whole of government or whole of enterprise strategic thinking, are characterised by siloes with very limited exchange of information, significant amount of duplication and redundancies and mostly lack of focused well directed efforts. Laggards may have some change initiatives, but these are few and far between, and the changes do not generally sustain. There is tentativeness in what they do and often, good results (if any) are attributable to chance rather than design. Digital laggards are unable to establish the real purpose of transformation, and lack the capability to create enablers and orchestrate the success factors to

their advantage.

Figure 1: The Four Levels of Digital Transformation Maturity
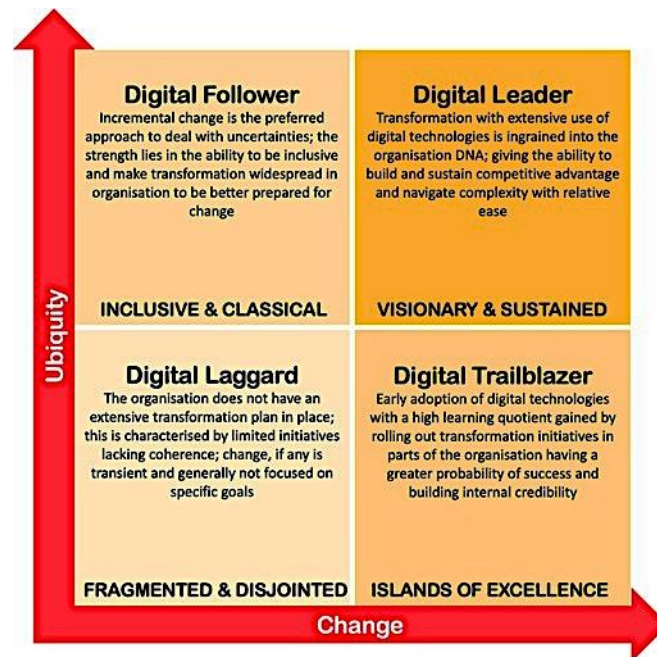


Digital followers are more traditional and classical in their approach. These entities prefer to take change in incremental steps with minimal disruption to current way of doing things. Followers are inclusive by design, in which the tendency is for them take along all parts of the organisation along the transformation initiative, albeit in an incremental manner. The premise is to make transformation more widespread and ensure that everyone is part of the journey – no one is left behind. Followers are usually not the first to embrace transformation, and when they do they may lack the political and operational capability to pull off a big change. This is attributed to the followers not having all the enablers and success factors in place at the start, and their decision to take incremental steps is to build these. They may be viewed as slow movers for multiple reasons, and if they face impediments, followers may reverse the gains from digital transformation.

Digital trailblazers exhibit characteristics that are in stark contrast to the followers. Given their admission of the enormity of digital transformation, trailblazers accept that it is not practically possible to move every part of the organisation at the same pace. Trailblazers acknowledge that there are always parts of the organisation who are more forward-thinking, and willing and able to move quickly. Therefore, the leadership in such cases allow certain parts to embrace disruptive change and let such parts derive full benefits of transformation – thus creating islands of excellence (the peaks). Trailblazers are among the first and the most eager to adopt digital technologies and may be seen as potential leaders poised for greater heights. The islands of excellence are used to build internal credibility, before preparing to scale up. Trailblazers are characterised by high learning quotient and ability to tackle steep learning curve.

Digital leaders are the ones who do well across both dimensions. In a way, they are a synergistic amalgamation of digital followers and digital trailblazers. Leaders are visionary in their approach and understand that ability to manage change at scale as a critical success

factor to digital transformation. Most likely, leaders are erstwhile followers who have the ability to scale out or trailblazers who have the ability to scale up. The path taken by a country to reach leader level depends on many factors, which are discussed in a subsequent section. The capability to sustain transformation across multiple cycles is the hallmark of leaders, and therefore they derive the maximum benefits which then lends itself into a strong reinforcing cycle bringing in further change. Leaders accept and factor in the complexity when embracing widespread and breakthrough transformation, and generally not discouraged by a few failures and setbacks. Leaders like to experiment, learn and move ahead. In most scenarios, leaders do not wait for examples, instead they create examples for others to emulate.

# Pathways to Success

Most countries and organisations begin their digital transformation journey in the lower left quadrant, i.e. as digital laggards. This is attributable to the fact that in today's world digital technologies are coming onboard faster than countries can absorb. In most scenarios, the technologies are available but the transformation is slowed down due to the internal inability to consume these and actually derive real benefits.

Figure 2: Pathways to Digital Transformation Maturity
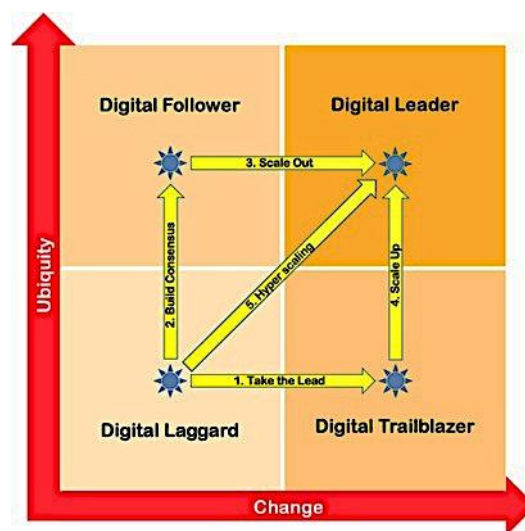


Once a country decides to move beyond being a laggard, it has three ways to move forward. The first option is it can allow certain parts to take lead and create the pathway to becoming a trailblazer. The second option is to follow (a leader) and build gradual consensus and internal capability before pressing ahead. The third (and the most difficult) option is to directly move diagonally into the leader level without any transition level to soften the disruption due to digital transformation. At times, without sustained effort it is also possible to fall back to a lower level from a higher level. This happens when the obstacles and challenges become unsurmountable and negate all progress.

# Digital Transformation Value Chain

Almost every country has or at least claims to have a digital transformation initiative. Earlier the term was defined and the central construct is that of digital services. The six fundamental attributes of services that make them digital are:

Personalised: Services are designed and delivered to suit the specific requirements of those who consume them. Personalisation is generally achieved by way of giving citizens a great experience that augurs to their needs and expectations.

Paperless: Services are automated by adopting widespread automation. Paperless services are a consequence of extensive business process reengineering and significant fundamental rethinking.

Cashless: A key aspect of digital economy is to encourage cashless transactions for services that have monetary dimensions. A cashless economy requires an integrated ecosystem of regulators, financial institutions, banks, payment mechanisms to work in tandem.

Presenceless: Services are designed with the underlying premise that human interventions would be kept to the minimum. A presenceless service is enabled by insights into citizen behaviours, creation of interaction patterns and encoding them into service design and delivery.

Frictionless: Services are designed and delivered end-to-end. This means that citizens are not exposed to all the internal coordination and exchange of information that takes places different ministries and departments, but what they receive is integrated experience. Frictionless (or seamless) services are enabled by boundaryless flow of information.

Consent-Based: Security and data privacy are the two imperatives that have to be dealt with utmost priority. In the digital era, a citizen shares huge amount of information in various forms. Therefore, the last but not least attribute that has a significant impact on the effectiveness of digital services is citizen consent. Citizens must know what data is to be collected, who is collecting it and for what purposes is it going to be used.

Leadership inertia to change is the biggest challenge to digital transformation. Therefore, it is important to project it as a value creating activity. The digital transformation value chain structures the initiative as a series of value functions working in synergy.

Figure 3: Digital Transformation Value Chain
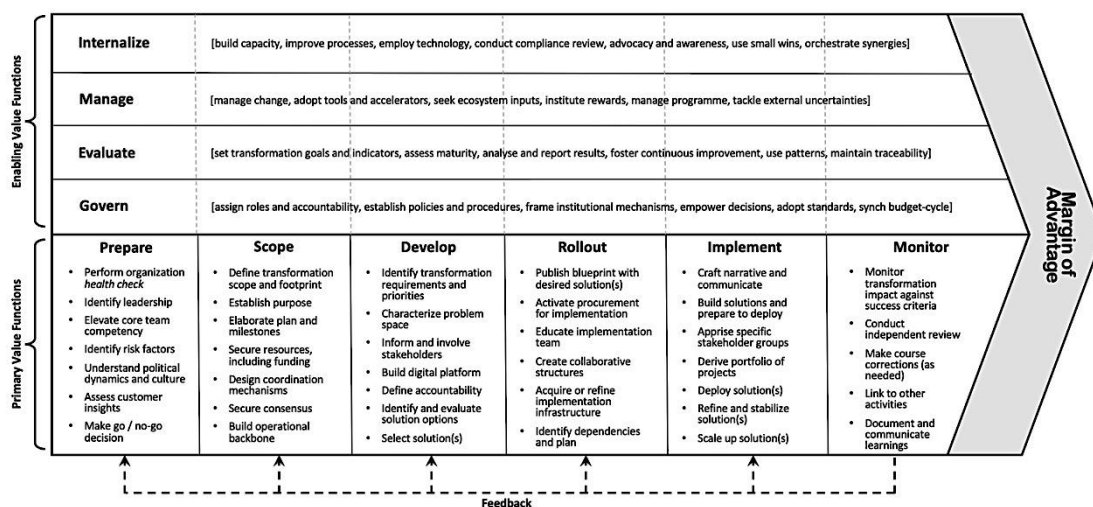


The bottom-half of the value chain show the various successive stages (prepare to monitor) that a transformation initiative consists of. The output from each stage forms the input to the next stage in the flow. In the top-half of the value chain are horizontal functions that enable

the stages and value functions of the bottom-half. The enabling value functions in the top-half are generally ongoing activities that are continuous in nature, amplifying the effectiveness of value functions in the bottom-half.

The digital transformation value chain provides a high-level process to be followed. In traversing the value chain, key issues that need to be asked and re-asked include:

Vision & Ambition: What do we aspire for? Do we have the determination to get there?

Purpose: Why are we doing this? How will it improve what we are already doing? What keeps us motivated?

Enabler: What will give us the means to achieve? What will support our capacity to deliver?

Success Factor: What must we get right for us to succeed? What could impede success?

Technology: What digital technologies should be use? What is our level of expertise to adopt specific technologies?

Digital Service (Portfolio): Which services should be digitised? Are these new or existing services? How will we make a smooth transition with minimal disruption?

Drivers: What are the critical elements that are aiding this initiative to progress and succeed? Are these drivers working in tandem?

These seven qualities are the components of digital strategy, which are put together to form the digital transformation continuum. These are in a continuum as they are distinct yet interrelated, sequenced and persistent.

Figure 4: Digital Transformation Continuum
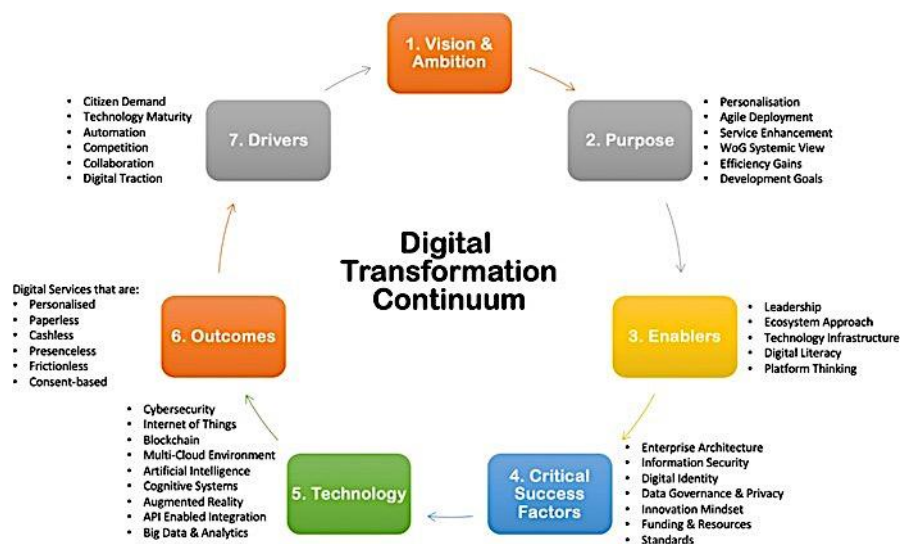
# Digital Transformation Building Blocks

Digital transformation places premium on speed and agility, but demands massive organisational changes that it takes a long time with sustained efforts to become a digital leader. It is therefore important to identify and understand the various components of digital transformation which must work synergistically. These are called the building blocks, which primarily are capabilities that countries will need to succeed. These building blocks establish a foundation to ideate, plan, design, deploy and operate citizen-centric digital services.

There are eight first level blocks – digital strategy, digital platform, value delivery ecosystem, digital service attributes, digital enterprise architecture, institutions and governance, citizen insights and delivery capabilities. Of these digital strategy and digital service attributes have been explained in the previous sections.

The value delivery ecosystem consists of key stakeholders who are actors in the digital service lifecycle (ideate, plan, design, deploy and operate). In this ecosystem, the emerging role of aggregators cannot be overemphasised. Aggregators are organisations that collect information on goods and services from several competing sources (providers) and make that information available in a more consumable form to several potential users (consumers) via a digital platform. The aggregator's value is in its ability to create an environment that attracts consumers to the platform and enable delivery of the goods and services.

Figure 5: Digital Transformation Building Blocks
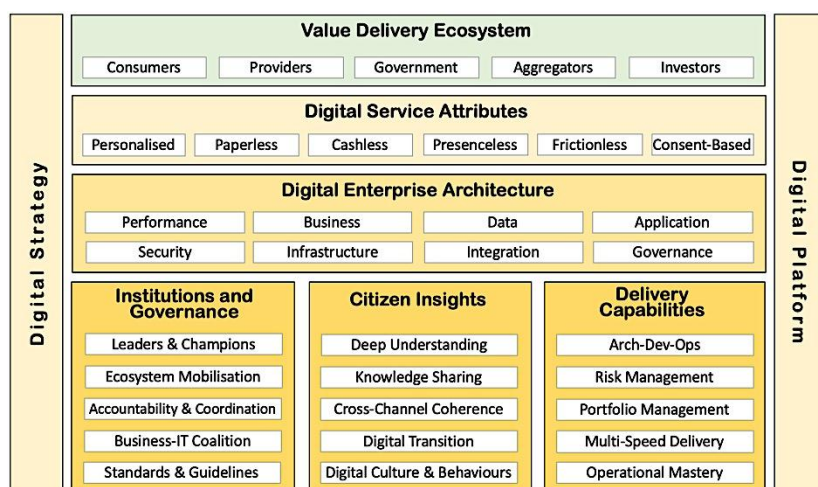


The digital enterprise architecture is the whole of government approach to support government ecosystems by transcending boundaries for delivering services in a coordinated, efficient and equitable manner. The aim is to establish best-in-class architectural governance, processes and practices with optimal utilisation of ICT infrastructure and applications to offer one government experience to the citizens and businesses through digital services enabled by Boundaryless Information Flow™1. The enterprise architecture consists of eight second level building blocks covering the eight architecture domains. These are:

Performance: The mission, goals and measures to guide priorities, decisions and outcomes. For digital transformation, it is recommended that the UN Sustainable Development Goals form the foundation for performance domain.

Business: The services, capabilities and processes to operationalise and realise performance.

Data: The way data and information are described, stored, exchanged and treated to gain actionable insights.

Application: The software and IT systems that enable business and operations with automation.

Technology: The physical ICT infrastructure that enables / restricts the ability to act.

Security: The way information is protected and made available for all legitimate reasons.

Integration: The way in which all aspects converge and harmonise to work together towards common goals.

Governance: The decision rights and accountabilities required for architecture to function smoothly.

Several countries have expended significant efforts towards development of national enterprise architectures2. In United States, South Korea and Estonia, government enterprise architecture is mandated by law, and India is working towards the same at the point writing.

