

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

# **BACKGROUND PAPERS**

# 19<sup>th</sup> National Conference on e-Governance

21st & 22nd January 2016, Nagpur, Maharashtra



### 19th National Conference on e-Governance

21st & 22nd January'2016, Nagpur (Maharashtra)

### Organizers



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

Department of Electronics and Information Technology Ministry of Communications & Information Technology Government of India



**Knowledge Partner** 



**Session Partners** 





### A **NASSCOM**<sup>®</sup> Initiative



Building a better working world







# Contents

1.	GATI – Governance with Accountability Transparency & Innovation for Citizen-Centric Services	1
2.	Financial Inclusion - JAM & DBT	25
3.	Urban Governance in Smart Cities	39
4.	Cyber Security Framework for Citizen Centric Services	57
5.	Technology enabled Education	81



19th National Conference on e-Governance White Paper on "GATI – Governance with Accountability Transparency & Innovation for Citizen-Centric Services"





Author:

• Mr. Vikas Aggarwal, Executive Director, Advisory Services – Ernst and Young LLP



### Contents

1.	Evolution of "Citizen Centric" e-Governance projects	5
2.	Accountability and transparency in service delivery	0
	or e-Governance projects	8
3.	Innovation in service delivery of e-Governance projects	16
4.	Concluding thoughts	22



#### 1. Evolution of "Citizen Centric" e-Governance projects

The World Bank defines e-Governance (or e-Government) as harnessing information and communications technology to transform relationships with citizens and businesses, and between arms of government to achieve benefits such as reduced corruption, increased transparency, greater convenience, higher revenues, and lower costs.

Rapid advances in personal computer and mobile technology, coupled with the proliferation of internet, have resulted in e-Governance becoming the cornerstone of development for all governments across the globe. e-Governance journey in India primarily started with the establishment of the Department of Electronics by the Government of India in 1970s and subsequent establishment of the National Informatics Centre (NIC) in 1977. The major push in the field of ICT-enabled governance came with the launch of NICNET in 1980s — the national satellite-based computer network, which was followed by the launch of the District Information System of the National Informatics Centre (DISNIC) program to computerize all district offices in the country for which free hardware and software was offered to state governments. NICNET was extended through the state capitals to all district headquarters by 1990.

In order to unify the e-Governance initiatives under a common objective, the National

e-Governance Plan (NeGP) was launched in 2006 with an attempt to push e-Governance as an integral part of the functioning as to how government services will be delivered. NeGP comprises 27 Mission Mode Projects (MMPs) and 8 core/support components. Despite the success of NeGP there was a need to revolutionize e-Governance by bringing further

#### NeGP vision: All Government services accessible to the

common man in his locality through a onestop-shop (integrated service delivery) ensuring convenience, efficiency, transparency & reliability.

transformation in the government's functioning and society's involvement in digitally

#### **Digital India Vision:**

"A programme to transform India into a digitally empowered society and knowledge economy" Digital India centred on three vision areas:

- Digital Infrastructure as a Utility to Every Citizen
- Governance & Services on Demand
- Digital Empowerment of Citizens

empowered knowledge society. Hence, a plan for Digital India was conceptualized and approved subsequently in 2015. The span and vision of Digital India is wider than NeGP, since Digital India incorporates electronic delivery of services with several other key strategic areas such as broadband highways, ICT manufacturing, access to mobile connectivity, employment creation along with e-Governance, etc. The figure

below summarizes the journey of e-Governance in India.



#### Fig 1: Journey of e-Governance in India

1.1. Changing nature of citizen engagement in e-Governance projects

Over the journey of e-Governance, the model of engagement with citizens has also evolved rapidly, moving from passive and fragmented engagement with more integrated and active engagement. This was made possible in response to the evolving technologies; increasing outreach of computers, mobile and internet; as well as increased expectations of the citizens from e-Governance solutions.

The figure below presents the e-Participation model of citizen centric service delivery, showing the various stages of maturity of e-Governance systems.

e-Information	• Enables participation by providing citizens with public information and access to information upon demand
e-Consultation	• Engaging people in deeper contributions to and deliberation on public policies and services
e-Collaboration	<ul> <li>Collaborating with stakeholders to play an active role in shaping policy through co- design of policy options and co-production of service components and delivery modalities</li> </ul>
e-Empowerment	• Empowering people through co-design of policy options and co-production of service components and delivery modalities

# *Fig 2: e-Participation Model (Source: ICIT 2013, the 6th International Conference on IT)*

In the early stages of e-Governance evolution, providing information regarding government services (prerequisites, process, requirements, etc.) and schemes was considered sufficient and this was achieved using government websites (categorized by department, schemes/ services, locations etc.). Then, the focus shifted toward delivering services to the citizens and e-Governance applications were developed for citizen to apply for services online and track their status. However, the level of manual intervention remained high. The next step was end-to-end automation of service delivery including automation of front and back

end processes. The next stage of evolution, which could revolutionize the e-Governance paradigm, is complete involvement of people in service delivery from conceptualization and decision making, to the process of service delivery etc., which could help in making e-Governance applications truly citizen centric. The figure below presents various stages of evolution of citizen-centric service delivery of e-Governance.



#### Fig 3: Evolving nature of citizen engagement in e-Governance projects

# 1.2. Establishing the need for accountability, transparency and innovation to transform citizen service delivery

Currently, e-Governance has become synonymous with efficiency and effectiveness. It is a valid assumption that all existing and new citizen services offered by the Government will be delivered electronically. Given the widespread usage and penetration of e-Governance, it has become imperative for e-Governance solutions to adhere to the basic tenets of governance, which include accountability and transparency.

The advent of ICT has brought in improved level of transparency and accountability in most citizen-centric government processes. ICT impacts how government organizations function, how information moves within a government organization and between government and citizens, how information can be tracked, accessed and retrieved by citizens as well as auditors, and whether clear responsibility and ownership can be assigned and tracked for each stage of a citizen-centric service. Most governments have reported a reduction in corruption, delays, and data losses after implementation of e-Governance applications. It is therefore, essential for e-Governance projects to imbibe accountability and transparency within their basic design principles.

India stands out among the rest of the developing countries treading the journey of e-Governance due to its substantial numbers and diversity of users. There is huge disparity in terms of level of digital literacy, language, internet usage/availability, demographics, etc. Implementing e-Governance solutions, which could effectively cater to the needs of all citizens is a great challenge for the government. Furthermore, the government is also constrained by the available funding for e-Governance projects. It is therefore essential that e-Governance projects in India find innovative means of funding, service delivery and outreach to ensure their success.

The subsequent sections of this paper explore the framework for accountability, transparency and innovation in e-Governance projects and also assess the current state of e-governance projects in India on these parameters.

"Never before in history has innovation offered promise of so much to so many in so short a time" – Bill Gates

#### 2. Accountability and transparency in service delivery of e-Governance projects

"We will transform governance, making it more transparent, accountable, accessible and participative." - Shri Narendra Modi, Prime Minster of India

There has been an increasing thrust on good governance especially by bringing in more transparency and accountability in governance. This section explores various facets of transparency and accountability in G2C e-Governance projects in India.

#### 2.1 Defining accountability and transparency in e-Governance projects

#### **Definition of transparency**

Transparency implies openness of decisions and actions. In other words, it means a free flow of information about decisions and actions, from source to recipient. Transparency in e-Governance means use of ICT to make public sector actions and decisions more open to public scrutiny. As a principle, public officials and civil servants are duty bound to act visibly, predictably and understandably to promote participation and accountability.



Instead of focusing on providing high volume of raw data, which may lead to confusion and opacity, transparency should focus on information being relevant, accessible, timely and accurate.

#### Types of transparency in e-Governance projects

The 'e-Government for Development Information Exchange' initiative by University of Manchester's Institute for Development Policy and Management has classified the type and degree of transparency in e-governance projects as follows:

Туре	Description
Publication	Providing some basic information about a particular area of government to provide basic insight into operations and personnel
Transaction	Automating some public sector processes, thereby partly reducing manual intervention
Reporting	Providing specific details of public sector decisions and actions, generally in the form of performance indicators
Openness	Providing information on current performance and also allowing users to compare that performance against pre-set benchmarks/targets

### Accountability Apart from providing information, ICT system supports some process of control over public servants

Furthermore, the content of information available as part of transparency initiatives of e-Governance projects can be classified under the following categories:

Category	Description
Financial	Data about public sector money (e.g. budgets, accounts)
Procurement	Data about purchase of goods and services by government (e.g. tenders, bids, contracts)
Workflow	Data about the flow of public sector work activities and resources
Registration	Data about recording of particular details with the public sector
Sector-specific	Data about a process that is peculiar to one particular part of the public sector
Mixed	Combination of different types of data from above

#### **Definition of accountability**

Accountability exists when there is a relationship where an individual or body, and the performance of tasks or functions by that individual or body, are subject to another's oversight, direction or request that they provide information or justification for their actions.

World Bank classifies accountability in governance into three categories:

Horizontal accountability: Formal relationships within the state itself, whereby one state actor has the formal authority to demand explanations or impose penalties on another. Its focus is on internal checks and oversight processes. For example, executive agencies must explain their decisions to legislatures.

"Accountability ensures actions and decisions taken by public officials are subject to oversight so as to guarantee that government initiatives meet their stated objectives and respond to the needs of the community they are meant to be benefiting, thereby contributing to better governance and poverty reduction.": World Bank

- Vertical accountability: Citizens directly hold the government representatives to account. Elections are an example of vertical accountability.
- Diagonal accountability: Operates in a domain between the vertical and horizontal dimensions. Direct citizen engagement with horizontal accountability institutions when provoking better oversight of state actions. Citizens bypass cumbersome or compromised formal accountability systems to engage in policy making, budgeting, expenditure tracking and other similar activities.