A digital platform is a repository of business, data, application and technology components (reusable building blocks and distinct interfaces) that allow for rapid design, development, deployment and delivery of digital services. With the use of standard and open interfaces, the digital platform is exposed to all the key actors (in the value delivery ecosystem) to build and use components. A digital platform is the result of enterprise architecture.

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[1] The Open Group. (2019).

[2] *Enterprise Architecture for Connected E-Government – Practices and Innovations*; Pallab Saha; IGI Global, PA United States. (2012).

Digital transformation stands on the three foundational pillars of – institutions and governance, citizen insights and delivery capabilities. These are absolute imperatives.

Figure 6: Role and Involvement of Citizens in the Digital Service Lifecycle
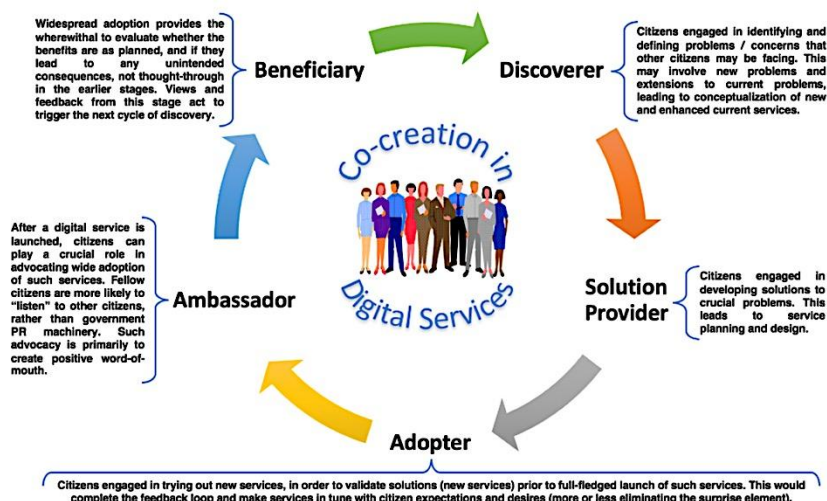


Knowing and understanding the citizens for whom the digital services are being developed and deployed is paramount to effective transformation. Citizen insight is at the heart of digital transformation. Digital technologies are changing the way citizen interactions are happening, with new rules and opportunities that were unthinkable a few years back. Government

services delivered via multiple channels need to be coherent and provide a consistent experience. Adoption of such digital services requires a change in citizen behaviours and habits. Digital interactions force the evolution in culture with speed, decision-making methods and rules, that may run counter to traditional way of doing things. It this transition is what takes time to internalise.

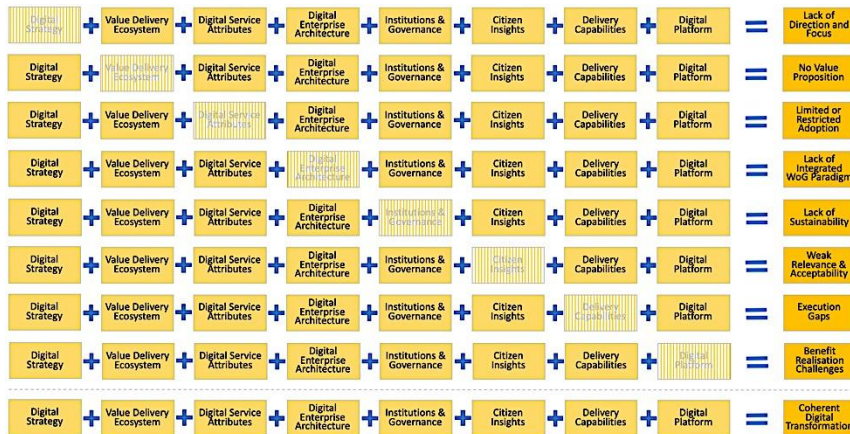Establishing the right institutions and governance mechanisms provide the necessary teeth to push through the transformation agenda – a case in example being Australia's Digital Transformation Agency3. Identification of leaders and champions to drive the transformation initiative is first and foremost, which also shown in the digital transformation value chain. Without leaders and champions digital transformation remains a non-starter. The second part of this pillar is to ensure that the vision and benefits of digital transformation are sufficiently understood by all the ecosystem actors. This creates momentum and encourages right behavioural changes that are so central to success. A coalition of the business and IT groups with clear accountability and decision rights is critical. The role of standards and guidelines in scaling up and scaling out cannot be overemphasised. Standards focus innovation in a directed manner, and allow countries to focus on the things and issues that matter – that is improving service quality and citizen experience.

Excellence in delivery capabilities ensures that there is enough internal capability to take on and successfully accomplish the goals of digital transformation. This level of transformation demands entrepreneurial and innovation oriented mind set. The ability to experiment and learn is very important and therefore, that requires an agile approach which integrates architecture, development and operations (Arch-Dev-Ops), an extension from DevOps. Digital transformation results in multiple projects which have to be handled as a portfolio with adequate risk management capabilities which come with operational mastery. Usually there is a lot of attention to 'new things' when discussing digital transformation. However, even with the adoption of digital technologies, certain portions or segments will continue to operate in their traditional ways and such diversity has to be absorbed. This is catered by building the capability to deal with multi-speed delivery and yet maintaining overall coherence.

Every building block plays a critical role in a country's journey towards digital leadership. One or more missing building blocks have a very significant impact and can be the reason for derailment of the digital transformation initiative. Therefore, it is important for countries to put attention to all building blocks and maintain balance between them while navigating the transformation journey, and digital leaders are expected to manage the all the building blocks concurrently in situations characterised by volatility, uncertainty, complexity and ambiguity.

Figure 7: Impact of Missing Building Blocks

| Digital Strategy | Value Delivery Ecosystem | Digital Service Attributes | Digital Enterprise Architecture | Institutions & Governance | Citizen Insights | Delivery Capabilities | Digital Platform | = | Result |
|---|---|---|---|---|---|---|---|---|---|
| *Digital Strategy* | + Value Delivery Ecosystem | + Digital Service Attributes | + Digital Enterprise Architecture | + Institutions & Governance | + Citizen Insights | + Delivery Capabilities | + Digital Platform | = | Lack of Direction and Focus |
| Digital Strategy | + *Value Delivery Ecosystem* | + Digital Service Attributes | + Digital Enterprise Architecture | + Institutions & Governance | + Citizen Insights | + Delivery Capabilities | + Digital Platform | = | No Value Proposition |
| Digital Strategy | + Value Delivery Ecosystem | + *Digital Service Attributes* | + Digital Enterprise Architecture | + Institutions & Governance | + Citizen Insights | + Delivery Capabilities | + Digital Platform | = | Limited or Restricted Adoption |
| Digital Strategy | + Value Delivery Ecosystem | + Digital Service Attributes | + *Digital Enterprise Architecture* | + Institutions & Governance | + Citizen Insights | + Delivery Capabilities | + Digital Platform | = | Lack of Integrated WoG Paradigm |
| Digital Strategy | + Value Delivery Ecosystem | + Digital Service Attributes | + Digital Enterprise Architecture | + *Institutions & Governance* | + Citizen Insights | + Delivery Capabilities | + Digital Platform | = | Lack of Sustainability |
| Digital Strategy | + Value Delivery Ecosystem | + Digital Service Attributes | + Digital Enterprise Architecture | + Institutions & Governance | + *Citizen Insights* | + Delivery Capabilities | + Digital Platform | = | Weak Relevance & Acceptability |
| Digital Strategy | + Value Delivery Ecosystem | + Digital Service Attributes | + Digital Enterprise Architecture | + Institutions & Governance | + Citizen Insights | + *Delivery Capabilities* | + Digital Platform | = | Execution Gaps |
| Digital Strategy | + Value Delivery Ecosystem | + Digital Service Attributes | + Digital Enterprise Architecture | + Institutions & Governance | + Citizen Insights | + Delivery Capabilities | + *Digital Platform* | = | Benefit Realisation Challenges |
| Digital Strategy | + Value Delivery Ecosystem | + Digital Service Attributes | + Digital Enterprise Architecture | + Institutions & Governance | + Citizen Insights | + Delivery Capabilities | + Digital Platform | = | Coherent Digital Transformation |

A culmination of the building blocks leads us to identify factors that are useful to evaluate whether a country or an organisation ready to embark on digital transformation journey. These factors are shown in the table below, and is consistent with first value function in the digital transformation value chain. Each factor will require multiple questions to make an assessment. These questions will need to be put together to develop and administer a readiness assessment survey.

Figure 8: Digital Transformation Readiness Assessment

| Ser | Readiness Factor | Urgency | Readiness Status | Degree of Difficulty to Fix |
|---|---|---|---|---|
| 1 | Vision | | | |
| 2 | Desire/willingness/resolve | | | |
| 3 | Need | | | |
| 4 | Business case | | | |
| 5 | Funding | | | |
| 6 | Sponsorship and leadership | | | |
| 7 | Governance | | | |
| 8 | Accountability | | | |
| 9 | Workable approach and execution model | | | |
| 10 | IT capacity to execute | | | |
| 11 | Departmental capacity to execute | | | |
| 12 | Ability to implement and operate | | | |

# Digital Transformation@Work

There is lot of hype and rhetoric about digital transformation. Several countries around the world have embarked on digital transformation initiatives. Done well, digital transformation can bring immense benefits. But it demands a massive cultural change (a paradigm shift in culture) to make it successful. Digital transformation needs a strategy and expects a connected and holistic view, instead of taking a piecemeal approach. A system is a set of things—people, cells, molecules, or whatever — interconnected in such a way that they produce their own pattern of behavior over time. The system may be buffeted, constricted, triggered, or driven by outside forces4. This is the central core of systems thinking, which is used to understand and analyse the dynamics of digital transformation in governments using causal loop diagrams. Information holds systems together and plays a great role in how they operate and behave. However, information-based relationships are hard to see.

4 *Thinking in Systems*; Donella H. Meadows; Sustainability Institute, London. (2009).
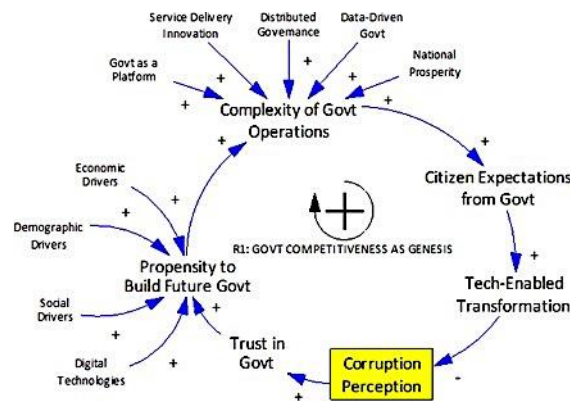


Many governments are experiencing the transformative power in revitalizing public administration, overhauling public management, fostering inclusive leadership and moving civil service toward high- er efficiency, transparency and accountability. This creates the need to: (1) change the way services are delivered and consumed; (2) change the way internal back office operations are executed; and (3) change the way resources and processes are sourced and combined. It is in this context governments are looking at digital technologies to bridge policies and outcomes, leading to more and more government services being offered electronically. Factors like service delivery innovation, distributed governance and data driven policies and decisions contribute to complexity of government operations, which raise citizen expectations and demand for digital technologies as a means to address such expectations. There is enough evidence that adoption of technology minimises corruption, which in turn raises trust in government. This trust aids the country to look towards building future-ready government, thereby creating a strong reinforcing cycle (R1: Government Competiveness as Genesis).
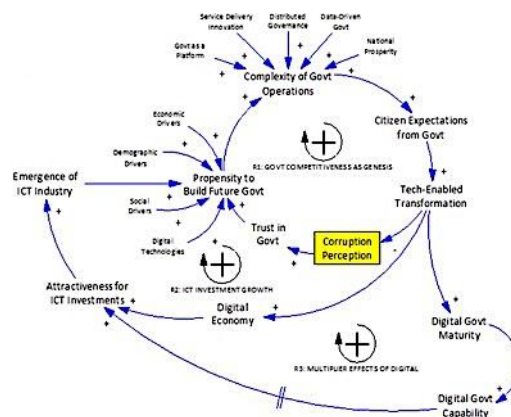


ICT is increasingly a central part of national competitiveness strategy and is a key enabler of socio-economic progress and development, productivity enhancement, modernisation, economic growth and even poverty reduction. Digital government's focus and capability provides the raw material to improve the overall ICT capability by way of greater resources, access to talented and trained people, attracting investments, expertise in research and development, supporting policies and governance among other enabling inputs. Greater ICT capabilities provide necessary impetus to the emergence of ICT industry. There are several countries who have utilised their foray into digital government as an entry point to build their

national ICT sector leading to digital economy **(R2: ICT Investment Growth)** and **(R3: Multiplier Effects of Digital)**, which feeds into R1 to strengthen the need to build the future tech-enabled government.
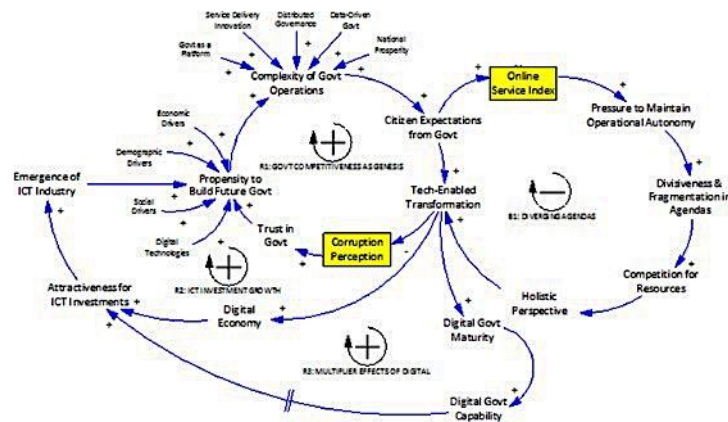


Government enterprise architecture provides a business-centric view of government operations and usually organises government operations through components like business areas, lines-of-business and business functions at the WOG level. Such standard approaches tend to discourage and overlook the need for operational diversity that is needed at the department level. Governments (and their departments) are under pressure to retain and even enhance operational autonomy. The trend of ministries and departments operating with a high degree of autonomy leading to diverging agendas is common and instrumental in putting breaks on government-wide transformation activities, and suspicion about the role of digital technologies can become an impediment (B1: Diverging Agendas).
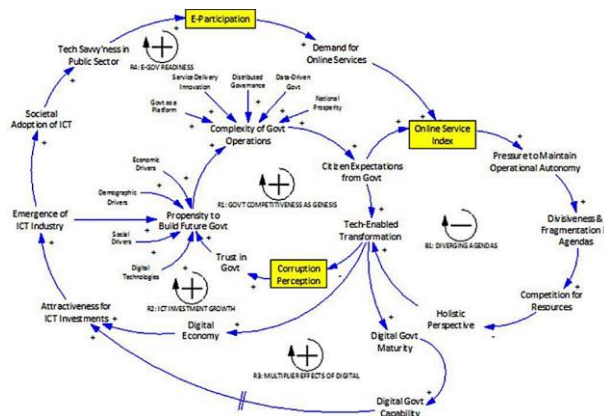