# 2.2 Challenges in effectively implementing accountability and transparency in *e-Governance projects in India*

"Good governance is being recognized as an important goal by many countries across the world. However, no country has so far implemented an e-governance system for 1 billion people"

- Late Dr. APJ Abdul Kalam, Former President of India

Although the Government has come up with several initiatives to facilitate the access to public services, and increase transparency and accountability through e-Governance, the desired outcomes are yet to be fully realized. This can be largely attributed to various front-end and back-end challenges that the government continues to face.

Front-end challenges relate to user-specific issues such as, high digital illiteracy levels, non-availability of user friendly interfaces, inadequate power supply in rural areas, low broadband penetration and most importantly, lack of awareness of e-Governance initiatives. On the other hand, back-end challenges relate to technical, process or human resource issues within the Government. These issues include lack of systems integration within a department, lack of integration across government departments, limited knowledge of using computers at various levels of bureaucracy and deployment of technology without proper process re-engineering.

The challenges, however real, are not very technological. Rather than technology development being the barrier, technology access and digital literacy are main concerns. For example, TRAI estimates that only 20.9% of the total population of India had internet access in March 2014. Moreover, the current literacy rate of India is 74.04% and the rate of digital literacy will be far lower than that. Coinciding with technology access is also the need for users to be able to understand and use technologies through which transparency tools are available. ICT solutions were primarily developed with an English language interface. However, in India a vast majority of citizens do not know English and use a local language.

Lack of co-ordination between various government departments/agencies and solution developers is also a major factor impeding the success of e-Governance projects in India. Unless there is a concerted brainstorming on the solution design and process re-engineering among various stakeholders, internal as well as external, success will elude.

2.3 Framework for assessment of accountability and transparency in e-Governance projects

This section assesses India's e-Governance initiatives on implementation of accountability and transparency measures. The following three factors have been identified as critical for effective implementation and adoption of accountability and transparency in e-Governance projects.

- Policies, regulations and guidelines which require adoption of accountability and transparency related practices in e-Governance projects
- Processes and tools/techniques, which can be included in e-Governance projects resulting in accountability and transparency in service delivery
- Change management and capacity building of people (stakeholders) involved in designing, executing and operating e-Governance systems for service delivery



Fig 5: Framework for assessing Transparency & Accountability in e-Governance projects

#### 2.3.1 Policies and regulations

Policies and regulations refer to the acts, regulations, guidelines and any other directives from the government, which institutionalize the adoption of accountability and transparency-related measures in e-Governance projects. This aspect covers both the availability of specific policies and regulations as well as effective mechanism for enforcement and monitoring.

Unlike the e-Government Act of 2002 in the US, in India there is no separate Act on e-Government till date. While India's IT Act 2000 is meant to primarily deal with cyber offenses, it has the following provisions to bring transparency in the functioning of governmental affairs through e-Governance:

- a) Legal recognition of electronic records
- b) Legal recognition of digital signature
- c) Use of electronic records and digital signature in governmental dealings
- d) Retention of electronic records
- e) Establishment of electronic gazette

Another significant effort in instituting accountability and transparency in e-Governance was the introduction of the Electronic Delivery of Services Bill, 2011. Key highlights of the bill included:

- Public authorities to deliver all public services electronically within a maximum period of eight years
- Establish Central and State Electronic Service Delivery Commissions to monitor compliance of government departments, and hear representations
- Public authorities to establish a mechanism to redress complaints. Complaints may

be for: (a) non-delivery of services in an electronic form; or (b) deficiency in the electronic service provided. In the first case, a representation may be made against the mechanism's orders before the Commission

In recent years, the Department of Electronics and Information Technology (DeitY) India has issued several guidelines, policy documents, frameworks and standardized templates with a view to bringing more transparency and accountability in e-Government projects. Some of the policies, which are relevant to adoption of accountability and transparency measures in e-Governance projects are:

- Guidelines for e-Governance projects
- Government of India website (GIGW) guidelines
- National policy on universal electronic accessibility
- Guidelines for Capacity Building and Institutional Framework for e-governance under NeGP
- Guidelines for strategic control in outsourced projects
- National Cyber Security Policy 2013
- HR Policy for e-Governance
- Guidelines on open standards
- Models RFPs for e-Governance projects
- Quality assurance and conformance standards

The launch of Digital India program has given a major boost to the e-Governance sector in India. Some of the salient e-Governance policies introduced by Digital India, relevant to adoption of accountability and transparency are:

- e-Kranti framework
- Policy on adoption of open source software for Government of India
- Policy on open application programming interfaces (APIs) for Government of India

Apart from the above policies at the central level, several states such as Karnataka, Andhra Pradesh, Kerala, Delhi, Gujarat have come up with IT policies/e-Governance policies.

While several guidelines and policies have been released by different regulatory and apex authorities at the Centre/ State level, most of these policies are recommendatory in nature. There is no single consolidated policy, which is applicable to all e-Governance projects and which can ensure that standard measures and tools for accountability and transparency are incorporated in an e-Governance project.

Furthermore, the evaluation and appraisal framework for e-Governance projects also does not mandate incorporation of these features in e-Governance solutions. Most e-Governance applications, especially those expected to be hosted over the internet, are required to undergo STQC audits. Other third party agencies (e.g. CERTIN or its empaneled agencies) only check cyber security related loopholes. None of these audits specifically evaluate application features relating to accountability and transparency.

#### Summary of assessment of policies and regulations

An overall assessment of the progress made so far by government departments on 'policies & procedures' for incorporating accountability and transparency in e-Governance projects is given below

S No	Component of innovation in configuration	Progress
1.	Availability of policies, regulations and guidelines	Needs improvement
	relating to accountability and transparency in e-	
	Governance projects	
2.	Assessment and audit mechanism to ensure	Needs significant improvement
	adoption of these policies	
Legend	:	
C	n track Needs improvement	Needs significant improvement

#### 2.3.2 Tools and technologies

With the increasing number of diverse e-Governance initiatives, it has become imperative that reusable IT tools and technologies be implemented for incorporation of accountability and transparency in e-Governance projects.

In a typical e-Governance system, the following IT tools/techniques can bring in accountability and transparency in the process and service delivery:

- Workflow management solution
- Government e-Office solution
- SLA monitoring/performance monitoring solution
- Helpdesk/call center
- User feedback/grievance redresses solution
- Status update mechanisms (SMS, email alerts)
- Identity and access management solutions
- Audit trail solutions
- Digital signature certificates
- Open data standards/APIs
- MIS/dashboarding solutions

The above solutions, if implemented as part of e-Governance projects should foster accountability and transparency. Several initiatives have been taken to develop reusable solutions, which can be incorporated as part of e-Governance applications. NIC (Centre and State), DeitY and other organizations offer several solutions to government organizations, which can be integrated as part of their e-Governance applications. However, the adoption of these solutions is still lower than needed.

There are several standalone initiatives by government organizations, both at Centre and State, which have significantly enhanced the accountability and transparency of those systems. A few examples are started below:

- Centralized Public Grievance Redress and Monitoring System (CPGRAMS) developed by Department of Administrative Reforms & Public Grievances (DARPG) and NIC, to act as a central grievance redress portal for citizens.
- Citizens' Charter portal by DARPG aims to improve the quality of public services by apprising citizens about the mandate of the concerned Ministry/Department/ Organization, contact details, service portfolio and grievance redress mechanism. It also provides the details of Citizen's Charter of various ministries/departments/ organizations of the Government of India.
- e-Kranti Framework of Digital India outlines the principles of 'eGov Impact Index' and 'Quality of Service' (QoS), which aim at dynamically computing the qualitative and quantitative impact of e-Governance projects. e-Kranti also envisages to integrate e-Gov Impact Index with the Results Framework (RFD) of Mission Mode Projects (MMPs).
- e-Taal Dashboard The e-Taal forum monitors government's e-Governance initiatives. It provides a Dashboard for providing a real-time aggregated view of e-Services being delivered across different states and levels of government.
- e-Monitoring of Service Level Agreements The e-SLA Monitoring System was launched by Government of NCT of Delhi for delivering the citizen-centric services offered by various departments. The system captures the details of the service requests and their disposal times. If the disposal times exceed the predefined SLAs, the departments are subject to penalization under Delhi Right of Citizen to Time Bound Delivery of Services Act, 2011.

#### Summary of assessment of tools and technologies

An overall assessment of the progress made so far by government departments on 'tools & technologies' for incorporating accountability and transparency in e-Governance projects is given below:

S No	Component of innovation in configuration	Progress
1.	Availability of re-usable IT tools/techniques for accountability and transparency in e-Governance solutions	Needs improvement
2.	Implementation of IT tools/techniques for accountability and transparency in e-Governance solutions	Needs improvement
Legend:		
C	n track Needs improvement	Needs significant improvement

#### 2.3.3 Change management and capacity building

Change management and capacity building are important tools for adoption of accountability and transparency measures in e-Governance applications. Some of the key elements of change management framework in government processes and systems are — clear shared vision, leadership commitment, people involvement, supporting structures/processes and performance measures. Since the last decade, the Government's (Centre and State) focus towards change management has increased considerably and change management is seen as one of the important success factors for e-Governance initiatives. However, the progress in this aspect has been slow and diffused, which has also hindered the adoption of accountability and transparency measures in e-Governance solutions.

The Government has also recognized capacity building of bureaucracy, government officials and citizens at large as an important consideration in e-Governance projects. Capacity building of government officers assumes increased importance in case of e-Governance projects, since computer education gained prominence only in the last decade and the level of digital literacy in India is low. As part of NeGP, the Government of India had recognized the importance of capacity building in terms of necessary knowledge and skills to conceptualize, initiate, implement and sustain e-Governance initiatives. An initial capacity building scheme was approved in 2008 with the following objectives:

- Establishment of institutional framework for state level strategic decision making including setting-up of State e-Governance Mission Team (SeMT)
- Imparting of specialized training, orientation program for SeMTs and decision makers
- Setting up of a central Capacity Building Management Cell for coordination and implementation of the scheme

The National e-Governance Division developed the e-Governance Competency Framework to identify the skills and behaviours required for Central and State government officers. NeGD also partnered with industry and academia partnerships to design and deliver training programs. With NeGP being subsumed into Digital India program, NeGD has continued with its capacity building initiatives with the following major components:

- Recruitment, deployment and management of the 340 specialized resources in the SeMTs in all States and UTs.
- > Training and development initiatives, including, inter alia,
  - Development of competency frameworks, training guidelines, content, case studies etc. for different groups of stakeholders
  - Developing a pool of certified trainers
  - Develop online and web-based training and set up Learning Management System
  - Certification programmes for specialized/key roles
- Knowledge management and sharing through workshops, development of case studies, sharing best practices and creation of knowledge repositories etc.

While there have been several initiatives in the area of change management and capacity building for e-Governance initiatives, there is a need for increased coverage and better performance incentives/measures to bring a lasting impact.

Summary of assessment of change management and capacity building

An overall assessment of the progress made so far by government departments on 'change management and capacity building' for incorporating accountability and transparency in e-Governance projects is given below:

S No	Component of innovation in configuration	Progress
1.	Change management initiatives to incorporate	Needs significant improvement
	accountability and transparency in e-Governance	
	solutions	
2.	Capacity building of government officers to bring	Needs improvement
	accountability and transparency in e-Governance	
	solutions	
Legend	Legend:	
On track Needs improvement Needs significant improvement		

#### 3. Innovation in service delivery of e-Governance projects

"A very simplistic definition of Innovation usually means doing something new or novel, different or better with the aim that it will lead to a positive difference. Innovation can be big or small and does not necessarily have to be something ground breaking. Often there is a dynamic relationship between innovation activities and R&D to drive technology breakthroughs."

#### Department of Electronics & Information Technology (DeitY), GoI

Most of the countries around the world are reconnoitring means to revitalize their governance procedure to make it more proactive, efficient, transparent and especially more service oriented. To accomplish this transformation, governments are introducing innovations in their governance structure, policies, capacities, and in the ways they mobilize, deploy and utilize human capital and information, technological and financial resources for service delivery to citizens.

#### 3.1 Framework for assessing innovation in service delivery of e-Governance projects

According to the studies conducted for "The Global Innovation Index (GII) 2015: Effective Innovation Policies for Development", technology gap between developing and developed countries is narrowing on an average. The developing countries are outperforming in innovation inputs and outputs relative to their level of development. They have realized that technology adoption alone is no longer sufficient to maintain a high-growth scenario; rather investment in innovation is now crucial to spur further catch-up. Switzerland tops the GII-2015 rankings with score of 68.30 while India is ranked 81st with a score of 31.74.

This necessitates the setting up of innovation policies, programmes and corresponding institutional arrangements to enhance their growth rate. In this section, we present an analysis of the reforms and initiatives on three dimensions, i.e., configuration, offerings and experience.

#### Fig 6: Framework for assessing innovation in service delivery of e-Governance Projects

Configuration	<ul> <li>Governance Structure</li> <li>Funding Mechanism</li> </ul>	
Offering	<ul> <li>Project Design</li> <li>Performance Monitoring</li> </ul>	
Experience	<ul> <li>Support Services</li> <li>Service Delivery Channels</li> <li>Citizen Awareness &amp; Participation</li> </ul>	

#### 3.1.1 Configuration

Configuration refers to overall arrangement or set up of the e-Governance initiative. The configuration aspects of e-Governance projects require innovative approach to ensure overall success and achieve desired objectives. In order to evaluate the innovations in configuration aspects, the following areas have been explored:

Governance structure: It refers to combination of individuals/functions organized into structures, and processes that define roles and decision-making abilities. While most e-Governance programs follow common governance structures, innovation in governance structures are needed to meet the changing needs of citizens. An innovative governance structure establishes linkage that ensures alignment between program strategy and direction, and the path to needed outcomes over the life of the e-Governance program.

In India, most of the early e-Governance programs were designed with government ownership and accountability. However, the government soon realized the need for expanding the skillset required and hence, included outsourcing as a major component under most e-Governance programs, thereby involving private sector as a major stakeholder in the governance structure. New outsourcing models such as turnkey projects, managed services, public private partnership (PPP), etc., have evolved over a period of time and are well adopted in e-Governance projects in India. Furthermore, the internal IT organization of government also evolved and adopted innovative measures to set up specialized organizations such as NIC, NISG, NeGD as well as State IT arms to spearhead e-Governance implementation.

An example of innovation in governance structure by involving self-help groups of citizens as a key project stakeholder can be seen in Andhra Pradesh. The Government of AP and the self-help groups developed a plan to provision and operate e-Government kiosks for the municipal "e-Sewa" centers adopted by Hyderabad. In the one-stop shop model, self-help groups operate the kiosks, which are owned and managed on a franchise basis by the private sector. This innovative approach to empower the self-help groups has been successful both in effective delivery of citizen services and also in entrepreneurial development.

However, India needs further innovation in governance structure in order to face the daunting challenge of bringing effective service delivery to more than 1.2 billion people across the country. This will involve both intrinsic changes in the organization structure, with adoption of more innovative organization structures and creation of centers of excellence (CoE). Furthermore, more innovative partnership should be envisaged with the private sector. In addition the role of citizens should increase and they should be involved in project governance structure and not only seen as project beneficiaries.

Funding mechanism: It refers to method or source of funding for e-Governance projects. The various project financing options may be public finance (government sponsored), private finance (private body through equity/debt and appropriate concession and revenue model) and project finance (through SPV using project assets and potential future earnings). The conventional process for funding of e-Governance projects involves sponsorship by Government through budgetary sources or loans and implementation of the project through an execution contract with private vendors, where payments are made to the private vendor based on the achievement of project milestones. Increasingly, several e-Governance projects have explored innovative approaches in funding models, e.g., PPP, BOO(T), Joint Venture (JV), privatization etc.

Passport Seva Project (PSP) is one of the landmark e-Governance projects based on the PPP model. There have been other innovations where government has used less prevalent models of financing such as funding by the private sector in exchange of sharing infrastructure, crowd funding, i.e., raising money from the private sector and citizens for e-Governance projects, which are expected to directly benefit a set of citizens. Surat implemented a state-of-the-art real-time CCTV surveillance network, with 104 CCTV cameras, though funds were raised from contributions by leading business groups in the city. Similarly several states in India are setting up their CCTV surveillance system, where the State Government has signed an MoU with a private vendor and in exchange of providing land for setting up of base stations, the vendor is providing the towers as well as bandwidth for the entire surveillance system. While such examples of innovative financing structure have begun to surface, India still lags behind in terms of innovation in this aspect.

#### Assessment of innovation in configuration

An overall assessment of the progress made so far by government departments on various components of configuration aspects is given below:

S No	Component of innovation in configuration	Progress
3.	Governance structure	Needs improvement
4.	Funding mechanism	Needs improvement
Legend	:	
0	n track Needs improvement	Needs significant improvement

18

#### 3.1.2 Offering

Offering means the end services being offered to citizens as part of the e-Governance initiative. The e-Governance offerings have been further classified into project design and performance monitoring, which have been assessed below.

**Project design:** It refers to blueprint of activities ranging from the need for delivering a citizen service to achieving expected outcomes. Conventionally, design of e-Governance projects strictly followed the non-automated version of the process. Automation was only used as means of making the activity paperless. However, governments across the globe have realized the importance of reengineering projects and processes and designing them to achieve best results in an automated environment. Therefore, the design focus of e-Governance solutions is shifting from procedural compliance to scalability, integration, convergence, and interoperability for delivering high quality of services.

Most of the e-Governance systems in India are still being designed with an objective to comply with policies and procedures of the manual business processes. However, there are several cases of innovative project design such as the Unique Identification Device (UID) or Aadhaar project. The entire project has been designed on the principles of scalability, convergence, integration and interoperability. The UID project acted as a stepping stone for several other e-Governance projects, which used the ecosystem created by UID for delivering multiple services and benefits to the citizens.

The e-Governance projects in India need to move beyond replacement of manual procedures and look toward more innovative techniques for service delivery to citizens. This can be achieved if the project design of each e-Governance initiative is guided by a common set of design principles and each initiative is reviewed by a central agency, which can act as the CoE for innovation.

Performance monitoring: It refers to the assessment of e-Governance initiative's functioning as well as the extent of realization of expected outcomes. Performance monitoring is an important tool for public administrators for strategic planning, benchmarking, evaluating progress, project/individual appraisal and identifying areas where adjustments need to be made.