The emergence of the ICT industry, in general, drives adoption of ICT. As societies at large, embrace digital technology, the inclusion and participation of citizens into the digital landscape improves e-participation. This creates demand for online services, as a tech-savvy society appreciates the benefits of online services. This further contributes to enhancing the online service index (R4: EGovernment Readiness). In itself, this reduces the digital divide aided by the fact that technology is largely afford- able today. Technology acts as an accelerator to digital government. As this maturity improves, the ability of governments in designing and delivering online services improves, which further make it attractive for ICT investments (R3: Multiplier Effects of Digital).
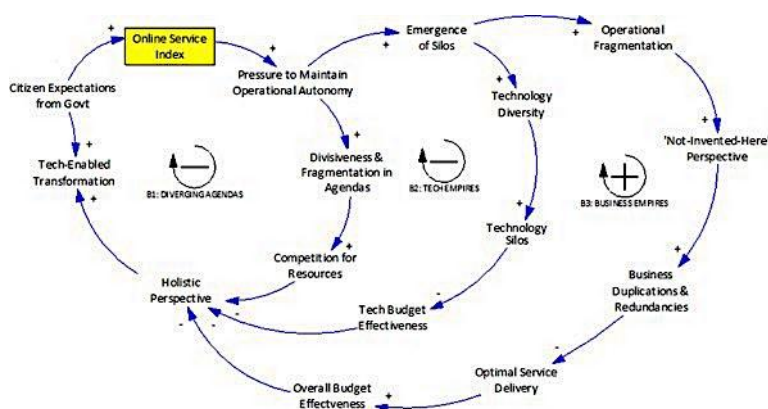
The impact of operational diversity amongst ministries and departments leads to the emergence of business silos that operate in their own stovepipes. Amplified by diverging agendas, business silos are instrumental in creating and abetting feudal form of governance. Government CIOs operate their "little" empires with negligible interactions both with the business (domain) side and IT organisations of other ministries or agencies (B2: Tech Empires). The siloed mindset is even more ingrained on the business side of the operations. Government departments like and demand to operate in their respective stovepipes in the name of operational autonomy. The concept of government as a single coherent enterprise is new, transformational and disruptive (B3: Business Empires). These further strengthen the diverging agendas resulting from the need to maintain operational autonomy feeding into B1.
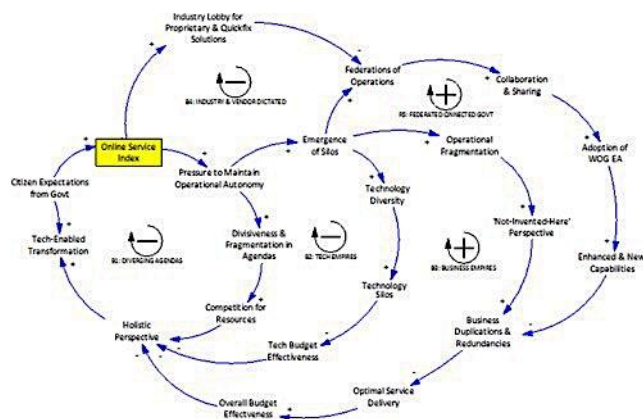


As fragmented and disjointed thinking becomes ingrained, it further drives the need for federation as a solution to deal with larger cross-departmental issues. Federation drives collaboration and requires coordination, and creates receptiveness to adopt a WOG approach, for the benefits it provides. The benefits of federated approach are all too visible. Federation keeps in check on disjointed silos and piecemeal thinking, while balancing the need for operational autonomy (R5: Federated Connected Government). As the pressure to provide online services increases, there is a tendency (and pull) to skip holistic coherent architecture. Certain sections of the industry lobby also act to undermine the WOG thinking (B4: Industry & Vendor Dictated).
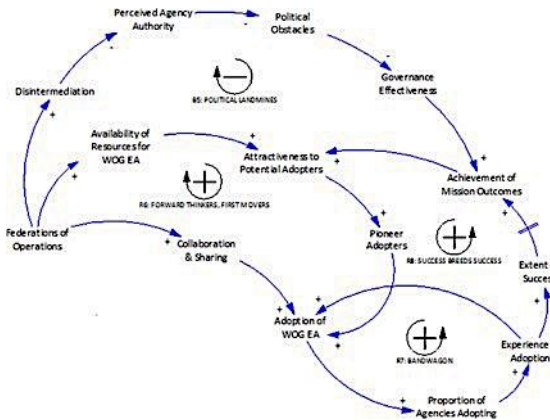
Federation leads to two consequences − on one hand it positively impacts the availability of resources and leadership attention towards holistic approach making it attractive to potential agencies, while on the other hand it also heightens anxiety and brings on obstacles and challenges as it is perceived to diminish authority (B5: Political Landmines). In a landscape of multiple ministries and departments in the government, there are always a few who are forward thinking and are more open to changes (R6: Forward Thinkers, First Movers). This group becomes the allies and supporters of the digital transformation initiative and contribute by creating success stories (R7: Bandwagon). In the public sector where aversion of risk is the primary operating principle, success stories and examples act as magnets to other ministries to embrace digital transformation. Over time this reinforces itself, unless there are unsurmountable challenges. A critical mass of successes provides the perfect antidote to all cynicisms and naysayers ((R8: Success Breeds Success).

As the adoption of enterprise architecture becomes widespread, the experience multiplies enhancing the chances of further and future success. This leads to expansion in the scope and footprint of digital transformation. The derived benefits are more visible and impacting. The initiative has better integration with policy design and implementation. Better experience leads to greater propensity for internalisation (R9: Internalisation). With an expanding coverage and scope, the programme costs go up and so does the expectations from the core team. At times, they are burdened with stretch targets (B7: Burden of Stretch Targets). Ballooning costs and stretch targets can potentially impact the quality of the programme implementation (B6: Programme Costs). Meanwhile, the value of government-wide enterprise architecture in embracing a holistic, integrated connected government has a positive influence to the digital transformation initiative (R10: Government-wide Architecture). All of these operate in a way that each supports the other, creating a group of reinforcing factors, leading to better value and 'ROI' for digital transformation. Putting all the above partial system models together, the full system model is shown below depicting a confluence of factors that impact digital transformation. Patterns (and anti-patterns) of adoption and diffusion are clearly visible in the model.

The full system model, capturing the dynamics can be used to identify interventions that can push digital transformation by strengthening the enablers (the reinforcing / positive loops) and weakening the impediments (the balancing / negative loops). In all there are ten positive loops (R1 through R10) and seven negative loops (B1 through B7), and to cover all multiple concurrent interventions would be required to produce more of what is required and less of what is not. Interventions may include changing numbers or constants, changing rules, minimising delays, channelling information flows, modifying goals and adopting newer

paradigms. Each of these is increasingly difficult to achieve, but also has greater positive impact in the system.

Figure 9: Digital Transformation Dynamics in Governments
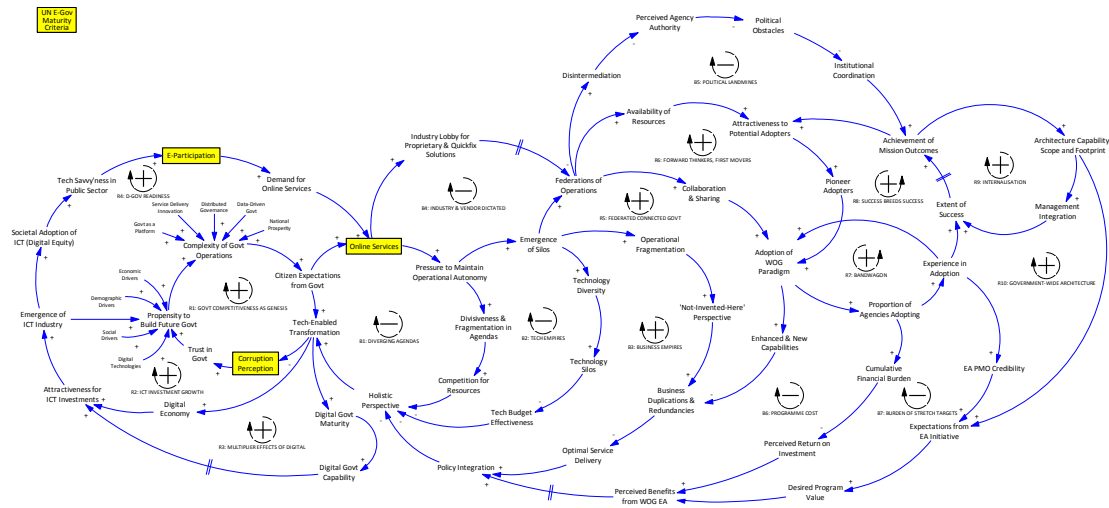


That said, impediments add 'friction' into the system which cannot be completely eliminated, and these also have some benefits in terms of providing a reality check from time to time. Through interventions, the aim is to ensure that the combined impact of impediments does not exceed the combined impact of enablers, else the digital transformation initiative derails. As countries mature from being a digital laggard to becoming a digital leader, the impact of impediments reduces, while the impact of enablers increases. It takes mastery to know the inflection point. The boxes in yellow are factors from UN eGovernment maturity assessment, which have been integrated into the overall system model.

In conclusion, digital transformation is a systemic change initiative (not a technology initiative) that is an advancement in thinking requiring a massive cultural shift. We ought to take an integrated view of the transformation paradigm with situational awareness, without getting dazzled by all the hype and rhetoric. Identifying and understanding the impact of interventions gives the ability to calibrate and control to get to the desired state. The intervention points act as levers (like a pilot in a modern airliner) to steer the transformation journey. The skill is to get the combination right. In order for countries move across and up in the digital transformation maturity levels (discussed earlier), the initiative needs to be carefully strategised and executed. Digital transformation brings a seismic shift with its benefits, but such a shift comes with its share of pain as well, therefore it needs a strategy.

# Digital Transformation Maturity Assessment

Digital transformation has many moving parts that are shown as the building blocks and their components. For a country or an organisation to fare well on the maturity assessment it is imperative these building blocks are in place providing positive influence and working in harmony towards a shared vision. It impacts countries administratively, economically, technologically, politically, legally and socially. Therefore, any tool developed for maturity assessment should be multi-dimensional, a combination of self and independent external assessment, with scale being an important parameter.

# Digital Transformation in Selected Countries

This section presents brief summaries of digital transformation in governments from selected countries. South Korea, India, Finland and Malaysia are described in this section.

## South Korea[5]



South Korea started its e-governance initiative in 1980. In this ensuing period, its journey can be segmented into five phases. In the first phase (1980–1995) the national basic information system was put in place. This included establishing administrative networks, and creation of core citizen and vehicle databases. In the second phase (1996–2002) with the foundational elements in place, the e-governance programme was expanded in scope to incorporate the national broadband network and completion of eleven major high priority e-government projects. Continuing its journey, in the period (2003–2007) the third phase, the focus and direction was to further and diffuse the use of ICT for enhancing and automating more than thirty major thrust areas like tax service, e-procurement, establishment of government-for-citizen services and implementation of systems to share administrative information. In the third phase, the country also embarked on the development and implementation of government-wide enterprise architecture, which was logical as the three phases of e-governance initiatives led to the realisation of replacing piecemeal thinking with a more integrated and holistic approach. In the fourth phase (2008–2012) the focus was on integration and collaborative manage- ment of information across government agencies and linking of government services to provide end- to-end experience with the adoption of cloud computing and hyper connected networks. In the fifth phase (2013–Present) the aim is to improve citizen experience by co-creation of services and their maturation. Recognising that services can transcend the entire ecosystem, the government has put in efforts to rope in the private sector in delivering digital services. Korea's e-governance journey can be broken down into three generations – the first focusing on efficiency, the second on effectiveness and the current one on creating and sustaining a nationwide digital economy. South Korea has won many accolades over the years and is undoubtedly worth learning from.

The seven key learning points include:

The essential foundation for successful digital transformation is high-level leadership and support across the political spectrum.

Adoption of digital technologies leads to change in bureaucracy from being a hierarchical structure with generalists to being modern, agile, specialist based and outcome oriented.

The ability to change with the needs to reorganise and embrace inter-organisational coordination mechanisms is a key success factor.

Making the transition from input oriented efficiency focused operations to becoming more outcome centered requires delegation of authority and decision making to local government agencies.

The operational foundation with the underlying IT architecture should be established and used, coupled with extensive adoption of standards.

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5     *Bringing Government into the 21$^{st}$ Century – The Korean Digital Government Experience*; Karippacheril, Tina George, Soonhee Kim, Robert P. Beschel Jr., and Changyong Choi; Directions in Development. Washington DC. The World Bank. (2016).

Government services must be planned and designed with the citizens, and integrated across sub-national and local governments.

Widespread digitalisation must include entities and organisations across the government sector and extend to the private sector as well.
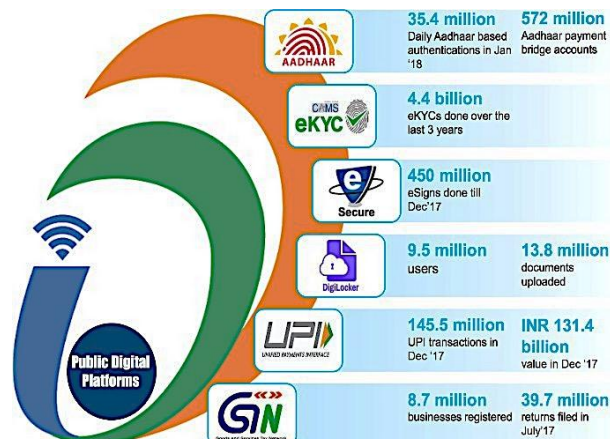


# India

India started its e-governance journey in the late seventies. This journey in the last four decades can be segmented into four phases. Phase 1 (1977-1998) can be termed as pre-e-governance era because here the aim was computerisation, rather than e-governance per se. Nevertheless, in this phase prerequisites to e-governance were put in place and the national informatics centre was established. Phase 2 (1999-2005) is when e-governance was earnestly pursued with the aim of enhancing efficiency through automation. This was also when certain regulations were established, and there was a national roll-out of electronic services and such capabilities were extended to local governments in the rural areas as well. Phase 3 (2006 – 2013) was when the first national e-government plan was put in place. This directed the efforts towards adoption of standards for enhancing effectiveness and the aim was to enable better citizen outcomes through the use of ICT. In the Phase 4 (2014-Present) the entire programme was named as Digital India. The Digital India programme is focused on fulfilling three  vision areas  through nine focus  areas, which  lay down objectives in areas such as skill development, e-governance, mobile / broadband connectivity, among others.

Figure 10: Longitudinal Journey of eGovernance in India Leading to Digital India



| Pre e-Governance Period | e-Governance Journey | | |
|---|---|---|---|
| | Information | | |
| | | Interaction | |
| | | Transaction | |
| | | | Transformation |
| **1977-1998** | **1999 till 2005** | **2006-2013** | **2014-Onwards** |
| NIC | MoCIT | NeGP | Digital & NeGP 2.0 |
| NICNET - State HQs | NICNET - District HQs | SWAN - Block level | NOFN - Panchayat level |
| Computerization - Banks, Rly. Reservation | Department Websites | Department-specific Applications | Integration (Aadhar and APIs) |
| | Use of email | Use of email plus SMS | Use of Social Media (FB& Twitter) |
| | Digitisation of Acts, Rules, Circulars | Department Databases | State Resident Data Hubs |
| | Focus on hardware-driven projects | Focus on citizen-centric services | Focus on Citizen Engagement (MyGov and Twitter) |
| | Translation of Processes, No BPR | Focus on BPR (Dept. Specific) | Focus on Transformational BPR |
| | Champion driven Projects | Institutional, Strategy driven Projects | Enhanced Focus from Political Leadership |
| | No Standardization - Focus on Replication of Successful initiatives with one-size-fit-all approach | Focus on Standardization - Infra, Policies, Tools, Training & CB - and also on State-specific customization | Further Consolidation of Infra using cloud and use of applications using AppStore |
| | No use of Standards and no focus on interoperability | Extensive Focus on Standards & Interoperability | Focus on Enterprise-wide (Whole of Govt) Data and Meta Data Standards |
| | Single Channel Service Delivery | Multi-Channel Service Delivery | Multi-Channel, Choice based Service Delivery |
| **Computerization** | **Efficient** | **Standards Based** | **Collaborative** |
| | **Automation** | **Effective** | **Flexible** |
| | | **Output Focused** | **Personalized** |
| | | | **Outcome Driven** |

Already one of the largest digital transformation initiatives in the world, the Digital India6 programme is working on enhancing the digital infrastructure, providing governance and services on demand and enabling digital empowerment of citizens. The Digital India programme with an ambitious agenda to ""transform India into a digitally empowered society and knowledge economy" is projected to cost ☐ 113,000 crores (or around US$17.5 billion).