Conventional practices include collation of MIS reports, audits and project appraisals, independent audits, SLA Monitoring etc. However, e-Governance initiatives require much wider and quicker performance updates, due to the ever changing nature of the domain. e-Governance projects are moving from traditional manual data feed based online monitoring systems to real-time monitoring systems and centralized dashboards assisting in prompt decision making and immediate course correction. Performance monitoring of e-Governance projects has seen innovation in terms of collecting real time customer feedback as well as collecting feedback through social media.

An initiative was taken by the Government of Uttar Pradesh to generate reliable and timely information regarding implementation of the mid-day meal scheme. This involved innovative use of ICT (cloud telephony and cloud computing platform and IVRS technology). Government of Chattisgarh is also using 'sentiment analysis' through analysis of social media feeds to assess the feedback of citizens on its schemes and their

implementation. This input is being displayed directly on the Chief Minister's dashboard. However, there are only few cases of innovative interventions in the area of performance monitoring of e-Governance projects.

#### Assessment of innovation in offering

An overall assessment of the progress made so far by government departments on various components of offering aspects is given below:

S No	Component of innovation in offering	Progress
1.	Project design	Needs improvement
2.	Performance monitoring	Needs improvement
Legen	d:	
	On track Needs improvement Needs	eeds significant improvement

#### 3.1.3 Experience

Experience refers to the components of an e-Governance project relating to mechanism of final delivery of services to the user/citizen. Experience is further classified into service delivery channel, support services and citizen awareness and participation. Each of these is explored below.

Service delivery channel: It refers to various delivery channels for offering citizen services through e-Governance projects. Various service delivery channels, which The UN e-Government Survey 2012 finds that the majority of countries are not fully utilizing the opportunities provided by multichannel delivery mechanisms. Australia, Bahrain, Canada, Denmark, France, the Netherlands, Qatar, the Republic of Korea, Saudi Arabia, Singapore, Sweden, the United Arab Emirates, the United Kingdom, and the United States rank high in multichannel service delivery because they provide services in various channels such as traditional ones supported by intermediaries, free access to public services through kiosks or WiFi, and mobile-based channels such as mobile web or applications. As seen from the list, these are all high income countries, suggesting that financial capacity is one of the main factors in implementing multichannel service delivery mechanisms.

could be used for e-Governance service delivery range from internet, mobile application (native/standalone), telephone, e-mail, SMS, interactive voice response systems (IVRS), Unstructured Supplementary Service Data (USSD), citizen contact centers, digital television etc. The success of service delivery is highly dependent on the citizens' preferred (or available) delivery channel. Adoption of multi-channel strategy and innovation in choosing service channels can address two objectives of government organizations — improving the reach and acceptance of services provided to citizens and enhanced efficiency and effectiveness of service delivery.

Karnataka MobileOne, an initiative by the Government of Karnataka, has developed a single platform to access more than 4,000 citizen-centric services over multiple delivery channels including mobile, web, native mobile application, IVRS, USSD, pull/push SMS. Learning by the success of Karnataka MobileOne, NeGD/DeitY has envisaged project "Umang" to develop a single platform to offer whole of Central Government Services over multiple delivery channels.

However, most e-Governance initiatives in India have restricted their offerings to only a few service delivery channels. Mobile governance is still in nascent stages and most of the service delivery channels have limitations relating to availability of services in local languages.

**Support services:** It refers to services, which supports and enable the service delivery in e-governance projects. These support services include providing information on government programs, grievance redress platforms, collation of citizen feedbacks for improvements, payment gateways, etc.

Efforts are being undertaken to improve and innovate the support services for e-Governance initiatives. Dial.Gov service, setup by Government of India, is a common man's interface with the Government for information on all welfare schemes which aims to bridge the existing gap between the benefit information and the beneficiary. It provides information to citizens about various welfare schemes and services provided by the Central and State Government, thereby empowering the interested citizen to reach the welfare benefits based on his/ her eligibility through intelligent search. The information about benefits will be available to the citizen through different mediums like Dial. Gov web portal, mobile application, an interactive voice response service and call center helpdesk. Government of Uttar Pradesh is setting up a centralized mega call center where direct feedback of citizens would be obtained and information about the important projects being implemented in the state shall be provided.

Traditionally, for most of the e-Governance projects involving payment transactions, integration with private payment gateways like BillDesk was the only available option. An initiative was undertaken by the Controller General of Accounts, Ministry of Finance to develop a payment gateway for Government of India. The Government e-Payment Gateway (GePG) is envisaged to provide a payment gateway for all the government organizations and shall be an integrated payment and accounting system for all levels of usage with seamless interface and data communication. This would result in the elimination of physical cheque processing systems and traditional issues associated with it, which would ensure major cost savings for the government departments by enhancing the overall payment processing efficiency.

Citizen awareness and participation: It refers to the level of awareness and involvement of citizens on various e-Governance programs and schemes. One of the key success factors of e-Governance initiatives is spreading citizen awareness about the benefits of the initiative and persuading them to utilize the e-Governance solution instead of the conventional mode of service delivery. Better citizen engagement also increases the accountability of the concerned officials through increased dialogue as well as frequent feedback on the service delivery.

One of the key initiatives is the MyGov portal, which is a platform for better citizen participation and interaction through group interactions, discussion forums, polls, blogs, talks, etc. Any citizen can log into the portal and can express his or her ideas and contribute to the process of nation building. Similarly, the 'e-people' web portal in South Korea brings together all means of interaction between the government and citizens. The objective is to improve the quality of service provided as well as register complaints, gather suggestions and offer a space for discussion. Germany and the US have been known for their citizen engagement initiatives. BundOnline is an e-administration initiative of

the federal authorities in Germany. The focus of the portal is to enhance awareness to citizens and businesses. Similarly, the US Office of Management and Budget (OMG) is trying to boost citizens' awareness of federal e-Government services through a marketing and outreach strategy focused on 10 of 25 "Quick Sliver" Projects. Marketing includes targeted outreach to particular customer segments, innovative ideas on how to increase usage and methods on providing greater synergy amongst e-Government offering.

#### Assessment of innovation in experience

An overall assessment of the progress made so far by government departments on various components of experience is given below:

S No	Component of innovation in experience	Progress
1.	Support services	Needs improvement
2.	Service delivery channel	Needs improvement
3.	Citizen awareness and participation	Needs improvement

Legend:



#### 4. Concluding thoughts

Despite significant investment in e-Governance initiatives in the past decade by the Central and State Governments in India, such initiatives are yet to succeed in fully meeting citizens' expectations and desired outcomes envisaged by the Government. Good governance comprises far more than the power of Government or the strength of political will or abundance of resources. The rule of law, transparency, and accountability are not merely an outcome of administrative reforms or institutional design but are outcomes of participative Government and society.

Transparency may involve significant efforts, demand more resources and generally slows down procedures; however it results in more structured approach and safeguards against influential interests. Accountability is the key to ensure that the delegated power is used appropriately and in accordance with public interest. Allocation of clear roles and responsibilities must go hand in hand with accountability for decisions, performance and outcomes. There is a need for effective policies and guidelines that provide much needed space for debate and consultation, encourage innovation, and pursue desired outcomes with positive incentives.

In order to bring digital transformation in citizen centric service delivery, the stakeholders and the decision makers need to chart out a clear roadmap aligned with the overall strategy and objectives of the e-Governance Projects. Some of the steps which can be taken to transform the conceptualisation and implementation of e-Governance projects are enumerated below.

Standards & policies applicable to all e-Governance projects: Most of the

standards and guidelines for e-Governance projects issued by nodal agencies in Central and State governments are recommendatory in nature. The need for setting up common minimum standards and requirements to be followed by Central and State government organisations that implement e-Governance projects is essential. These standards and requirements should be aligned to the government's overall vision and take inputs from past learnings and leading practices. Compliance to these policies should be a pre-requisite for approval of new e-Governance initiatives and release of funding. Further, all the project appraisals and audits (by agencies such as STQC, CERTIN, etc.) should include compliance to these policies as a prerequisite for operation of e-Governance applications.

Centre of excellence for innovation in e-Governance: The federal structure of government with distribution of authority among Centre and State has often led to standalone design and implementation approaches and duplication of efforts. This advocates the need for set-up of a centralised Centre of excellence (CoE) for e-Governance projects which can solely focus on bringing in standardisation and innovation among e-Governance initiatives in India.

The CoE will explore leading practices of e-Governance (national / international), develop reusable platforms and solutions, and develop solutions for integration of disparate e-Governance initiatives. The CoE should be consulted at the design stage as well as the execution stage of each e-Governance project to replicate innovative solutions already undertaken by other agencies, share learnings and leading practices (national/international) and provide relevant information and benchmarks from other e-Governance projects.

- Partnership with private players for innovation: The government's partnership with private sector players has been restricted to only few aspects of citizen service delivery. However, with the widespread growth in private sector, especially the technology start-ups, there is immense scope for the Government to partner with these entities and bring a lasting change in quality of citizen service delivery. Private sector is making rapid strides in supply chain innovations, mobile technology, e-Commerce, m-Commerce, user-base expansion, social media integration, cloud deployment, big data analytics, etc. Utilising the development platforms and delivery channels established by private sector players would lead to lesser turnaround time and wider outreach for e-Governance projects. Further, with the advent of smart cities, e-Governance applications need to achieve a far greater level of sophistication and integration, which can be expedited through partnership with private sector.
- **e-Governance project appraisal and impact assessment:** There is need for development of holistic appraisal framework to assess the e-Governance projects. The appraisal frameworks should account for outcomes achieved by the e-Governance project such as timeliness of project implementation, citizen engagement, increase in user base, ease of use, accountability and transparency measures, degree of innovation, etc. The appraisal method should also account for any limitations of the project such as funding delays, literacy level of the users etc. and provide appropriate exemptions. The project appraisal framework should be created and approved at the design stage and periodic assessments should be carried out. Further, each e-Governance project should be designed with a definite life-span and there should be a time-bound plan for phasing out of each project.

**Change management for effective implementation of e-Governance initiatives:** In order to achieve success in implementing e-Governance projects, it is essential that the performance assessment of stakeholders take a view of the outcomes of these projects. The performance appraisal of government officers involved in design, implementation as well as operation of e-Governance initiatives should be tied to the success of the project. The design of such performance appraisal and management system would require due administrative reforms and deliberations.

## **19th National Conference on e-Governance** White Paper on **"Financial Inclusion - JAM & DBT"**

**Developed by -**



Authors:

- Mr. Subhash Patil, Partner, Government and Public Sector – Global Practice, PwC
- Mr. Achin Bansal, Principal Consultant, Government and Public Sector, PwC



### Contents

1.	Financial Inclusion and its critical role	29
2.	The Indian financial inclusion experiment	30
3.	Benefits of Digital Payments	30
	3.1 Benefits for Governments when they digitize payments	31
	3.2 Benefits for Recipients of Digital Payments	32
4.	Digital Payments and Financial Inclusion in India:	
	Set to take off	35



#### 1. Financial Inclusion and its critical role

Financial inclusion is broadly defined as both access to and usage of appropriate, affordable, and accessible financial services. Comparative global data finds that the use of a deposit account at a bank or other formally regulated financial institution varies widely across regions, economies, and individual characteristics. Worldwide, 50 percent of adults report having an individual or joint account at a formal financial institution, according to data from the Global Findex database (Demirgüç-Kunt and Klapper, 2012). But current statistics on the high rate of financial exclusion, particularly in developing countries and among women, illustrate key challenges for policymakers to address:

- Globally, more than 2.5 billion adults do not have a formal account.
- Only about one out of every five adults living on less than \$2 (U.S.) per day has a formal account—that means nearly 80 percent of poor adults are excluded from the formal sector.
- While accounts are nearly universal in high-income economies, with 89 percent of adults reporting that they have an account at a formal financial institution, less than half that number of adults in developing economies is banked: only 41 percent.
- For women in developing countries, the situation is worse: Only 37 percent have formal accounts, compared to 46 percent of men.



Without access to the formal financial system, women, poor people, small businesses, and otherwise excluded people must rely on their own (extremely limited) informal and semiformal savings and borrowing to finance educational and entrepreneurial investments, thus making it harder to alleviate income inequality and spur broad-based economic growth. However, those who are excluded from the formal financial system are likely to be recipients of payments—not just wages and government-sponsored social transfers, but also, increasingly, remittances from family members who have left home in search of economic opportunity either elsewhere in the country or abroad.

#### 2. The Indian financial inclusion experiment

The progress in the development of financial inclusion in India can be examined by understanding the stages involved in it. The concept of examining financial access became important immediately after the All-India Rural Credit Survey that was completed in the 1950s. The results of the survey revealed that farmers relied heavily on money-lenders in the year 1951-52. Only the urban areas had large number of bank branches compared to rural areas. Such a condition continued in the country until RBI started financial inclusion growth model in the 2000s. Because the urban areas were fully concentrated with numerous bank branches, this resulted in the higher absorption of bank credit in the urban areas. Thus, the growth of the private business credit was seen in the year 1957-61 from 44 percent to 60 percent in the year 1970

Looking back at history, the GOI and RBI have taken quite a few steps to enhance financial inclusion actions which include the following:

- Nationalization of banks (1969, 1980)
- Priority Sector lending requirements
- Establishment of Regional Rural Banks (RRBs) (1975, 1976)
- Service area approach (1989)
- Self-help group-bank linkage program (1989, 1990)

The government's latest plan of action, as envisaged in the CFIP or Sampoorn Vittiya Samaveshan, hopes to extend coverage of basic financial services all excluded households. The Jan Dhan Yojna is the first proponent of the CFIP. In this first phase, the CFIP has endeavored to provide universal access to all the beneficiaries through sub-service areas (SSAs). Each SSA will consist of 100-1,500 families in a cluster of villages and each SSA will be serviced by a BC agent (BCA) whose task it will be to facilitate account opening and smooth banking operation.

The latest inclusion plan will have as its focus households rather than geographical areas. After satisfactory conduct of accounts it is proposed to offer reasonable need-based credit facilities for which overdraft facilities will be sanctioned. A smart card (RuPay card) will be issued to enable customers to operate their accounts even without BCs. Simultaneously suitable awareness will be created among the financially excluded.

In the second phase, there is a proposal to make available a pension scheme for identified individuals in the unorganized sector and offer microfinance products through government-owned insurance companies.

The paper looks at in detail the growth and benefits arising out of this latest effort of financial inclusion in India at later stage in depth.

#### **3.** Benefits of Digital Payments

A Gallup, Inc. survey of 11 countries in Sub-Saharan Africa found that more than 80 percent of adults make bill payments or remittances with cash (Kendall et al., 2014). Given the lack of digital-payment penetration, governments, consumers, and financial providers
in Sub-Saharan Africa are still bearing the high cost of cash payments—costs associated with manual acceptance, record keeping, counting, storage, security, and transportation.

Yet, advancements in technology and electronic-platform- based business models have allowed many governments to increase the efficiency and scope of their electronic payments infrastructure. For example, a 2011 study of 62 developing and high-income countries (representing approximately 81 percent of the total world population) found that over 77 percent of countries have an e-payments system in place for social security contributions by citizens, and around 84 percent of countries researched have electronic and/or automated systems for vehicle-related payments such as fines and tolls (EIU, 2012).

Digital payments have many benefits, to both senders and receivers. Moving from cashbased to digital payments has the potential benefits of making payments more efficient by lowering the cost of disbursing and receiving payments; increasing individuals' risk management capacity; increasing the privacy of payments; increasing control over the funds received; increasing the security of payments and reducing the incidence of crimes associated with them; increasing the transparency of payments, and thus making it less likely for there to be leakage between the sender and receiver; increasing the speed of payments; and providing a first entry point into the formal financial system. In short, the benefits of digital payments go well beyond convenience; if provided efficiently and effectively, they can transform the financial lives of those who use this technology.

### 3.1 Benefits for Governments when they digitize payments

Increased transparency Given the liquidity and transactional anonymity of cash, cash payments are subject to "leakage" (payments that do not reach the recipient in full) and "ghost" (fake) recipients, particularly in the context of government transfers. By moving toward digital payments, the traceability of the payment process is improved. First, recipients have digital records of the amount of the payments they are to receive. Second, digital payments generally require more stringent identification documentation, making it harder for ghost recipients to remain undetected.

#### Case Study

Evidence from India shows that making social security pension (SSP) payments digitally via smart cards compared to manual cash payout at the village level by a government official results in a 1.8 percentage point lower incidence of bribe demands for obtaining the payment (compared to an incidence of 3.8 percentage points for manual cash payments: a 47 percent reduction) and the incidence of ghost recipients fell by 1.1 percentage points (Muralidharan et al., 2014).

Lower costs Moving from cash payments to digital payments can lead to significant cost savings in the long term. The potential cost savings are especially striking when considering large-scale government-to-public payments, such as social transfers.

#### **Case Studies**

• In South Africa, the cost of disbursing social grants in 2011 by smart card was a third that of manual cash disbursement (R13.50 compared to R35.92) (CGAP, 2011b).

• A study by the management consulting firm McKinsey & Co. estimates that automating the delivery of government payments could save the Indian government approximately \$22.4 billion (U.S.) per year resulting from reduced overhead, transaction costs, and fraud (Lochann et al., 2010).

• In Brazil, the Bolsa Família program reduced its transaction costs from 14.7 percent of total payments to 2.6 percent when it bundled several benefits onto one electronic payment card (Lindert et al., 2007).

#### **3.2 Benefits for Recipients of Digital Payments**

Lower costs Data for 123 countries show that greater ownership and use of accounts is associated with a better enabling environment for accessing financial services, such as lower account costs and greater proximity to financial intermediaries. The results suggest that digital payments that reduce the cost and increase the convenience of financial transactions may expand the pool of eligible account users and encourage existing account holders to use their accounts with greater frequency and for the purpose of saving (Allen et al., 2012). Recipients of cash payments in rural areas often have to travel a considerable distance to designated locations such as a bank branch, money transfer operator (MTO), counter, or government office, which may only be available in a regional capital, in order to receive a remittance or government transfer or make a bill payment. This results in significant travel time and travel expenses, and is further costly in terms of income forgone while traveling and waiting to collect a payment.

Increased control Digital payments allow remitters greater control over money sent home. Randomized studies suggest that migrants value and take advantage of opportunities to exert control over savings in their home country. There is also consistent evidence that migrants have preferences over the extent to which remittance recipients in the home country use remittances, in particular how much of the remittances are saved (McKenzie et al., 2014).

#### **Case Studies**

• Researchers found that migrants to the United States were much more likely to open savings accounts at a partner bank in El Salvador, and accumulated more savings at the partner bank, if they were offered an account with the greatest degree of monitoring and control. Migrants desired savings accounts in their name only, as opposed to accounts in the name of someone in El Salvador or joint accounts. (Ashraf et al., 2014).

• In a field experiment, over 27 percent of a sample of Filipino migrants in Rome were interested in a product to directly pay remittances to schools in the Philippines. In a related lab experiment, the authors find that the "soft" commitment of simply labeling remittances for education raises remittances by more than 15 percent (De Arcangelis et al., 2014).