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6 National eGovernance Division, Ministry of Electronics and Information Technology, Government of India. (2018). It comprises three main pillars. The first is creating a digital public infrastructure, which includes high-speed internet access, "cradle to grave" digital identity; digital financial inclusion; and secure cloud storage for personal documents. The second is the digitisation of government services and the improved use of digital technologies and data to support decision-making. The third is the "digital empowerment" of citizens, which focuses on universal access to digital services, and universal digital literacy. India is well on its way to become a trillion-dollar digital economy fuelled by an ever-expanding digital infrastructure that provides a strong base for realizing a trillion-dollar digital economy, rapidly growing heterogeneous consumption class driving digital demand, widespread adoption of emerging technologies further aiding digitisation and data explosion and emergence of new sources of data creating newer digital interactions.

Moving forward, the role of enterprise architecture to achieve digitalisation is gaining momentum. The development of the India Enterprise Architecture Framework (IndEA)7 along with the Digital Service Standards points to increased adoption of architecture and standards. The main conclusions from the efforts so far are:

Digitalisation is well underway, and India ranks amongst the leaders globally, adjusted for its size, diversity and complexity.
For reasons of reach, coverage and economics the penetration and adoption of mobile technologies has outpaced other technologies.
Despite the development and deployment of underlying mobile technology infrastructure, certain government services are still silo-based and fragmented.
Mobility as an information-driven initiative, requires a shared platform, is citizen-centric, affects security and privacy, enabled by devices, connectivity and personal choices. M-Services (i.e. digital services on mobile devices) require multiple parameters.
People use technology they trust, therefore building trust and maintaining privacy is paramount.
Digital transformation in the government focuses on the 5Ps:
People-centered: Delivering citizen centric, trust based services derived through life stage events.
Proactive: Preempting services citizens need or are eligible for and trigger service delivery proactively.
Predictive: Using analytics to develop innovative services consistent with intended outcomes.

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7 *India Enterprise Architecture Framework – Parts 1 and 2*; Ministry of Electronics and Information Technology, Government of India. (2019).

Participative: Activating and leveraging pan government, multi-channel feedback, with results integrated into policy decisions
Partnership-based: Delivering services through ecosystem of collaborating partners, including those in the private sector.
In 2016 and in 2018, India was ranked No.1 globally in the Digital Transformation Maturity Index by Dell and Intel. With the successes achieved till now, India is poised to raise the bar. Starting 2019, Digital India v2.0 will be launched very soon. This will consist of thirty digital transformation themes organised into nine focus areas.

# Finland

Like in many other countries, digital transformation journey in Finland has followed from its e-government initiatives in the past five decades8. Finland has long embraced technology in

many aspects of its economy. Dating back to 1970s, adoption of ICT for the purpose of good governance has since focused on improving public service delivery and outcomes. Riding on its initial success, Finland rose to become one of the most advanced countries in the use of ICT in the 1990s – when it had the highest adoption of internet connections per capita in the world. This led to rapid technological advancements. Digitalisation has always been high the government's agenda and in 2015 Finland published its National Action Plan. The country follows a 'Digital First' policy when it comes to public services. The current Digital Finland programme aims for digital transformation of industries and society is a key element for growth, entrepreneurship, job creation and welfare. Digital transformation is designed to enable speeding up the development of innovative responses not only to local economic and societal challenges, but for reaching the UN Sustainable Development Goals.

Finland's journey towards digital transformation is guided by its Digital Finland Framework9. This framework integrates three important perspectives:

Enable digital innovations to create a platform economy to transform the priority industry sectors.
Support for ongoing digital transformation across the nation.
Target to achieve the UN sustainable development goals.
Key areas that digitalization has been adopted in public service provision are health care provision, social service provision, security service provision, integration service provision, and election and citizen participation services (e.g. e-voting, e-democracy, and e-participation).

Finland has been ranked as one of the leading countries in several digital transformation related assessments. For example, in Digital Economy and Society Index 2017 and 2018, Finland ranks 2nd with particular strengths in digital skills and digital public services. According to the Global Competitiveness Report, Finland has the best availability of scientists and engineers in the world combined with one of the most digitally oriented population.

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8  *eGovernment in Finland*; European Commission. (2015).
9 *Digital Finland Framework – A Framework for Turning Digital Transformation to Solutions to Grand Challenges*; Ministry of Economic Affairs and Employment, Government of Finland. (2017).
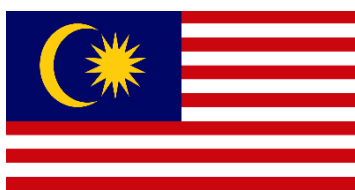


Malaysia[10]

Malaysia's journey towards digital government has been quite similar to other countries. It started in the 1970s with focus on computerisation and data processing. The 1980s ushered in an era of development and deployment of management information systems, which primarily enabled automation of certain processes for efficiency gains. This era continued till late 1990s. Starting 1997, the country matured to have full e-government services covering G2C, G2B and G2G services. This was enabled by rapid spread and adoption of internet and intranet across the nation. This sowed the first seeds of a tech-savvy nation. As a natural progression, the need was felt to focus on integration so that citizens have a seamless experience when dealing with end-to-end business processes. This led the government to concentrate on delivering services through an integrated and connected government starting 2010. The Public-Sector ICT Strategic Plan for the period 2011- 2015 aimed to – enhance service delivery, enhance capacity and capability, enhance performance measurement capability through a connected government built on a resilient and sustainable ICT infrastructure. Malaysia's journey till about 2015 is considered as eGov 2.0. In 2015, as part of the Eleventh Malaysia Plan, the country has put significant emphasis on digital transformation aiming to transform its public service delivery. The drivers for its digitalisation initiatives are – greater and more sophisticated citizen expectations, emerging technology trends and an economy based on digital technologies.
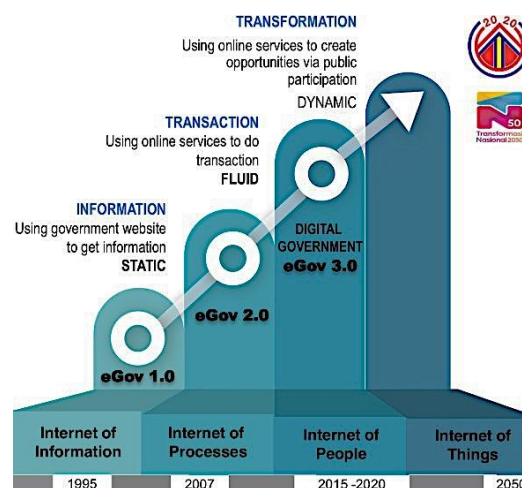


The currently active Public-Sector ICT Plan for the period 2016 – 2020 contains three main layers – the innermost being the strategic thrusts that the country aims to focus on, followed by a layer of enabling ecosystem with enterprise architecture at its core, surrounded by a set of principles providing the contours of digital transformation in government. Malaysia's adoption of government enterprise architecture called the 1GOVEA is a core enabling factor in its digitalisation journey11. It views enterprise architecture as a structured approach to define an organisation across different domains. Based on TOGAF®12, it is often used as a practice to help transform the organisation through understanding, reconciling and planning across the business, data, application and technology domains. The 1GOVEA is designed to improve delivery processes to raise responsiveness, reduce bureaucracy, leverage data to enhance outcomes and lower costs, expand outreach of services and increase accountability through transparency.

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[10] Malaysian Administrative Modernisation and Management Planning Unit, Prime Minister's Department, Government of Malaysia. (2018).

[11] *Malaysia's Digital Economy – A Driver of Development*; Washington DC. The World Bank. (2018).

[12] *The Open Group Architecture Framework Version 9.2*; The Open Group. (2019)
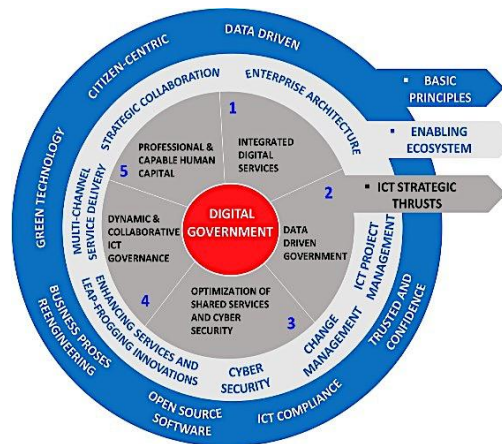
The current plan consists of six thrusts, thirteen strategies, twenty-nine programmes and ninety-three activities. The six thrusts are:

Integrated, inclusive and secure digital services.
Data driven digital service delivery.
Digital service branding, publicity and promotion.
Legislations and governance.
Capability and capacity building.
Digital service delivery system outcome optimisation.
Moving forward, with its current digitalisation plan Malaysia aims to build an ecosystem of collaborative and engaged stakeholders who enable cross-agency commitment to mission productivity to provide personalised services driven by business insights running on a secure and resilient ICT infra- structure. According to the Economist Intelligence Unit's Asia Digital Transformation Index, Malaysia has been ranked sixth in 2018, which points to the fact that it is moving in the right direction and its digital transformation are starting to show results.

# Concluding Thoughts

Digital transformation is a systemic change not a technology modernisation programme. Countries are committing significant resources, but there is ambiguity in understanding what digital transformation actually means. This paper takes an outside-in view and anchors the discussion on the key aspect that citizens experience – digital services. From a citizen perspective, it is the transformation of services (enabled by digital technologies) that matters the most. The role of enterprise architecture is pivotal to transformation. Digital transformation requires a balancing act between political, economic, social, technological and legal factors. Countries that get this right, will flourish and improve the lives of their citizens, while the rest will have to work smarter to keep up with citizen expectations and demands.

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# Digital Defence: India needs to safeguard its Digital Boundaries

- *To safeguard against Digital enemies, India needs to put in place a high-level Artificial Intelligence security system along with other digital security mechanisms to protect the digital boarders*

**By- Dr. Ajay Data, Founder & CEO, Data Xgen Technologies Ltd & Chairman, UASG of ICANN.**

India is witnessing a digital revolution and cyber attack to our systems is a serious threat as invasion through foreign boundaries and from inside the country. As our Defence forces are vigilant and guarding our Land, Water, and Air boundaries, a strong digital Defence mechanism has become mandatory for national security. Hence, securing the digital infrastructure of the country has emerged as a top priority not only for the government but for all stakeholders.

**Building a Digital Defense**

Five years ago Prime Minister Narendra Modi had talked about his vision of a Digital Armed Force and the increasing importance of dominating cyberspace. The government had asked the senior military leadership to prepare for rivalries in cyberspace. The focus was on the development of domestic capabilities. India is in the process of establishing a robust cyber agency that will steer the planning and conduct of cyber warfare in the military. Hopefully, once the policy matures, the cyber agency will be expanded to a much-needed cyber command. India has built domestic capability for the hardware and software being used in the military information technology (IT) infrastructure and other strategic commercial purposes. Though we have domestic products being available, a concerted effort to use indigenous solutions is conspicuously absent. We also need a policy framework to indigenize our cyberspace that will have huge national security implications. We certainly need to look at having our own Operating System for Desktops and Mobile phones to ensure full control over every aspect of data flow and security.

**The Digital Enemies**

Faced with severe cyber attacks and intelligence, countries have moved to restrict foreign products from use in critical networks. A couple of years ago, Beijing banned government offices from buying Microsoft Windows, and security software from Symantec and Kaspersky Lab. Later on, the ban was also applied to Cisco and Apple products. Last year USA President Trump signed a bill banning the use of Chinese Huawei and ZTE technology by the US government.

Denial-of-service (DoS) and distributed denial-of-service (DDoS) attacks, Man-in-the-middle (MitM) attack, Phishing and spear phishing attacks, Drive-by attack, Password attack, SQL injection attack, Cross-site scripting (XSS) attack, Eavesdropping attack, etc are some of the most popular attacks which country and its citizens are struggling with and we need to have a mechanism to deal with them and also establish the strictest punishment. These cyber attacks are nothing less than terrorist attacks on servers and computers which may potentially impact millions of people in one attack.

We appear indifferent to the vulnerabilities that exist in our critical networks due to freely available unmonitored hardware and software. Over 60 percent of software and hardware being used by telecom companies is sourced from either Huawei or ZTE. It is an open secret that Huawei was being probed for hacking a BSNL network five years ago. State-run telecom giant entered into an agreement with ZTE for research and commercialization of future 5G technology. But for security reasons, it is still under the carpet. In view of high national security risks, even Australia with a lesser number of internet users compared to India has banned large mobile phone manufactures from supplying equipment for the 5G mobile network.

Software is not a different story. While 69 percent of Indian companies face cyber attacks. We mostly use the Microsoft Windows operating system on our computers. Foreign-controlled companies owned closed-source software also pose security threats. India is a prime target for several international spying agencies. Hence, we need to take the lead in indigenizing our entire IT infrastructure for national security. Digital enemies are very powerful and to safeguard our systems, we need to put in place a high-level Artificial Intelligence system along with other digital security mechanisms. We may be sitting at a time bomb and we must take every measure to defuse it. It may be too late if we don't take appropriate measures now.

**Email Security**

Email security is an area that India needs to address. It is unimaginable to calculate the amount of data we share over email and moreover, equally risky especially when unethical hacking and the cyber breach becomes a regular practice. The simple solutions like antispam and antivirus software are no longer enough. Email Account compromise, Inheritance Mail, Corporate Data Breach, Credit Data Fraud, Extortion, Ransomware, Spoofing and phishing are every day threats in India. The security teams need to understand the ever-evolving protocols and remain ahead in the learning curve for possible attacks. In addition to sophisticated hardware, it is important to take care of measures to avoid falling prey to hacking, cyber security issues or data leak. There are certain practices that are small and easy to implement but help negate the problem to a great extent.

Theft of digital identity and online brand impersonation as well as the loss of intellectual property and malware infection emerged as the top security blind spots for companies rolling out digital transformation. They have high levels of business impact and long recovery times and in many cases neither Government nor companies can afford it. The Frost & Sullivan study said in its report.

Not using emails is not the way out. What is important is ensure that the emails sent to colleagues, customers, vendors, etc are as secure as possible. One should always be sure of what information he/she is sharing and with whom. One should take care of not including any suspicious email id to our mailing list to ensure that the information does not get into the wrong hands. Avoid sending information of utmost confidentiality through emails and even if you do, make sure that it is thoroughly encrypted. Even while receiving emails, it's important that the country takes special measures to let citizens be protected from phishing attacks and protect them from these "get rich" scam emails and identify theft emails.

**Avoid falling prey to Malware**

It has been found that almost 2-4% of emails contain virus which means that an unimaginable number of emails with viruses are circulated every day. We need to execute a multi filtering arrangement that will check email connections with various antivirus engines. By utilizing the intensity of the distinctive algorithms of each engine, identification rates have expanded, giving robust security against such malware.

Digital Defence along with email Security will remain an issue. Some very innovative and secure solutions have been designed to address such issues. One of them is an email service called Datamail (powered by XgenPlus), designed and developed in India by Data XGen Technologies. It has features that can take care of the above-stated security issues.

In the end, I must point to the Chinese wall, that was erected to prevent exchanges or communication that could lead to conflicts of interest likewise India needs its Digital Armed force to avoid the act of conflicts on digital assets of the country.

**Security India**

There is a urgent need to start thinking about Secured India along with Digital India, however to start with Govt of India can mandate simple three things. 1) All domain names provided by NIXI (.in registry) must have SSL on website. 2) All companies registered under ROC must have there email infrastructure on SSL which mean IMAP, POP, SMTP and Webmail be on SSL and with two step authentication and 3) Govt. may setup there email infrastructure to receive email only from TLS infrastructure and sender must be authenticated with SPF, DKIM and DMARC. Six months to year time frame may be given to make these changes. These are small steps but important steps towards secured India.