Increased incentive to save Only 22 percent of adults worldwide report having saved at a formal financial institution in the past 12 months, and 77 percent of adults living on less than \$2 a day report not having an account at a formal financial institution (Demirgüç-Kunt and Klapper, 2012). Digital payments create the opportunity to embed poor people in a system of automatic deposits, scheduled text reminders, and positive default options than can help people overcome psychological barriers to saving. A substantial collection of literature shows that small "nudges" may have a significant impact on forward-looking financial and nonfinancial behaviors in settings as diverse as defined-contribution pension accounts, insurance products, and commitment savings products (Choi et al., 2004; Ashraf et al., 2010; Karlan et al., 2012; Karlan et al., 2014).

Increased risk management Digital payments also connect individuals to the broader economy and can strengthen informal insurance networks. Electronic networks allow families to expand their "community," and can help households smooth unexpected income shocks by accessing money or support from a community wider than those physically proximate.

#### Case Study

A mobile operator and an insurance company in Kenya jointly offer micro-insurance to farmers to protect them against drought or excessive rains. The program protects more than 10,000 smallholder farmers in Kenya against extreme weather conditions. Weather stations automatically send data on rainfall to the insurance company, triggering payouts via mobile money payments, when too little or much rainfall is recorded. An estimated 46 percent of their clients are women (Manfre and Nordehn, 2013).

Improved speed and timely delivery In contrast to a cash payment that travels at the speed of its carrier, digital payments can be virtually instantaneous, regardless of whether the sender and receiver are in the same town, district, or country. This means that employees are paid on time, which might reduce demand for payday loans and informal loans to meet monthly expenses. Especially in emergency situations that lead to unexpected income shocks such as a health emergency or natural disaster, speed and timely delivery can be of the essence. In digital form, payments—be they remittances from abroad or government assistance in times of disaster situations—can be made without delay when the need is greatest.

Increased security Recipients of cash payments not only often have to travel considerable distances to receive their payments, but also are particularly vulnerable to street crime once they carry the cash, due to the liquidity and transactional anonymity of cash. While security is a concern when traveling with any large amount of cash, this concern is especially salient for regular cash payments, such as social transfer or wage payments, that are received at publicly known points in time. Digital payments can also be held more securely than manual cash payments. By reducing travel times to withdraw money, recipients can store value in either traditional accounts or e-wallets, and cash out smaller amounts at their convenience or directly transfer funds onwards to pay for bills such as electricity. At the same time, it is important to have in place systems to prevent security breaches of digital payment mechanisms (e.g., stolen account numbers).

Increases in women's economic participation and empowerment One of the significant benefits of moving to digital payments in both social transfers and remittances is that it can contribute to a G20 commitment of increasing women's economic participation and empowerment, and can do this through a number of channels.3

Evidence suggests that digital transfers empower women within their households (Docquier et al., 2009). This is particularly true for recipients of the social cash transfer, because, in contrast to cash payments, the arrival of a digital payment is often private information that allows the recipient to conceal the payment at least temporarily from other household members or friends who may place demands on the use of the money (at the risk that recipients might also withhold funds from which the entire household is entitled to benefit). Sociocultural issues and other factors might prevent women from controlling their own money and assets. But electronic payment might give recipients greater agency with regard to how the money will be used, particularly if the payment is tied to a stored-value product, such as a formal account or an e-wallet, which makes it harder for family and friends to access the funds. It is also worth noting that women are not only receivers, but also senders, of remittances (World Bank, 2014a).

## **Case Studies**

• From the social cash transfer program in Niger, for instance, there is evidence that greater privacy and control of mobile transfers, compared to manual cash transfers, shifts intra household decision-making in favor of women, i.e., the recipients of the social cash transfer (Aker et al., 2013).

• In Kenya, the arrival of mobile money transfers increased women's economic empowerment in rural areas, by making it easier to request remittances from their husbands who migrated to urban areas for work (Morawczynski and Pickens, 2009).

• A large body of empirical literature suggests that income in the hands of women, compared to men, is associated with larger improvements in child health and larger expenditure shares of household nutrients, health, and housing (for an overview, see Duflo, 2012).

• The Global Findex data finds across 148 countries a positive and significant relationship between female labor force participation and female account ownership, but no similar relationship for men. This suggests that women might benefit more from having an account opened for them by someone else, such as an employer, and/ or that only employed women can afford or have necessary documentation for an account of their own (Klapper et al., 2014).



Adapted from: Demirgüç-Kunt, A. and L. Klapper, 2013. "Measuring Financial Inclusion: Explaining Variation in Use of Financial Services across and within Countries." Brookings Papers on Economic Activity, 279-340.

## 4. Digital Payments and Financial Inclusion in India: Set to take off

The Indian financial services landscape is undergoing a tectonic shift. Building off prior programs, the government has invested in regulatory reform, improvements to the banking, payments, and ID infrastructure. They have also announced a series of programs targeting the bottom of the pyramid (BoP) and micro, small, and medium enterprises (MSMEs). Simultaneously, we are beginning to see real shifts in the adoption of digital technologies and banking services (such as basic savings accounts and smartphones) driven by compelling use-cases such as government subsidies delivered directly unleashing tremendous innovation with the potential to speed financial inclusion for millions.

It gives enough reason to believe India is nearing an inflection point with changes playing out in three areas that are giving birth to exciting startup financial services models: MSME Finance, Digital Payments, and Consumer Services.



## 4.1 Paradigm shift key areas towards digital finance

#### **MSME** Finance

As mainstream microfinance has matured in India, focus has turned to the country's chronically underserved MSMEs, where, according to an IFC estimate, there is a debt gap of over \$60 billion. Already, innovative companies like Aye Finance, Varthana, Vistaar, and Kinara Capital have been serving this sector by partnering and building specialized acquisition and underwriting approaches. These changes are being accelerated by the government: last year, the RBI announced a new category of "small" banks that focuses on poorer customers. This year the government proposed the creation of a MSME bank (MUDRA) with a \$3 billion capital allocation for the sector. Supported by these initiatives, over time, more players and capital flow are expected into the space, resulting in greater volume of lending to the underserved.

The wholesale debt gap has been as a major pain point for these kinds of innovative startup lenders. Without demonstrating break-even and lacking a track record, it's very difficult to access affordable funding critical to scale. Players like IFMR and Intellegrow are supporting these lenders along with other entrants, though we think that plenty more can be done here.

On a more positive note, as e-commerce, internet, and smartphone penetration have grown, new data sources and channels are opening up, allowing companies to better reach and serve new customer segments. Companies like CapitalFloat partner with eCommerce marketplaces to access and assess small merchant vendors. SMECorner, IndiaLends, and NamasteCredit have gone completely digital: they acquire potential borrowers online, help them complete an application, and provide them with a range of credit options from different banks.

#### **Digital Payments**

For a long time, India's digital payments infrastructure languished, until efforts led by the National Payments Corporation, an entity blessed by RBI and owned by leading financial institutions in India, began to knit together the plumbing that connected banks, points of sale, mobile wallets, and other financial accounts. These efforts have eased barriers to adoption and interoperability issues: volumes through IMPS, a system used to send smaller payments instantly between bank accounts and other digital wallets, reached \$1.3 billion per month in February (13 times the volume sent in September 2013).

The government has also encouraged a burst of private innovation by promoting payments banks, a new category of Indian banks. The new structure is designed to attract new players (i.e. non-bank and non-NBFC actors) to hold and transfer money on consumers' behalf. Mobile operators, for example, have millions of distribution points for prepaid credit around the country; they can now be used to load cash onto mobile wallets and sent across the country. Perhaps the most recent visible successes in this space are third party mobile wallet operators like Hermes, Oxigen, and PayTM (which recently received an investment from Alibaba). PayTM has made its platform interoperable with IMPS (enabling instant transfers to bank accounts), offers peer to peer transfers via mobile apps, and will soon launch a network of physical "cash-in and cash-out" locations.



All these signs are encouraging, though the market is still nascent and fragmented. Most volume is from early adopters and wealthier users. To achieve real scale, players must look to ensure greater interoperability, and provide more relevant use-cases and value-added services that make digital payments more attractive and convenient to the mass market, BoP, and micro businesses.

#### **Consumer Services**

Consumer financial services remain one of the biggest untapped opportunities in India. Rising internet penetration, increasing mobile access, and the growth of coverage of credit bureaus have primarily benefited higher income groups thus far. Online banking and comparison websites like BankBazaar are used primarily by connected and well documented consumers. However, as smartphone penetration increases, these models are moving into the mass-market and BoP. Companies like First Access and InVenture are leveraging data generated through mobile phone usage and purchases to extend credit to those with little other documented evidence of their capacity to repay. CreditMantri is helping "subprime" consumers understand their credit scores, build credit history, and access relevant products and services from other financial institutions.

Now two additional public-sector efforts to lay broader infrastructure will further catalyze innovation and increase access for the most underserved. The government's Jan Dhan Yojna (JDY), announced last year, has already rolled out around 125 million basic bank

accounts in partnership with state and private banks (that get a commission for every account opened). While over half of these accounts have a zero balance and there is anecdotal evidence that not everyone who wants an account is able to get one, we are tentatively optimistic that this program is much "stickier" than previous efforts: each account includes a debit card, an overdraft facility, and bundled insurance. To further encourage usage, the government has also begun disbursing subsidy payments into these accounts. We wrote more about the possibilities of these accounts last fall here.