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# FUTURESKILLS: NASSCOM'S Up-Skilling & Skilling Imperative in the DIGITAL AGE

Program:
National Conference on E-Governance

Session:
Inclusion and Capacity Building

<u>Background</u>

At the cusp of the 4th Industrial Revolution digital disruption is a global phenomenon impacting nations and businesses thereof; there is a need for re-skilling and up-skilling existing and new talent for current and future requirements at an unprecedented rate. However it is a well-known fact that the skills competence of a country's workforce significantly impacts its developmental goals, as is reflected in the contribution of the IT workforce in India. It is perceived that India's IT industry continues to be a net hirer with talent acquisition cutting across multiple industry sectors. Technology, as is strongly evinced, is no longer an issue relevant only to companies and stakeholders in specific industry sectors; with each passing year, technology has become a crucial driver behind the dominant forces that are shaping the domestic and global economies. It has become deeply embedded into the very fabric of businesses in every industry sector. Driven by the adoption of digital technology, the total addressable market for technology would continue to rise exponentially.

India has performed well over the last few years on multiple aspects of digitalisation, bases the collaborative involvement and impact of government action, business innovation and investment. India, when compared to other countries, emerges as a leader in some foundational elements, nevertheless has the ability to scope out opportunities and grow on many fronts and achieve the foreseen value.

Globally, India will have the largest young workforce by 2020 with 65 percent of its population under the age of 35. Thus, vis-à-vis the ageing workforce of the developed economies, India should aspire to achieve the benefits of the demographic dividend through its young and dynamic workforce.

Next-gen technologies are impacting both the national and global ecosystems like the eye of the hurricane. The interoperability impact of technologies like AI & Big Data Analytics, Cyber Security, IOT, Cloud Computing, Social & Mobile etc. is changing the way we work, live and learn. The autonomous networking of machines and systems along with the inclusion of big data analytics is revolutionizing the way things are designed, demand for mass production and even product lifecycles; increasing efficiency and quality will open up a

plethora of jobs demanding different skill sets mooting workers and machines to work together symbiotically.

The disruption caused by the impact of digital technologies on how work is done is posing a dual challenge for industry. First, as jobs change, the current workforce needs to be re-skilled to perform the new roles that are emerging1. Second, there is an increasing gap in the availability of appropriately skilled talent entering the workforce resulting in a more than 60% unemployment rate2.

In consideration of the above India must strive to develop a comprehensive future workforce strategy encompassing the drivers of change and global employment trends spawned by digital natives in the wake of Next-gen/Digital technologies's headwinds. India, cannot afford to be left behind as a digital immigrant and laggard in the 4th Industrial Revolution.

India's future workforce strategy will be responsible for building India's digital economy, which is of paramount importance but requires a cross functional and multi- sectoral tactic with a dynamic approach to bridging the skills gap and establishing change management stability.

While industry is aligning itself towards investing and setting up infrastructure to skill its in-house workforce and to skill the upcoming workforce, a spotlight needs to fall on higher education that supplies new talent. Studies and surveys have observed that the output of India's education system is not aligned to the demands of the new labour market. It is the speed of change that is a completely new dimension to the alignment of the output of the higher education system and the input that industry requires. The recommendations provided in this report are derived from the gaps that employers observe in new recruits when they look for skills sets to match the type of work they are addressing.

Changes in some key elements in the higher education system could go a long way in making students more ready for the jobs of today and the future. However the impact of Industry 4.0 won't be immediate, but with its forecasted growth on the rise, more companies will be looking to invest in Industry 4.0 or risk being left behind. Ultimately talent will drive business, and skills will drive talent

FutureSkills Platform Connecting the Dots

Industry, in the middle of a massive disruption with the advent of digital technologies in the 4th industrial revolution finds itself experiencing a massive global shortage of talent in the new emerging technologies. Business will flow to the place where talent is available in quantity and quality. We need to be at that place. (India has the second largest pool of STEM talent in the world).There is an opportunity to create new lines of service with the new technologies (BCG report shows upto 2 MM jobs can be created directly in IT-ITES and upto 4-6 million additional jobs in other sectors that need IT enabled professionals).

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1 World Economic Forum Future of Jobs Report;
http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf
2 Times of India Article; https://timesofindia.indiatimes.com/home/education/news/60-of-engineering-graduates-unemployed/articleshow/57698133.cms

Government, business, and society need to work together to support a dynamic workforce that is able to constantly reskill and upskill. This means revisiting life-long learning and work regardless of geography and innovating public-private partnerships. These efforts seek to leverage the profound shifts taking place in the learning industry. Careers are being and will continue to be reimagined. Learning and development organizations are supporting the new reality by adopting new and expanded learning architectures promoting collaborative experiences at work that help people constantly learn and share knowledge.

In its present construct, India's value proposition is to be the digital solution's destination of the world. However in response to the 4th Industrial Revolution wherein the rate of change has accelerated, this requires companies to be more agile. Moreover a new social contract is developing between companies and workers, driving major changes in the employer-employee relationship. The days when a majority of workers could expect to spend a career moving up or across the corporate ladder at one company are over.

Understanding the impact of the gig economy, robotics, cognitive technologies and their impact on education, skills and career development will be crucial to ensuring countries are able to manage risks and opportunities presented by workforce dynamics for inclusive economic growth.

In consideration of the above NASSCOM/SSC NASSCOM took on the onus of spearheading the response to this challenge where re-skilling the existing workforce and up-skilling new entrants is the number one priority.

NASSCOM/SSC NASSCOM has developed FutureSkills, a platform to catalyze the reskilling of 2 Million IT - ITES industry employees in future technologies such as (1) Virtual reality, (2) Internet of Things, (3) Big Data Analytics, (4) Artificial Intelligence, (5) Robotic Process Automation, (6) 3D Printing/ Additive Manufacturing, (7) Cloud Computing, (8) Social & Mobile, (9) Cyber Security, and (10) Blockchain. The initiative was launched by the Hon'ble Prime Minister of India, Shri Narendra Modi, at NASSCOM India Leadership Forum on 19th February 2018 in Hyderabad.

Since the launch of FutureSkills the ecosystem has made massive progress. FutureSkills has companies like Genpact, WNS, Wipro, TechM, Cyient, CGI, WNS etc all with users in multiples of thousand coming on to the platform. Presently the platform has employees registered from over 80 companies with over 30 Partners and over 300,000 committed users. NASSCOM has also reported that 'Skilling' is the number one priority for organizations in the industry, to adapt to digitally transforming operations; the industry now has over 600,000 digitally skilled professionals in FY 2018-19.

FutureSkills, is an industry utility to get India started/accelerated on the journey to building skills and becoming the global hub for talent in the emerging technologies. FutureSkills,

enabling India 4.0 is an IT-ITeS Sector Skills Council NASSCOM initiative, powered by NASSCOM and its partner stakeholders.

FutureSkills **is a AI enabled  portal designed as a resource for the IT-ITES industry to start with  and subsequently for  other stakeholders  in a cross functional approach  to enable discovery, continuous learning and deep skilling in the 10 emerging technologies. Focusing  on**  the ten new emerging technologies,  this  portal is  setup as a marketplace and content library, where the best global providers of content and learning will come together to offer learners information on the latest jobs, the skills required , learning content, assessments and certifications. It was felt that building the ability to discover what is out there, the jobs available and the in-demand skills, will create the 'pull' for learners to use the resources available and map a journey from where they are, to where they want to be.

This platform has the ability to create a marketplace where the best-in-class training and assessment providers could be accessed through a single window. The curation engine has the capability to trawl  massive amounts of high quality learning content that's available on the web and funnel it in an easy-to-consume way to make it meaningful and efficient thus making  the learning eco-system broad based and of very high quality.

FutureSkills Objectives are:

- Discovery: Become familiar with 9 emerging technologies, discover high demand job roles in these technologies as well as the skills needed for these job roles;
- Continuous Learning: Formal and informal learning through of hours of curated content tailored to the individuals areas of interests and goal;
- Deep Skilling:  Up-Skill by enrolling in free or paid deep skilling pathways at a marketplace  with all the major global providers of courses, assessments, labs and credentials;

# Awareness of New Technologies and a Spiky Skillset

One of the significant outcomes of "Higher Education" should be to prepare an individual for entering the job/employment market so as to be gainfully employed for life and also to enable/create job opportunities.There is a need for students to become aware of the new emerging technologies, related job roles and skills needed, and pick up the skills for at least one of those job roles prior to finishing university.  It is very important for students across all STEM and Liberal Arts and Sciences streams to have a broad understanding of the 'Digital' technologies like Big Data Analytics, Artificial Intelligence, Internet of Things, Cloud, Cyber Security, Digital Marketing and Social Media Analytics, Robotics, Block-chain, 3D Printing, and Virtual Reality.

This requirement calls for the university system to have strong fundamentals embed in whatever they teach. This is the lowest hanging fruit in the list of industry recommendations. Strong fundamentals are the foundation on which future capabilities can be built. For example, someone who understands the core concepts of coding will be better prepared to learn advanced languages as they emerge. Someone who understands Statistics and Mathematics very well, will be in a better position to learn AI/ML. An understanding of data structures will make it much simpler for someone to learn the tools and technology of Big Data Analytics.

Through much of the industrial age, and more specifically in the last o 100 years, education and innovation were tightly coupled and dominated by Science, Technology, Engineering and Math (STEM). Therefore, it is important to provide an education that balances technology, logic, and problem solving with ethical and societal knowledge which requires a collaboration between Industry and Academia enabled by Government in the following areas.

**Faculty Development** – The impact that good teachers have on students is well known. With change becoming a constant, having a robust mechanism for faculty development is critical. This is one of the most serious issues facing us as technologies change and ways to teach evolves. Many faculty/teachers /trainers have been unable to keep up and hence there is a significant negative impact on students. Faculty development needs to encompass upgradation of knowledge of faculty on core subject matter, as well as on understanding new teaching trends and deploying new technologies for teaching in the classroom (including technology to record lectures that allows subsequent playback). Some ideas that could be thought through include a platform that allows faculty to share best practices and learnings on specific topics; a re-design of the Performance Management criteria for faculty to incentivize the desired behaviour of getting upskilled regularly; certification of faculty on new technologies & the pedagogy of teaching using these courses; and Internships with companies for faculty, for research, problem solving and innovation. An urgent, collective effort is called for on 'Faculty Development' which can be augmented by the FutureSkills platform.

Hence, it is imperative that we introduce changes in teaching curricula and pedagogy so as to work upon new domain skills w.r.t. the Next - gen/Digital technologies via blended training and development programs for faculty and students alike. It is equally important that these programs help them skill up, whether to move higher up the ladder or take a tangential route and make a career switch altogether. Continuous, life-long learning has emerged as the order of the day as it's about helping students to develop the knowledge and skills they will need in a digital age; not so much digital skills, but the thinking and knowledge that will bring them success.

As of 2019, FutureSkills is available as an ongoing initiative to select academic institutions; benefits of the initiative are extended to enable the supply side readiness on future technologies which will eventually help students coming out of these institutions secure jobs of the future within India and overseas. However faculty training has to be an inbuilt process

in existing and emerging technologies.   Support from MeitY, NSDC, MSDE, MHRD, AICTE can empower this initiative, which can be scaled nationally, enabling a larger cohort of institutes.

Starting 2020, it is planned that FutureSkills  also be  available to benefit individuals (in a retail mode) impacted by the advent of digital technologies, people in other industries and sectors who need to pick up digital skills, students in colleges who want to join the IT industry and Government employees who urgently need re-skilling with support of Government of India.  It is crucial that India needs to invest significantly in building its talent if it is to retain its place as a global hub for digital talent. Multiple other countries have already made serious investments in skills in the new technologies (including China and Singapore in Asia). Success in this new age requires a strong partnership between government, academia and industry to accelerate momentum; no one group can solve this independently on its own.

**Progress so far in creating Job and Occupational standards for Future technologies:**
IT-ITeS Sector Skills Council NASSCOM, under aegis of NSDC, fulfilling the mandate of Ministry of Skill Development & Entrepreneurship (MSDE) has made significant progress in defining Job Roles, National Occupational Standards and Model Curriculum at a technology level guided by the 'Talent Demand & Supply' reports for the respective technologies:

1) Artificial Intelligence
2) Big Data Analytics
3) Cybersecurity
4) IoT
5) Cloud Computing (on-going)
6) Social and Mobile (on-going)

**Indicative list of Technologies, Specific Skills and Job Roles:**

| Technology | Specific skills | Indicative Job Roles |
|---|---|---|
| IoT | Includes skills and knowledge related to design of IoT platforms, sensors, network architecture, communication gateways etc. | IoT- Solution architect, IoT – Hardware solution designer, IoT network specialist |
| AI/ BDA | Includes aspects of data storage, data engineering, data sciences, machine learning, NLP etc. | Data Architect, Machine learning engineer, Data scientist, Applied scientist |
| Cloud Computing | Involves development of cloud application, cloud infrastructure, cloud management, automation etc. | Cloud Architect, Infrastructure engineer, Cloud administrator, Cloud security ops analyst |
| 3D Printing | Primarily requires skills related to 3D modelling, 3D model slicing, expertise on 3D printers etc. | 3D modelling engineer, Software engineer-slicing, Solution architect |
| VR | Mostly concerns with 3D modelling, VR devices and sensors, VR designs, VFX etc. | VR designer, 3D modeler, VR-product hardware engineer |
| Social and Mobile | Involves development of mobile applications and services for different mobile platforms | UI designer, application developer, testing engineer |
| Cyber security | Primarily involves application security, end-point security, network security etc. | Security architect, Penetration tester, Application security analyst |
| Blockchain | Primarily requires skills related to development blockchain applications, blockchain infrastructure etc. | Blockchain scientist, Blockchain developer |
| RPA | Requires knowledge of process automation, RPA platforms etc. | Product manager, RPA developer, Development coordinator |

## The 10 Digital Technologies encompass 50+ Job Roles categorized across 7 Job Families:



| Job Family* | Job Roles | |
|---|---|---|
| **Architecture** Design, create, deploy and maintain various architectures | Cloud Architect | Data Architect |
| | Solution Architect | Sensor Architect |
| | Security Architect | Architect - IAM |
| **Analytics** Research and Design of algorithms and presentation of data | BI Analyst | Visualization Specialist |
| | Data / Applied Scientist | Blockchain Scientist |
| **Operations & Administration** Perform administration and operations activities to ensure availability, scalability and reliability of systems | IoT - Control Room Operator | IoT - Field Engineer |
| | Cloud/ Database Administrator | Site Reliability Analyst |
| | VR - Service Technologist | RPA - Deployment Coordinator |
| | RPA - Service Engineer | 3D Printing Technician |
| **Strategy** Define strategy both internally and for the customer | Product Manager | Chief Data Officer |
| | Consultant | Practice Lead |
| | IoT – Domain Specialist | |

| Job Family* | Job Roles | | |
|---|---|---|---|
| **Security** Design security processes. Detect and respond to threats | Analyst – App Security | Analyst - Compliance Audit | Analyst - End Point Security |
| | Analyst - IAM | Analyst - Security Operations Centre | Security Infra Engineer |
| | Consultant - Network Security | Forensics Specialist | Penetration Tester |
| **Design & Graphics** Use computer graphics or simulate user experiences | 3D Modelling Engineer | Computer Vision Engineer | VR Designer |
| | UI Designer | UX Designer | VFX Artist |
| **Engineering** Design, develop and test software, hardware, firmware and the desired infrastructure | Data Engineer | DevOps Engineer | Machine Learning Engineer |
| | Hardware Engineer | Integration Engineer | Test Engineer |
| | Software Engineer | Application Developer | Infrastructure Engineer |
| | Cloud Migration Analyst | RPA - Automation Developer | VR - Optical Scientist |
| | VR - Sound Designer | Network Specialist | Material Analyst Engineer |
| | 3D Printing Mechanical Expert | Embedded Analyst | |

*Job Family is defined as a set of related Job Roles. The list of job families / roles mentioned above are indicative in nature and could evolve over the next few years

Roles typically performed by mid to senior level professionals
Roles performed across various experience levels

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# 1917 Integrated Technology Enabled Agri Management System (1917 iTEAMS)

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# ABSTRACT

One of the much-touted benefits of e-government is the citizen-centric focus of its initiatives. The use of digital technologies promises to provide multiple channels of communication and transaction for all sections of society with government. The direct provision of information is immensely beneficial for stakeholders from the farming community globally, and particularly in developing regions where farmers are often under the hold of the middlemen. Moreover, with the increasing use of mobile phones and Internet connectivity, there is a need for governments to implement specific e-government initiatives that can directly link farmers with markets, agricultural expertise, and provide relevant and reliable information pertaining to their sector.

This case study paper focuses on the 1917 Integrated Technology Enabled Agri Management System (1917iTEAMS), launched by the state government of Meghalaya, India. This system provides a toll free number "1917" which is accessible from all telecom service provider networks of the state and from certain telecom circles outside the state. The goal of the initiative is to provide a platform for the agricultural farmers in the state to network and connect with each other, and establish direct lines of communication with markets across the globe. This paper examines the various stages in the implementation of 1917iTEAMS, and discusses the success factors, challenges and lessons learnt in the process. The study will also discuss the perspectives of various stakeholders involved in the process, especially to what extent are farmers satisfied with this initiative. This will also include strategies to spread awareness on the program, and the required training to selected representatives from villages.

KEYWORDS
e-government, agriculture, helpline, mobile technology

## 1 Introduction

The state of Meghalaya is located in the Northeastern part of India, and together with the six states in the region are collectively referred to the "Seven Sisters of India". With a population of 2,966,889 and the land area of 8,660 sq mi, it is one of the least dense states in the nation. The rural population of the state is close to 80%, much higher than the national average of 69%, and the state is dependent on the agrarian economy, especially non-traditional crops. The state is largely forested and also receives the highest amount of rainfall in the country.

In recent years, Meghalaya's economy has seen a gradual growth in the industrial and services sectors, and its consequent contribution to the GSDP (Gross State Domestic Product). Meanwhile, the share of the agricultural and allied sectors in the GSDP has decreased drastically from around 40% in the early 80's to 15-19% currently. However, the agricultural sector still remains a significant source of employment for the state as more than two-thirds of the population is dependent on it for their livelihood.

Some of the major causes for such sectoral changes as part of the state economy can be attributed to the fragmentation of the agricultural land holdings, the greater numbers of small and marginal farmers, the resulting prevalence of tenant farming practices, and weak post-harvest management. The farmers are also beset by structural hurdles such as dominance of middle-men, trader cartelization, irregular power supply, lack of assured irrigation and access to finance. Perhaps the most challenging hurdle faced by the farmers across the state includes the absence of organized evacuation logistics, limited or no access to remunerative and sustainable markets and the absence of transparent processes and platforms that facilitate healthy buyer seller interaction and activities.

To address these challenges and empower the farmers of the state, the government of Meghalaya launched an innovative helpline, 1917, which is accessible from all telecom service provider networks of the state and from certain telecom circles outside the state. This number is based on the Integrated Technology Enabled Agri Management System, also referred to as 1917-iTEAMS. The goal of the initiative is to provide a platform for the farmers and related stakeholders in the state agricultural sector to network and connect with each other, and establish direct lines of communication with markets across the globe. The most important aspect of this initiative is the ability of farmers to directly access relevant and reliable information and markets, without the influence of middlemen and unreasonable traders.

### 1.1 1917 Integrated Technology Enabled Agri Management System

The 1917-iTEAMS program was inaugurated by the Chief Minister of Meghalaya on December 29th 2017, which was very symbolic as it occurred one hundred years after the 1917 Champaran Satyagrha undertaken by the nation's founding father Mahatma Gandhi to liberate famers from colonial exploitation. The 1917iTEAMS program can be considered as India's first-ever disruptive farmer centric, market-oriented, cloud based facilitation service that connects farmers to markets through real time agro advisories, affordable logistics, and market information. The program was established by the Department of Agriculture in collaboration with the Meghalaya Institute of Entrepreneurship (MIE), Digital India Corporation (DIC), Meghalaya Small Farmers Agri Business Consortium (MgSFAC),

Department of IT, Central Agriculture University (CAU), and Department of Animal Husbandry,.

The primary Programme Management Unit (PMU) for 1917iTEAMS is the MIE, which operates through the following 3 verticals: agro advisories, logistics solutions and market connect.

## 1.2 Agro Advisories

The important goal of digital government is to provide citizens and stakeholders with access to information and necessary expertise, both online and through mobile technologies. Such access is vital to farmers in a hilly and rainy state like Meghalaya, where transportation is regularly hampered by weather and terrain conditions. The 1917iTEAMS enables the farmers to call the toll free 1917 number with queries related to Agriculture, Horticulture, Fisheries, Animal Husbandry, Apiculture and Sericulture. There are two Agri Response Centres (ARCs) linked to the 1917 number to respond to these queries, as well as provide farmers information related to disease management in crops, health management in livestock and even departmental schemes and training.

*1.2.1 Logistics Solutions.* The use of digital and mobile technologies in government enables agencies and citizens to improve their performance and be more efficient in daily functions, and this is very applicable to farmers in Meghalaya who use the 1917 helpline. The number enables farmers and their buyers to discuss evacuation and transportation logistics and determine viable solutions to transport goods to farms or markets. This process is also strengthened by a network of Agri-Response Vehicles (ARVs), that are entrepreneur owned pickup trucks that offer a high competitive freight rate (Rs. 0.02 per kg/ km).

*1.2.2 Market Connect.* Finally, the major benefit of 1917iTEAMS is the provision of information on potential markets, buyers and sellers and enlightening farmers and buyers of the different selling / buying options available to them. It is important to note that 1917iTEAMS connects the registered farmers with commodities to sell to the registered buyers looking to buy the same commodities but does not participate in any buying / selling negotiations.

## 1.3 Vision of 1917iTEAMS

To address and solve the pain points of the farming community through the design and implementation of an 'Integrated Technology Enabled Agri Management System' (iTEAMS) that provides organized produce evacuation logistics, access to markets, consistent and complete response / resolution, networking, knowledge, education and life skilling in a transparent and convergent manner leading to universal access to markets and market intelligence, financial empowerment and inclusion, improved efficiency and effectiveness of the Agri and allied sectors while bringing about a positive attitude and behavioural change amongst all stakeholders.

## 1.4 Objectives of 1917 iTEAMS

Provide access to the best markets, information, practices, packaging and safety.
Facilitate organized aggregation and evacuation logistics across the state.
Provide transparency in all transactions and a state-wide trade facilitation platform with highest governance standards to facilitate healthy and competitive buyer seller interaction and activities.

Provide universal access to market intelligence using Artificial Intelligence technology so that buyers and sellers can make informed choices of where, how and how much to buy or sell for.

Provide quality, security, minimal wastage for consumers and higher returns for farmers.

Converge farmers' needs, markets' needs, technology trends & development.

Open up opportunities for the growth of enterprises and entrepreneurs in the value chain.

To be the first in the country to set up and operate an Integrated Technology Enabled Agri Management System in a convergent framework combining Polity, Public sector commitment / experience and Private sector expertise.

1. Enhance the visibility & credibility of Government for all citizens

## 2 Process Description

The 1917iTEAMS is largely based on the 108 Emergency Services which enables farmers and citizens to dial a single toll free number connected to a centralized call, dispatch and facilitation centre called the Agri Response Centre (ARC). The ARC operates on a cloud based technology platform developed and hosted by Digital India Corporation (DIC), formerly Medial Lab Asia, of the Ministry of Electronics and Information Technology (MeitY). This platform collates 1) advisory, market, evacuation and logistics demand of farmers, FPOs, SHGs, Cooperatives etc on the supply side based on calls made to the toll free number, and 2) the requirement for agri produce / products from buyers on the demand side through calls made to the ARC, emails from prospective buyers and through a mobile phone app developed in-house.

The ARC has a content dissemination section that processes this data and sends out important information through text based SMS, voice calls, and through mobile apps, thereby enabling both buyers and sellers to make informed marketing choices. This would include information related to crop, weather, animal health, input dealers, market information, buyer demand, produce availability, plant protection and expert advisories. The other component of 1917iTEAMS is the evacuation and logistics service which consists of dedicated, entrepreneur owned, Agri Response Vehicles (ARVs) across the state. These vehicles are usually 2 tonner pickup vehicles backed by a GPS enabled fleet management and tracking system, which will move out, under the direction and tracking of the ARC, to lift farmer's produce from aggregation sites and transport the produce directly to the farmers' choice of markets.

Unlike other technology and cloud based platforms, the iTEAMS is not a place where trade or buying and selling happens. It is simply a cloud based platform that provides advisory services and ensures a level playing field where buyers and sellers are made aware of each other's needs and prices, and decide on whom they want to shake hands with. Once the deal is done the farmer / buyer places the call to the ARC on the toll free number for lifting and transportation of the produce by the ARVs to destinations of their choice.

The following section outlines the various stages in the implementation of the 1917iTEAMS project, and the success factors, challenges, and lessons learnt.

## 3 Stages in Implementation of 1917 iTEAMS

Stage 1 (Problem Statement) began with the identification of major points of concern among the farming community through interviews, focus group discussions and workshops. The

research team reviewed the existing techniques and brainstormed on potential solutions, thus conceptualizing the 108 model.

Stage 2 (Agro Advisory) involved the identification of a technology partner and platform, and the team selected Media Lab Asia (now Digital India Corporation) and their Interactive Information Dissemination System (IIDS) platform of m4Agri. The content was then developed, digitized and aligned with the line departments. The content dissemination component of 1917iTEAMS is both a pull and a push-based system. Finally, the platform users were mobilized and registered through awareness campaigns, trainings, exhibitions, workshops, seminars etc.

In stage 3 (Logistics Solution), the entrepreneur owned ARVs were on boarded through a public procurement process along with the establishment of a fleet management system. User mobilization and registrations continued through road shows, awareness campaigns, trainings, workshops, digital and social media.

Stage 4 (Market Connect) involved the mobilization of buyers and sellers through visits, calls, emails, social media as well as market surveys.

In Stage 5 (Upgradation) the software was upgraded and the model was fine-tuned based on the recommendations of experts. The team also then brought in AI engine and app ecosystem. Finally, the application was expanded to the entire region in Stage 6, and the feasibility of expanding to the entire nation was discussed.

Various steps were taken to record the feedback and perspectives from the stakeholders involved in the process as shown in the steps above. The overall feedback from farmers and buyers was positive and provided helpful insights on the extent of the project reach.

### 3.1 Success Factors

- Personalized 'Agro Advisory' based on 'Farm and Farmer Profile' in the local dialect through the IVRS, SMS and the mobile app
- Booking of Agri Response Vehicle (ARV) on Toll Free and through the mobile app
- Market accessibility through the ARVs
- Sell / buy request on Toll Free number and on the mobile app
- Price transparency and information on IVR, SMS and mobile app
- Best fit product market scenario
- 'Personal Assistance' to raise 'Multimedia Query' through Smart Phone app
- 'Live Interaction' with Scientists and Level 2 experts through the IVR
- Facility to 'Refer Critical Problems' to relevant 'Crop Specialist' available virtually
- 'Round the Clock Query Registration Facility' through IVRS & Smart Phones
- 'Anywhere Anytime Access' to Past Advisories
- Facility to 'Push Emergency Message' to Farmers based on Location and Crops
- 'Network Independent' – Accessible from All Networks
- Farmers using text messages as a reference and validating transactions
- Timely information related to production, protection, post-harvest and weather
- Voice messages to aid farmers with less literacy skills
- Weather forecasts and awareness to help in planning agricultural work
- Short films via social media on agriculture related information

- Increased awareness about the use of ICTs in agriculture

**3.2 Challenges in Implementation**

- Farmers not disclosing their complete information to maintain the farm database
- Non availability of the complete soil data for each farm
- Non availability of parameters to maintain the farm history for each farmer
- Non availability of reliable production figures for some crops
- Non availability of real time market prices for certain commodities
- Non-familiarity of farmers with a multiple option based IVRS.
- Little to no aggregation of produce at farm gate leading to sub optimal utilization of ARVs

**3.3 Lessons Learnt**

The successful implementation of the 1917iTEAMS project necessitates the continuous training and feedback sessions for field personnel to understand the issues of the farmers. There was a need for more sensitization meetings and linkages with various service providers for need based services. The critical aspect of the project success was the data on production and pricing critical for the platform to remain relevant, this required a continuous presence of on ground support. Such support was also needed for the gradual introduction of IVRS options to farmers, and to train them to use the 1917iTEAMS platform to access expert solutions in their daily agricultural practices. Finally, the promotion of local aggregators was considered necessary for economies of scale, optimizing ARV usage and attracting bigger buyers.

**4  Awareness Campaigns strategies for 1917iTEAMS**

There were many strategies adopted to spread awareness on the program, and the training required for representatives in the villages.

i. Specialized Agencies were engaged by 1917iTEAMS to build awareness through ATL, TTL and BTL campaigns like road shows, print advertisements, hoardings, market kiosks, radio and TV spots, social and digital media etc.

ii. In-house teams of Field Managers and Farmer's Coordinators were placed at the Block Level who conduct village and farming family level trainings almost on a daily basis.

iii. Network and functionaries of the Agricultural Technology Management Agency (ATMA) are present in every block of the state. These are technical personnel who have been tasked by the line department to support 1917iTEAMS in addition to their other functions.

iv. Engagement Programs through Farmer's Friends Network: A network of progressive farmers and socially responsible individuals identified and recognized by the Department of Agriculture, Government of Meghalaya. 1 FF is present for every 3 Villages in the state of Meghalaya. These are the individuals trained to spread awareness at the field level, aggregate produce and help to mobilize users.

v. Participation in workshops, farmer melas, seminars, training programs etc of the line departments by the technical personnel of 1917iTEAMS.

## 5 Conclusion

This paper discusses the 1917iTEAMS initiative, which was launched by the state government of Meghalaya to enable farmers to network with each other, connect directly with the markets, and obtain the necessary agricultural expertise. The first year of implementation has witnessed ground-breaking experimentation, testing and validation of almost all aspects of the system and program. The most encouraging aspect of 1917iTEAMS is that it has been very well received by both the farming community and the market, especially in the Garo Hills region, where it is emerging as a catalyst for the collectivization and aggregation of both people and produce. Despite teething problems especially in the software (which have later been rectified), farmers who have made use of the services of iTEAMS have expressed their appreciation of the advisories, market linkages and logistics. However much more needs to be done to extend the services of 1917iTEAMS to all the farmers of the state. One of the future goals of the project is to introduce an AI driven platform to better match the buyers and sellers, handle routine requests, analyze trends and make projections that can assist in location specific crop planning and forecasting. Such practices can lead to better framing of policies, schemes, budgets, and interventions for the benefit of farmers. The1917iTEAMS is a unique innovative project that can be adopted and implemented in other states in India and regions across the world.

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# Supercharging the Public Sector- Imagining the Government of the Future with AI

The Public Sector globally is in an urgent need for a massive facelift. The growing crisis of confidence in our public services – supposedly serving the essential rights of the people within a government's jurisdiction, and most often availed by the most vulnerable sections of our society – is a cause for concern. There is a rising clamor from the people, demanding more efficiency and accountability from the public sector – alongside improving the reach and quality of services that it provides. While there are no simple solutions to this hugely complex problem, public sector enterprises can unlock massive value by adopting artificial intelligence into their departments and processes.

The buzz around AI has been growing consistently, specifically in the private sector – where AI is being widely adopted and is achieving excellent business outcomes across industries and use cases. Public services have historically been conservative when it comes to technology adoption, and for a good reason. They are accountable to the public, who provides funding to their departments. But with AI maturing and permeating across business functions and burgeoning consumer confidence in its value, can governments afford to ignore the transformative impact of this technology? This transformation becomes even more critical for a developing country like India, where technology is the best tool to enable the kind of economic growth and social change that is needed to ensure we leapfrog to reach our rightful place in the world order.