Also there is reason to be excited about the growing scale of India's Universal ID Program (launched by the previous government and institutionalized by the current administration). Over 800 million people have been issued national identity cards, with their fingerprint and retinal scan stored in a central database. Relevant institutions like banks can receive immediate verification of an individual's identity (as per regulation) by accessing this server directly, alleviating a major pain point in reaching poorer customers.

These accounts can also be associated with a now ubiquitous mobile phone number to provide an extra layer of security. The ID database certainly has problems (with reports of duplicate entries and imperfect information).

If it all comes together, the combination of an institutional bank account, a verified identity linked to a financial profile, and mobile internet access will open up powerful new low-cost applications for the BoP. This positions India at the take-off stage for universal financial access for all.

**19th National Conference on e-Governance** White Paper on **"Urban Governance in Smart Cities"** 

**Developed by -**



Authors:

- Mr. Sanjeev Gupta, MD, H&PS, India
- Mr. Vishvesh Prabhakar, MD, Sustainability
- Mr. Vishal Sharma, Lead Smart Cities
- Greeshma Susheel, Analyst



## Contents

1.	Building Smart Public Services for India	
2.	Global Scenarios Re-shaping Public Services	43
3.	Smart Governance	44
4.	Urban Governance in India	44
5.	Public Service Challenges faced by Citizens in India	44
6.	India Overall Ranking	45
7.	Major trends in Urban Governance	46
8.	Opportunities for Improvement	47
9.	Strategies and Plan for Implementation	53
10.	Smart Urban Governance Ecosystem and Technology interventions Possible	53
11.	Technology enablers for smart Urban Governance	54
12.	Conclusion	55



## 1. Building Smart Public Services for India

Today, governments across the world are faced with the challenges of balancing competing demands while developing Global cities. How can governments afford to maintain the standard of public services delivery with unremitting economic constraints? How can governments tailor traditional service models to more closely serve the citizen? Clearly, managing such complex requirements necessitates an innovative approach to service provision.

More importantly, the smart city initiative of the governments today needs to evolve around the concept of citizen-centricity as the connections between citizens and the providers of services become more direct—and the need for responsiveness, transparency and agility rises. This whitepaper attempts to create a roadmap on how to accelerate innovative and wise application of Urban Governance.

## 2. Global Scenarios Re-shaping Public Services

i. The global population is gradually aging. As we near 2050, for the first time in India's history, we are likely to have more adults over 60 than children1. Due to this sway, dependency ratios are increasing, meaning that fewer citizens are contributing to growth.

ii. In many developed economies, average productivity growth has dropped below 1% p.a. over the past decade2. Productivity growth has become a real concern for policymakers.

iii. The required adjustment in structural primary balance in G20 high-income countries from 2010-2020 is 9.6 percent of GDP3 Many developed nations are now in a policy environment where it is not acceptable to increase public spending as a straightforward response to global challenges



## **3.** Smart Governance

Smart cities have raised many questions at the moment. One key question is the role of Smart governance in cities. A city can be termed as smart when investments identified in physical, social and environmental infrastructure supports sustainable economic growth and a high quality of life for citizens.

In the smart city's context the concept of Urban governance, is "a set of principles to be adopted by urban governments expressing how to control and guide city growth and what principles should apply in internal and external stakeholder relations"<sup>4</sup>. The focus is therefore on collaboration of citizens and all stakeholders in urban life5, it is also on participation-based organizational arrangements and democratic institutions.

### 4. Urban Governance in India

Urban Governance 6 is the concept of governance in relation to urban areas, reflecting how the various constituents of public service delivery are organized to increase the welfare of citizens. Though the 74th Constitutional Amendment Act meant to entrust power to local urban governments through decentralization of power and functions, the capability of ULBs to plan and manage their cities can be considered to be inadequate. Local Bodies in Indian cities are facing severe pressures on service delivery and are sluggish to cater to the needs of the new urban population.

The 74th Constitutional amendment has not succeeded in achieving the autonomous governance structure as envisaged. The reasons for this varies from political to lack of accountability and financial constraints.

The phenomena of urbanization in Indian cities, are increasing in an unprecedented manner and is burdening the already weakened urban local bodies.

This can be addressed only through institutional innovations and policy reforms 7, so that right kinds of incentives prevail for nurturing new institutions. Integrated thinking, planning and decision making processes with citizen participation are also needed, which demands new governance models

#### 5. Public Service Challenges faced by Citizens in India

#### Public Service Challenges faced by Indian Citizens are as given below:

i. **<u>Ouality and Reliability of services:</u>** Citizens frequently face issues with the reliability of public services offered in Water, electricity and transport sectors. The major challenges are, the availability of these key services 'on time' or in an uninterrupted manner. Many citizens also face erroneous billing, with respect to water and electricity usage.

ii. <u>Limited Ease of Use and Real Time tracking:</u> Extensive and Lengthy Forms for service requests & Inadequate provision to track requests and applications real time causes the citizens to invest more time in getting things done.

iii. <u>Multiple Visits:</u> Due to rapid expansion of urbanization, most of the service delivery centers in India function on limited staff and hence the citizens are unable to

complete the processes or requests on the same day itself. In many cases the applicant has to visit the service delivery centers multiple times which is inconvenient and time consuming.

iv. **Non-Availability of Complete Information:** Many times the citizens are provided with the inaccurate data due to the unavailability of the same. There is no single window where the citizens can know about the bouquet of Public Services offered by the government. Partial or incorrect information dissemination by the staffs also affects the perception about the efficiency of Public Services.

v. <u>Monopolistic Nature:</u> Many sectors under public services are in the control of Government which requires stringent regulation and monitoring, this has resulted in non-responsive and inefficient staff.

vi. **Lack of Engagement with City officials:** The citizens are not involved in the framing of policies and regulations which have an impact on the lives of public. Many citizens feel that by engaging their views or feedback into the system will help the officials to improve the way services are delivered.

## 6. India Overall Ranking

Accenture's latest research8 confirms that adopting digital technologies is at the heart of governance transformation. The adoption of digital technologies in governance brings substantial benefits to society and the economy. This research was conducted by Accenture and the findings are exclusively Accenture's.

**India:** India has a long way to go to meet citizens' expectations and build trust in service delivery. Despite having a long-term digital strategy and vision, India fall behind in the measures on core infrastructure, service delivery experience and addressing issues of access and citizen centricity.

India ranked eighth<sup>9</sup> overall in digital government performance



## India Citizen Satisfaction



The citizens of India have listed the following top priorities to improve public services in the future:

- i. Plan for the long term, not just the next few years (35%). Citizens feel that the government should have a long-term vision and plan to provide more advanced digital services that would help increase their confidence in the government's actions.
- ii. Understand better the priorities of citizens and communities (32%). Citizens want the government to address their needs better and provide advanced platforms such as social media and mobile to interact with government departments. In fact, more than 80 % of the surveyed citizens are open to using cloud computing.
- iii. Improve the skills of people who work in public services (29%). Citizens want the government to focus on training public sector employees to meet the challenges of public services in the future. Currently, just half of the surveyed citizens feel that the employees possess the required skills.

## 7. Major trends in Urban Governance

An assessment of city governance and local decision-making models across the world 10 identifies the following major trends;

**No one model of governance.** The wide variety of governance institutions and decisionmaking model should reflect both the local context, history and the complexity of the issues to be resolved.

i. <u>**Region-wide authority is essential for cities.**</u> Many cities have been moving towards two-tier models and regional coordination (e.g. the Greater London Authority, combined authorities, Scottish Strategic Planning Authorities) for better urban governance.

- ii. **Decentralization with fiscal autonomy.** A challenge in many countries, however, has been the failure to entrust revenue raising mechanisms for new responsibilities, resulting in local fiscal imbalance. London has few revenue raising tools compared to most major cities around the world, and other UK cities have even less fiscal autonomy.
- iii. Large cities and city-regions are different. They differ from other municipalities in terms of size and density, financial and administrative capacity, and in the complexity of the challenges they face. In countries such as Spain and Germany, cities and city-regions have different (or 'asymmetric') governance arrangements and powers.
- iv. Senior governments have a critical role in enabling the success of cities. As in the UK, countries ranging from Brazil and Switzerland to Australia and the United States are recognizing the central place of cities in national economic prosperity. The national (or sub-national) role in urban governance varies, but there is generally a focus on intergovernmental coordination, local investment and equalization for fiscal differences, incentives for intermunicipal cooperation and governance innovation.
- v. <u>Capable and visible city leadership is critical.</u> Many decision-making models exist and local context is important. For large cities and city-regions especially, models with a directly elected mayor appear to have greater potential to provide coherent city vision, mobilize coalitions of stakeholders, and provide profile and accountability for citizens.

## 8. **Opportunities for Improvement**

Accenture has identified five opportunities for improving the Public Service Delivery in India. These were identified after extensive global analysis and working with leading governments across the world which are most successful at implementing highly efficient Public Services.

The opportunities for improvement are;



#### 8.1 Engaging Citizens

Engaged' citizens are actively involved in the decision making of their region which will have an impact in their lives. A government that is truly engaged with its citizens also creates a live, online dialogue with its constituents. This goes beyond just the ability to vote digitally, but to be able to give people a voice in the design and delivery of public services, as well as express an opinion on the quality of services offered.

The areas for improvement are;

#### A. Establishing an Omni-channel dialogue –

- i. By allowing citizens to vote or express an opinion on a range of public issues that concern them.
- ii. Citizens should also be enabled to provide feedback on the performance of their elected officials and offer innovative solutions to solving major societal issues.