AI has been successfully tested, and it is time that government and public sector come around to exploit its potential. At Fractal, we partner with Fortune® 500 companies to create competitive advantage by powering every human decision in the enterprise. We believe in the power of combining data science and behavioral sciences to drive large scale programs that achieve lasting change. Our trifecta of decision making (Augment every human decision with better data & AI; Engineer for internet scale and Incorporate human centric design and behavioral sciences) is apt for the kind of national transformation initiatives that are needed specifically in India.

Here are a few broad areas where AI can deliver compelling outcomes for public services.

**Augment Strategic Planning**

AI can help improve the reach and availability of public services by augmenting the process of planning strategic initiatives across departments.

*Given the vast amount of data points that government programs generate over time, it is impossible to keep track of the successes and failures using traditional techniques. Repetition of mistakes and duplication of effort is rampant. Machine learning and big data analytics provide the tools to derive patterns and insights at scale to significantly improve government planning and decision making.*

For instance, using AI:

- Departments responsible for public works, road and transportation, railways etc. can accurately identify areas that urgently require infrastructure development, based on population and traffic data. AI is a hugely beneficial intervention that will help prioritize infrastructure development projects. In addition to accurately forecasting the time and cost required to build these necessary facilities, AI can also provide a mechanism for timely maintenance of these facilities. As an example,

  *Indian Railways is considering deploying drones that will capture images of railway tracks to assess wear and tear. The only way to do this at a scale that moves the needle is by deploying AI-led automated software at the back-end that analyzes these images at exponentially higher speeds with a significantly lower cost.*

- Government departments can recognize areas that need additional schools and hospitals. Population and demographics data can be used to demarcate areas with high instances and risk of disease outbreaks, that also have large, and under-served elderly populations to prioritize the planning for hospitals. In the same vein, schools and colleges could be built in areas with a young population, currently under-served by the education system. Using AI, these departments can also determine the teachers and doctors required to staff these schools and hospitals and raise recruitment requisitions.
- Government could also study the macro-economic trends, to identify the need and model outcomes of economic and monetary policy interventions. AI can help assess the probability of success of policy instruments, prior to implementation, to ensure an effective roll-out of these initiatives.

**Improve Speed and Accuracy of Predictions**

An important benefit of artificial intelligence is to reconcile past and current data trends to make near-accurate predictions for the future. This ability to make accurate forecasts could provide a strong boost for

- The agricultural sector – by mapping weather, soil and activity data, AI can help farmers improve the predictability of their yield and associated revenue. In an advanced state, AI could also help predict the fair price of agricultural produce by analyzing price trends, thus giving farmers a fairer rate for their crops. Specifically, in India AI can play a key role in meeting the government's ambition to double the farmer's income by 2022.

- Defense and Internal Security departments – by identifying and predicting potential bad actors who could be a security threat to the nation based on their history of past activities and affinity

with illegal activity. Similarly, by analyzing patterns of attacks of adversary nations, the military would be able to better predict and ward off potential threats. The latest developments in AI led computer vision and natural language processing (NLP), can significantly enhance the speed and scale of national defense and internal security programs.

- Public Health Studies – this could be done by mining social media data to identify and contain potential disease outbreaks. Additionally, properly maintained datasets could give a boost to epidemiological studies. By identifying commonalities in the incidence and spread of diseases we could help pharmaceutical companies devise medical formulations to cure those. In India, AI can contribute significantly in narrowing the gap between demand and supply of healthcare services, by providing tools that help increase the efficiency of medical staff and increase the availability of services in the remotest corners of the country.

*Global companies like Google are already experimenting with AI-based diagnosis of diabetic retinopathy. Indian companies like Qure.ai are automating screening of TB patients leveraging deep learning. Each of these initiatives has the power to improve the outcomes for patients dramatically.*

**Automate and Fast-Track Key Functions**

One of the key tasks performed by governments – and a cause for massive public grievance – is adherence to bureaucratic process and paperwork resulting in slow execution. AI can help clear the massive backlog of paperwork that is an area of struggle for public services by:

- Fast-tracking legal paperwork – with our courts struggling under the immense weight of more than 25Mn pending cases, AI can help read and provide case summaries, and adjudicate minor bail hearings.
- Addressing Citizen Queries – it is no stretch of imagination that chatbots could be used to process and serve RTI requests. AI could also help address department-level queries and file complaints in a seamless manner, without causing frustration to citizens seeking basic information and redressal. Many state governments in India are already exploring chatbots that interact in local languages, bringing in a new standard of e-governance.
- Automating Fraud Detection and Benefits Administration – given the plethora of cases of fraud, the most susceptible members of the society face much grievance in availing basic facilities due to the checks and balances put in place. Loan approvals, reimbursement of insurance claims and processing subsidy benefits could all be rated and approved by intelligent agents, which will help improve the experience of working with public departments. AI can further control leakages in DBT schemes like MGNREGA (2018 Budget of INR 55,000 cr.) to ensure that the full benefit flows to the intended recipients and fraud and waste is minimized.

The need and potential for AI in governance is great. For public services to stay true to their name, and serving the public, an AI-augmentation of government is a necessary step. AI can help enable a friendlier, more transparent, and frictionless government, which is the need of the hour.

**About Fractal**

Founded in India in 2000, Fractal is a strategic analytics partner to Fortune® 500 companies globally and helps them power every human decision in the enterprise by bringing analytics & AI to the decision. With more than 1,300 employees, Fractal is present across 16 global

locations including the United States, UK, Australia and India. Fractal has been featured as a "Hot Artificial Intelligence (AI)" company by Forbes® and a leader on Forrester WaveTM: Customer Analytics Service Providers, 2017 & 2018.

We leverage AI through our unique trifecta approach:

1. **Artificial Intelligence**: Build algorithms that match and exceed human level intelligence in a broad range of cognitive tasks

2. **Engineering**: Build and implement innovative products at scale through strong data and process engineering

3. **Design**: Approach every solution with the user in mind and incorporating human behavior to maximize adoption

**\*\*\***

# Background paper on Blockchain

Today, Blockchain is no more just a buzzword. It has moved from the laboratory to field and even if one is not aware, there already might be a blockchain layer involved in one of the services being used by us. This is what brings to have a closer look at the blockchain ecosystem in terms of both its present and the future.

The blockchain is defined broadly as a technology that is incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value. This decentralized, cryptography based, solution offers the prospect for sharing financial, legal, physical or electronic information more readily than previously possible, across multiple sites and across the full range of public service, business and personal dealings, whether government to business, government to consumer, business to business, business to consumer or consumer to consumer, with the overall potential to redefine transactions in terms of simplicity and removal of potentially multiple steps, all of which involve participants or middlemen.

All of the above properties make it a very relevant technology to be used for public good. At the same time we must be aware of the challenges posed by this emerging technology. There needs to be a recognition that the public sector is more comfortable with standard products and technologies. However, since there's a moving target for almost all emerging technologies, and rigid compliance at this stage could stifle innovation.

DARPG as a key department for innovation and reforms should work with other key Ministries and Departments like MeitY and NITI Ayog to ensure there is a conducive environment to use the technology which addresses painpoint which the Blockchain technology can easily solve.

The Government is looking at this technology with lot of hope to solve some of the long standing problems like Land records, Health Records, Education records etc. However, we must be aware of the capabilities and the limitation of the technology before moving forward.

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# Workflow Automation System in State Secretariat, Government of Odisha

**Shri R.N Palai , ITS**
Special Secretary to Government,
Electronics and Information Technology Department
Government of Odisha

| 1 | Name of the State/Ministry | : | **Odisha State** |
|---|---|---|---|
| 2 | Name of the host/owner organization | : | Electronics and Information Technology Department |
| 3 | Status of the host/owner organization | : | Nodal Department, Govt of Odisha |
| 4 | Name of the Project | : | Odisha Secretariat Workflow Automation System (OSWAS) |
| 5 | Name of the Nodal Contact Person | : | Shri Rudra Narayan Palai, ITS, Special Secretary to Government **E&IT Department, Government of Odisha** |
| 6 | Contact Address | : | Plot No: N-1/7-D, Acharya Vihar, Bhubaneswar, PIN – 751013, Odisha |
| 7 | Telephone/Fax/e-mail | : | 0674-2567295 Fax- 0674-282842 |
| | | | |

## Project Summary:

OSWAS started in the year of 2009-10, is conceptually an office automation application outlining the procedure for efficient and effective management of government Secretariat practice to eliminate the physical movement of files with role based workflow system. Electronic processing of files using OSWAS has enabled quick disposal of matters and has brought down the time to establish and implement decisions significantly while bringing transparency to the system. The OSWAS application is truly a paperless platform to accommodate Secretariat work flow as per Odisha Secretariat Instruction Manual.

To meet the challenges of technical obsolescence, a new version of OSWAS named as OSWAS v2.0 has been implemented since November, 2018 after revamping of the Application with added features.

The new version of OSWAS is based upon Open Source technologies and incorporates best practices from various Public Sector implementations globally with enriched GUI, enhanced features, high performance and ease of use. It provides a set of tools to rapidly configure /

customize requirement. Besides, the new Application is OS independent (Windows, Linux, Mac), browser independent, database agnostic and can be accessible from devices like iPAD, iPhone, Macbook etc.

## Date of launch of project

*OSWAS 1.0 Initiation:* 2009-10
Support Phase: April 2013 – Nov 2019
OSWAS 2.0 Initiation: 2017-18
Support Phase: Jan 2019 – Dec 2023

## Coverage:

**OSWAS application is used by 42 Departments of Government of Odisha including all Ministers, Chief Secretary and Chief Minister office. It is also being used in 3 directorates namely OCAC, DG Vigilance and OSDMA. Currently, external users / citizens are not intended users of the newly proposed OSWAS system.**
**Stakeholders**

The identified stakeholders for the OSWAS are as follows:

    i.    All user departments of Odisha Secretariat.
   ii.    Program Management and Project Management Team
  iii.    System Integrator : Tata Consultancy Services Limited
  iv.    Odisha Computer Application Centre
   v.    Electronics and Information Technology Department

## Problem statement or situation before the initiative

The day to day official work in the department was cumbersome because the decision behind the issues involves a lot of flow of information in the form of files manual movement from one officer to another was being done for seeking views, opinions, concurrence and approval. The physical file movement of official files & documents incurs a lot of time and requires lots of paper work before the final decision is made by the senior officials.

As a result many crucial decisions were not been able to take on-time due to the slow movement of files and/or unavailability or absence of the senior officials in the office for clearing these files. Missing of files is also very common in most of the government offices and locating the file out of the physical storage to difficult on time.

The availability of relevant and authentic data in form of the decision in an easily intelligible form is an important requirement for any kind of planning. Due to lack of integrated/collaborative centralised workflow system it was difficult to take a consolidated decision.

## Project Objectives:

OSWAS was undertaken with an objective to ensure effectiveness of Government procedures and enhance efficiency of Odisha Secretariat. Objective behind this reform is given below:

- **Enhance productivity with efficient monitoring & control**

- **Effective internal information exchange**

- **A structured & collaborative work environment in the Secretariat**

- **Enable prioritization of work**

- **Use IT as an enabler to Govt Department**

- **Access controls at all levels**

- **Efficient and transparent administration**

## Project Scope, Approach and Methodology:

The scope of the project includes:

- Customization and implementation of Application Software for "Odisha Secretariat Workflow Automation System"

- Application and Hardware Infrastructure AMC Support

- Maintenance & Handholding Support to the users of Departments

- Delivery of End-user Training

OSWAS solution has flexibility, scalability and adaptability to meet the organization requirements. The solution's comprehensive self service capabilities provide the flexibility of using digital channel to perform various functions and avail required benefits. It facilitates faster transformation by providing a single integrated solution cutting across all the departments of the organization.

## Modules of OSWAS:

OSWAS comprises of 14 core applications which involves file and correspondence processing and 7 common applications used across the departments:

1. Portal - Welcome page of application including Department wise usage, User Login, Calendar and latest news and notifications.
2. Dak / Correspondence Management- Workflow of Correspondence(s) in the system. Allows user to create, assign correspondence(s) and attach to file.
3. File Management- Workflow of file(s) in the system. Has features like File creation, File movement, send File(s) etc.
4. File Processing- Allows users to add, view notings/correspondence(s)/file(s). Take actions viz., Link/Approve/Reject/Dispose File(s) etc.
5. Files Room / Record Room - Central repository for the user to view all files and correspondence as per the hierarchy.
6. Document Management System and Knowledge Bank-
   Document repository for artefacts like Government Rules, Regulations, Circulars, Acts etc., with searching facility.
7. Workflow Management System- Base Workflow engine that supports the operations and transactions for business functions.

8. Communiqué System (Internal Messaging)- Messaging System for internal OSWAS users.
9. Organization Structure Management- Managing departmental hierarchy along with subjects and channels of file/correspondence movement.
10. Dashboard- Graphical representation of performance metrics indicating departmental usage.
11. Notice Board and Bulletin Board Service- View and Publish notifications, broadcasting notice.
12. MIS Reports- Transactions and Movement registers for files and correspondences.
13. Audit Trail Management- Maintains transaction records for historical purpose and analysis.
14. Search Engine- Files and Correspondence searching using advanced filters.

## Common / General Applications

1. Court Case Management System (all types including NHRC cases)- Handling legal matters as an add-on to File Management Module
2. RTI- Handling RTI matters. Capture and Report generation of new and legacy data.
3. Online Telephone Directory- Department user can view, add, update, and delete telephone numbers.
4. Application for vehicle management and fuel consumption- Requisition of Govt. vehicles and fuel management.
5. Tours and Travels- Facilitating employee tours and travels with defined workflow.
6. Leave Management- Handling employee leaves along with approval. Managing leave rules of Government of Odisha
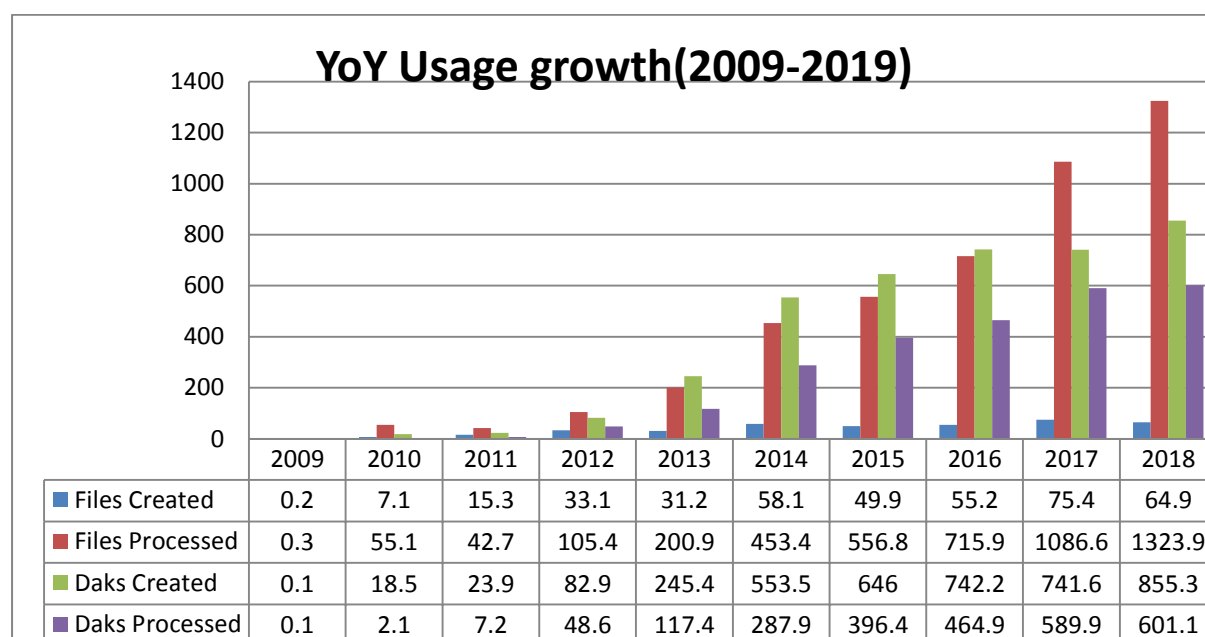7. Assembly Questions – Processing of files related to Legislative Assembly

## Features

i. Open Source, Platform independent, browser agnostics scalable Solution accessible over different digital devices like iPAD, MAC system.
ii. Approval of Noting and drafts using Digital Signature
iii. Automation of Routine Tasks  (File creation, Dak creation, Disposal of files and daks etc)
iv. OSWAS is a intranet based application but Accessibility of the application is 24*7 over VPN has been enabled for for selected higher level officers to address urgent administrative matters from home or remote locations at their convenience as and when required.
v. SMS and e-Mail based alerts for priority files and correspondences
vi. Availability of various MIS reports and Dashboard features.
   a. Robust audit mechanism has been put in place and Security Audit of the system is conducted at regular intervals to resolve the vulnerabilities in the system.
   b. Bi-lingual facility to support Odia & English languages
   c. Role based user creation with hierarchy mapping and access rights

vii. Integration of Digital Signature has been ensured the sense of security to the regular workflow and ownership. The OSWAS Application is available 24X7 and to ensure uptime, BCP site has been established at the Odisha State Data Centre.

**Scope of Integration:** Designed with the facility of Restful integration with other external applications like e-Despatch (For Letter movement to other offices where OSWAS is not in use), SMS / eMail gateway integration, citizen facing eAbhiyog and RTI Portal.

## Adaptability Statistics

The following statistics give an impression of adaptability by different users in the State Secretariat.

### YoY Usage growth(2009-2019)

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|
| Files Created | 0.2 | 7.1 | 15.3 | 33.1 | 31.2 | 58.1 | 49.9 | 55.2 | 75.4 | 64.9 |
| Files Processed | 0.3 | 55.1 | 42.7 | 105.4 | 200.9 | 453.4 | 556.8 | 715.9 | 1086.6 | 1323.9 |
| Daks Created | 0.1 | 18.5 | 23.9 | 82.9 | 245.4 | 553.5 | 646 | 742.2 | 741.6 | 855.3 |
| Daks Processed | 0.1 | 2.1 | 7.2 | 48.6 | 117.4 | 287.9 | 396.4 | 464.9 | 589.9 | 601.1 |

*(All Numbers mentioned above are in thousands)*

## Benefits to the Departments

- Transparency of public administration and efficient record keeping.
- Involvement of user departments towards govt decision making and agility.
- Standardization of common processes and prioritization of work.
- Simplification of administrative routines and improvement in service provision.
- Traceability and accountability of actions with Audit trail.
- Effective reporting and dash board for various reporting.

## Conclusion:

OSWAS started with the objective of file automation has helped the Odisha Government with a clear perspective of ownership and compliance. Electronic processing of files has enabled Government of Odisha to quickly dispose of administrative matters. The application has added a sense of security to the regular workflow. Integration of the application with

VPN and Email solutions has enabled Govt. users to address critical administrative matters at their convenience as and when required. The application has clearly met the state 5T's objective. Based on open source technologies, it has significantly reduced the file reduction time and helped in achieving transparency causing a digital transformation across Government of Odisha. Owing to its benefits, it has been planned to implement the same across Heads of Departments for handshaking between users of departments and HOD's.

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# National eServices Delivery Assessment 2018-19 (NeSDA)

*Ms. Kiran Puri*
*Joint Secretary, DARPG, GoI*

*Sh. Prasad Unnikrishnan*
*Partner, IGH, KPMG*

Over the years, the e-Governance systems implemented by Central and State Governments have helped the Nation to increase the speed of communication, reduce the time and cost of availing government services to citizens, increase convenience to citizens, improve customer service and create an environment of transparency and accountability through the provision of access to information. While there have been many successful initiatives undertaken by Central Ministries and State/UT Governments to improve overall e-Government development, there was no means to measure the overall efficiency of service delivery mechanism from a citizen's perspective. With an objective in mind, DARPG developed a framework that could measure the depth and efficiency of e-Governance service delivery of the existing e-Governance service delivery mechanisms of the nation. As a result of these, the National e-Governance Service Delivery Assessment (NeSDA) framework was conceptualized and launched in August 2018.

While benchmarking States, UTs and ministries on their e-governance/e-service delivery performance is an objective of the study, another significant achievement is imparting sensitization on the importance of service delivery efficiency and promote participation of all departments and ministries at State, UT and Central Level to adopt the e-government framework in their day-to-day functioning to reinforce the vision of MINIMUM GOVERNMENT AND MAXIMUM GOVERNANCE.

NeSDA assessment across all States & UTs is another milestone towards fortifying the foundation & impact of e-governance in India. This study provides a holistic & comprehensive view of the effectiveness of e-Governance service delivery model across States & UTs. This study highlights what best practices can be followed and replicated to raise the level of e-Governance service delivery rationale basis on three broad areas.

- **Services & Portal Assessment** – service websites (URLs) assessment to measure service level maturity & performance of services offered.
- **Citizen Survey** – feedback from citizens to verify & validate the benefits of e-Governance services delivered by the States & UTs.
- **Benchmarking –** case studies to highlight best practices to learn & replicate.

The objective of the study is not to rank State & UTs in the area of e-Governance but to encourage them towards easy and efficient public service delivery.

The framework would be used as a benchmarking tool to evaluate common services provided to citizens (G2C), business users (G2B) and government departments (G2G) under the pre-

identified focus sectors of Finance, Health, Social Welfare (including Agriculture & Health), Education, Labour & Employment, and Environment, by all States and Union Territories and respective Central Ministries. The framework consists of 7 key parameters namely Accessibility, Content Availability, Ease of Use, Information Security & Privacy, End-service Delivery, Integrated Service Delivery and Status & Request Tracking. The State/UT portals are assessed only on Accessibility, Content availability, Ease of Use and Information Security & Privacy parameters. The 7 key assessment parameters are described as follows:

1. **Accessibility:** Accessibility is necessary for good transactional user experiences, including two-way communication. With respect to e-Governance services, accessibility may be defined as the extent to which a user is able to access a portal and its services irrespective of the device in use, technology or ability. These can include enabling users to create personal login on the portal, availability of Single Sign-on feature for users to sign-in through an integrated authentication initiative and availability of installable mobile applications for providing information and services.

2. **Content Availability:** Availability of updated, authentic, relevant and user friendly information in different/ local languages, which can be easily understood and shared through multiple sources such as email and social media. The ability to understand and use the content on Government portals determines the extent to which people can participate in the economy through electronic media. Therefore, the definition embeds five key dimensions – quality, presentation, understandability, local language and ease of sharing.

3. **Ease of Use:** Degree to which a user believes that usage of a system shall be free from effort or difficulty. It includes easy content exploration, findability, task efficiency and automation. It encompasses different aspects like system usability, flexibility, system control, user adaptability to the system etc. This is a decisive factor upon which the adoption and satisfaction of e-government services are reliant on.

4. **Information Security and Privacy:** 'Information Security' is the safety and integrity of information transacted upon e-Government platforms at all times (Achieved through a robust technical architecture while ensuring ease of access at the user interface level). This represents the strength of e-Government platforms to eliminate any threats to information.

5. **Integrated Service Delivery:** The term "integrated service" consists of two parts: service and integration. In e-Government parlance, 'service or e-service' is a set of activities delivered by government agencies that is facilitated by information technology. Providing effective and efficient e-services requires the integration of e-services across levels and branches of government agencies collaborating with each other.

6. **End Service Delivery:** End Service Delivery measures the citizens' satisfaction with faster delivery of end services, elimination of manual processes, and reduction of time / manual effort to obtain a particular service.

7. **Status and Request Tracking:** A mechanism through which the citizen can get to know the stage at which his / her service request is at using the unique Service Request Number or Application Number. For every service request submitted by

citizen, either, manually or online, a unique service request or application number should be issued to the citizen. In reference to this unique number, the status of the request can be tracked by the citizen through various channels such as website, SMS, call-center, emails, etc.

A participatory approach was taken for conduct of the study. The States and UTs were sensitized about the National e-Governance Services Delivery Assessment including various stages of the assessment and process for data submission. The feedback from the States were received on the framework, parameters and questions related to the parameters. The same were incorporated into the final framework and populated on the online assessment tool "NeSDA Portal". NeSDA Portal (https://www.nesdaportal.in/) is an online system that was developed to assist DARPG in carrying out this assessment. The entire process of data entry, review, assessment, evaluation and scoring were done online in this portal. The portal also provided important information, components and factors playing a role in the assessment. All the States, UTs and Central Ministries had to submit the links and take the assessment through the NeSDA portal. There are 4 stages of assessment in this portal. These are as detailed below:

### Stage 1 - Basic Data Entry

In this stage, all the States, UTs and Central Ministries were asked to upload the appropriate URLs for the 53 mandatory services from 6 identified sectors. The services considered for this stage of data entry were in the G2C (Citizen Services) and G2B (Small Business Services) categories.

### Stage 2 - Review & Acceptance of Basic Data Entry

In this stage, the URLs uploaded by the SPOCs were checked by the NeSDA reviewer team to see if they were appropriate. The functional service links were approved and the service links with issues were sent back to the SPOCs for them to resubmit the appropriate service links based on the reviewer's comments. Once these URLs were re-submitted by the SPOCs, the reviewers then carried out a final validation of the service links submitted.

### Stage 3 - Detailed Portal/ Service Questionnaire

In this stage, the SPOCs had to fill in the assessment questionnaires for the approved service links submitted by them in the previous stage. The assessment questionnaire for the States and UTs consisted of 42 questions for the portal and 77 questions for the services. For the Central Ministries, the assessment questionnaire consisted of 41 questions for the portal and 77 for services. The SPOCs had the option to choose 'Yes', 'No' or 'Not Applicable' for each of the questions in the assessment questionnaire. For each 'Yes' for a question, they were required to upload the relevant screenshot as a proof from the respective service link webpage. The detailed assessment questionnaire is provided in Annexure II.

### Stage 4 - Review & Acceptance of Detailed Portal/Service Questionnaire Reponses

In this stage, the validation of responses to questions submitted by the SPOCs in Stage 3 were reviewed by the NeSDA reviewer team. On the basis of the uploaded screenshots and accompanying comments, the questions of the assessment questionnaire were then either approved or sent back to the SPOCs for them to resubmit the appropriate screenshots for the

particular service link question. Once these screenshots were resubmitted by the SPOCs, the reviewers proceeded with the final validation of questions for the approved service links in the assessment after verifying the uploaded screenshots.

Further to incorporate citizens' perspective, a Citizen Survey was conducted to determine the satisfaction levels of respondents based on their experience in availing e-services from their respective States and UTs. The prime objective of conducting the survey was to understand first-hand experience of respondents to improve the quality of e-service delivery. Insights obtained through the perspective of the respondents will help the departments plug the gaps in the system and streamline the e-service process efficiency.

The final assessment report was drafted, reviewed and finalized by DARPG with the support of the knowledge partners. While all the efforts have been taken to ensure that the assessment is fair and represents the accurate status of the depth and efficiency of e-Governance service delivery systems across the country, it is key to note that the assessment is purely based on the data sets provided by the States, UTs and Central Ministries to DARPG through the NeSDA portal. Aberrations from actuals in terms of availability of a certain service link or feature, if any, would be correlated to the data provided by the States, UTs and Central Ministries through the NeSDA portal. Similarly, the review of the submissions were done basis the Guidelines published on the NeSDA portal. It may be possible that the scores of certain States or UTs are low because of the non-adherence to the assessment guidelines or because of submission of inadequate data by the States/UTs/Central Ministries. If the State/UT had indicated that a particular service or services were unavailable online, then those services were omitted from the scoring calculation. As a result, the assessment is based on the available services provided by the state. Therefore, it should be noted that a State/UT's scoring in a particular service sector is based on the actual number of services provided and assessment thereof. The current NeSDA framework has addressed most of requirements of the e-Governance assessment from an efficiency and effectiveness perspective. While this is the first-of-its-kind benchmark exercise for the year 2018, DARPG intend to conduct this on an annual basis for improving the States and Central Ministry service parameters. Going forward, DARPG would enhance the framework to address the current challenges of the Governments at the same time keeping in mind the expectation gap from the citizens.

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# Comprehensive Telecom Development Plan for the North-Eastern Region:

**Background:**

On 10.09.2014, the Union Cabinet approved a proposal to implement a Comprehensive Telecom Development Plan for the North-Eastern Region. The estimated cost of implementation is Rs. 5336.18 crores to be funded from Universal Service Obligation Fund (USOF).

As the tender rates of bidding units of Meghalaya were 70% higher than the estimated cost, therefore tender for provision for 2G based mobile services was cancelled. On 23.05.2018, Union Cabinet approved the proposal for implementation of a 2G+4G technology based mobile services in Meghalaya under Comprehensive Telecom Development Plan for the North-Eastern Region at a total estimated project cost of Rs. 3911 crore plus applicable taxes as per actual, to be funded by Universal Service Obligation Fund, in accordance with the ITRs, 1951 and enhanced cost of CTDP Project for NER for an amount of Rs 8,120.81 crore (Rs. 5336.18 Cr. already approved by Union Cabinet on 10.09.2014) plus applicable taxes as per actual.

❖ State-wise details

| S.No. | STATE | No. of Villages to be covered | Number of Towers for Uncovered Villages | No. of Towers along National Highways | Length of Optical Fibre Cable to be laid (Kms) | Estimated cost for mobile services (Rs. Crore) | Estimated cost for Augmentation for Transmission Network (Rs. Crore) | Estimated Cost (Rs. Crore) |
|---|---|---|---|---|---|---|---|---|
| 1 | Arunachal Pradesh | 2805 | 1893 | 149 | 1587 | 1635.68 | 136.44 | 1772.12 |
| 2 | Assam | 2503 | 1874 | 33 | 228 | 1538.23 | 25.09 | 1563.32 |
| 3 | Manipur | 528 | 384 | 53 | 172 | 379.01 | 16.31 | 395.31 |
| 4 | Meghalay | 2374 | 2162 | 11 | 124 | 3911 | 12.77 | 3923.77 |
| 5 | Mizoram | 252 | 227 | 19 | 747 | 200.28 | 65.26 | 265.26 |
| 6 | Nagaland | 134 | 112 | 48 | 154 | 136.14 | 17.57 | 153.57 |
| 7 | Sikkim | 23 | 19 | 1 | 125 | 16.14 | 11.55 | 27.55 |
| 8 | Tripura | 2 | 2 | 7 | 76 | 8.4 | 10.98 | 19.38 |
| | **TOTAL** | **8621** | **6673** | **321** | **3213** | **7824.88** | **295.97** | **8120.81** |

**Status:**

Agreement signed on 08.12.2017 with M/s BAL/BHL for installation of 2004 mobile towers in 2128 uncovered villages and along National Highways of Assam, Manipur, Mizoram, Nagaland, Sikkim, Tripura and National Highways of Arunachal Pradesh for a project Cost Rs 1655.66 Cr.

Agreement signed on 16.01.2018 with BSNL for provision of 2G based mobile services in Arunachal Pradesh and 2 districts of Assam was reviewed on 06.05.2019 in NITI Aayog, wherein it has been decided to cancel the agreement. Accordingly, fresh DPR is under preparation and to be submitted for DCC, Cabinet approval.

BSNL has been nominated to provide OFC ring connectivity between state capitals and between & district headquarters to ensure reliability and redundancy in the transmission network. 1st Tender for OFC & Equipment's was 97% higher. BSNL re-floated Tender and rate is 88 % higher. Revised modality of implementation is being worked out.

Proposal to install 2173 towers of 2G+4G technology for providing mobile services in 2374 uncovered villages and along National Highways for an estimated cost Rs. 3911 Cr has been approved by Cabinet on 23.05.2018. In the meantime, DoT LSA has given new list of 2691 number of uncovered villages of Meghalaya. DPR as per new list of uncovered villages prepared and under submission for DCC approval.

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State Convention Centre, Beside Pine wood, Camels Back Road, Shillong, Meghalaya 793001