#### B. Co-creating new policies and programs with citizens

- i. By enabling citizens to submit ideas and give creative input into the design of policies and programs, thereby opening up the 'legislative design space'.
- ii. The citizens should also be able to share ideas for new ways and means of delivering services.

#### C. Promoting participatory budgeting

- i. Giving Citizens power to shape their own future. (Participatory budgeting was first introduced in the city of Porto Alegre, Brazil in 1989, where as many as 50,000 people take part in the participatory process each year to decide on how to spend as much as 20 percent of the city's annual capital budget. Since then, more than 1,500 cities have spearheaded participatory budgets across the globe).
- ii. By Enabling Different modes of payment and Providing Personalized Services.

#### 8.1.1 Case Study — e-Estonia

#### Scope

Digitalized every aspect of their government services; from monitoring healthcare to registering a new business.

#### How they did it?

In 2005, they introduced i-Votes, allowing citizens to cast votes online for any formal election using their state-issued ID card. In the 2007 Parliamentary election, 5.5 percent of votes were cast online; by 2011, that proportion had risen to 24.3 percent. Not only have i-Votes saved over 11000 working days in processing paper votes, the electoral turnout has risen by 1.5 percent. Estonia has set up an omni-channel dialogue with its people where they feel involved in the political process.

## Benefits

- Citizen involvement goes beyond i-voting to being actively involved in the legislative process, reviewing white papers, listening to parliamentary meetings and submitting ideas on-line.
- National leadership has permeated down to municipal levels as well. In establishing a platform for digital engagement with government and setting a stance as a truly transparent administration.
- In addition, city legislation and other documents are available on the home page for citizens to review.

## 8.2 Open & insight-driven services

From the citizen's perspective, access to a range of services, be it at city, state or national level should be completely seamless i.e. it shouldn't matter which part of government actually delivers the service. By leveraging the Big Data revolution, governments can derive a wealth of new insights on how people use services or the who is most in need, tailoring and targeting their services and using real-time information to improve organizational efficiency and mission effectiveness.

The areas for improvement are;

## A. Open up public data and systems

- i. Through a rigorous privacy and security policy, government can develop standard protocols, so this data can be discoverable, reliable and interoperable.
- ii. In New York, this allowed the city leadership to get real-time feeds from 40 agencies, facilitated cross-agency collaboration, and improved resource efficiency.

#### B. Build analytics capability for proactive response

- i. Powered by data analytics to become proactive rather than reactive.
- ii. Combined with customer segmentation techniques, this would enable them to better understand constituent needs and preferences, propose more targeted interventions, forecast trends and proactively address issues (for example, tax evasion, and social fraud prevention).

## C. <u>Revolutionize the back office</u>

- i. Governments need to deploy the latest productivity enhancement approaches including lean, agile processes and look towards shared cloud-based services.
- ii. The workforce needs to be upskilled to manage the new technologies and Back-office performance should be benchmarked against best in class as a useful diagnostic for administrators.

#### 8.2.1 Case Study — NYC DataBridge

#### Scope

Developed city-wide data sharing platform that assimilates data feeds from over 50 source systems, from roughly 40 agencies and external organizations.

#### How they did it?

Over the past four years, by harnessing Big Data. Data is merged to fit geographical information and is also used for cross-agency analysis. NYC has also created the 'Analytics 101' course for City government employees to provide them with an overview of available data and tools.

#### Benefits

- Readily available data and new cross-agency comparisons will help to encourage a deeper performance management culture, not only pushing agencies towards improvement, but also celebrating agencies that are performing exceptionally well.
- DataBridge has directly resulted in: the location of structures at risk of catching fire; the accelerated removal of Hurricane Sandy debris; the identification of restaurants illegally dumping in sewers; and the prevention of illegal cigarette sales.

#### 8.3 Collaborative service ecosystem

A future-ready government would actively seek these partnerships and explore a range of models with different risk and reward structures. Building on existing shared services models that reduce costs, collaboration across multiple departments are possible.

The areas for improvement are

#### A. Promote data sharing whilst ensuring security

- i. Standardized exchange protocols would form part of the foundation for deep collaboration between sectors.
- ii. This should allow the user to be authenticated once and authorized to access the full range of services, based on their personalized profile.

#### B. Scale innovation through market-making

- i. A lack of scale and limited knowledge of funding avenues currently constitute significant barriers for innovation-minded entrepreneurs and SMEs. By playing the role of market- or bridge-maker, government can connect these players with suppliers, customers and potential investors.
- ii. According to a study of young entrepreneurs in the G20, 5 percent of entrepreneurs will go on to create over 50 percent of new jobs, provided government creates the right regulatory environment.

#### C. Create networked innovation hubs

i. A collaborative ecosystem is not simply a digital platform but also involves building physical working spaces and innovation centers where actors can meet and partner to create new products and services. ii. Innovation hubs are office spaces where entrepreneurs and other selfemployed workers can connect and offer tools to build businesses, share ideas and learn how to monetize them.

## 8.3.1 Case Study—The City of London Procurement and Purchase-to-Pay Programme

## Scope

City of London designed a digital marketplace and enabled collaboration across an ecosystem of partners and suppliers.

## How they did it?

In 2011, the City of London decided to take a transformative approach to Procurement. The new system however has centralized the procurement of 18 departments and has made the City one of the best local authorities to do business with especially for SMEs. Prior to the introduction of the new system, the Council used an outdated service which favoured established businesses and was inefficient on resource-spend.

## Benefits

- This has opened up a procurement ecosystem, which has encouraged projects and proposals from the private sector to submit innovative solutions. Selection is based on meritocracy and efficiency, rather than prior work or company size.
- The change in attitude, to digitalize procurement methods, has allowed the City to make substantial savings by mid-2014, the Borough had already achieved £21.8 million in savings and was commended at the Public Procurement Awards.

## 8.4 Integrated Digital and Spatial Planning of Cities

Spatial tools, notably geographic information systems (GIS) for mapping and monitoring urban areas which will help the citizens to report crime, road conditions, water/waste distributions etc.

The areas for improvement are;

## A. The street-based, continuously connected grid

i. For effectively managing the problem of urban sprawl; testing, building and visualizing different scenarios like traffic/road conditions, it is imperative to have a robust Integrated Digital and Spatial Planning of Cities.

## B. Metrics for identifying patterns

i. Development of a prototype information system for regional planning in a generic decision support environment for the management of regional zones through the feedbacks provided by the citizens and through rapid assessment of problems.

## C. Modelling the dynamics

i. Combination of system dynamics and agent-based models over a geospatial domain to identify the land-use patters, water bodies etc using the satellite remote sensing data will help the authorities to predict natural calamities.

## 8.5 Secure Mission Critical Infra

With Government handling increasing amounts of sensitive personal data (from health records to tax revenue data) it is vital that Citizen Information is handled in a secure and transparent way.

The areas of improvement are;

#### A. Introduce stringent security and privacy policies

- i. Government legislation needs to be reviewed to ensure cyber security and data privacy laws are up-to date.
- ii. Absolute clarity on who owns specific data and what abilities others have to see or use it is essential.

#### B. Identify and proactively address threats and vulnerabilities

- i. Threats are emerging from new sources that are harder to locate. Security services need to widen their searches to ensure that they accurately detect new emerging threats in cyber-space.
- ii. Government needs to put in place robust infrastructure with fail-safe measures to keep services mission-critical 'always on'.

#### C. Engineer to be a non-stop government

i. Government needs to manage risk across the public enterprise by understanding which services are mission-critical and then prioritizing resilience.

### 8.5.1 Case Study — Altinn, the Norwegian online portal

#### Scope

Developed a 24\*7 online portal that has significantly eased the burden of public reporting for businesses, citizens and administrators.

#### How they did it?

Altinn, created in 2002 and updated as part of the Altinn 2 programme in 2010. The portal started out as a bottom-up, experimental initiative with limited funds.

Now nearly half a million businesses do their statutory reporting through the portal and over 700 different public forms are available.

#### Benefits

- Just three years after the introduction of online tax forms, 85 percent of businesses used Altinn to complete their tax reports, reflecting a strong user-focused design and trust and assurance features built into the system, Businesses can deal with all financial reporting through one single entry point rather than dealing with numerous agencies.
- The portal also gives businesses a better overview of their financial and regulatory information.

• The robustness and productivity improvements provided by the portal have encouraged other users to join. It has evolved into a mission-critical service availed by several user groups.



## 9. Strategies and Plan for Implementation

Extending the common data model into the whole economy and developing relationships with all delivery partners (including the private sector) enable the government to better focus on core policy and service delivery competencies.

Augmenting the power of analytics across broadly held data sources by adding "social listening" could help the public sector draw better insights and make more effective decisions.

Public-sector organizations that move from IT-focused value to business benefits, adopt fast and iterate often on innovate ideas, and are not afraid to fully embrace new methods for project delivery and rethink capital investment planning to focus on innovation.

By orienting services directly to citizens, transactions are streamlined, self serve becomes a more cost-effective and viable service option, and direct and real-time feedback is obtained by streamlining back office processes

## 10. Smart Urban Governance Ecosystem and Technology interventions Possible

The main components of the Smart Urban Governance Ecosystem are:

- a) <u>**City governance:**</u> City governance forms the foundation for the smooth functioning of the city. It includes the day-to-day activities of the local government and coordination with various other agencies to ensure that services are provided to all citizens across the various strata of the society.
- b) **Operations and maintenance:** Operational maintenance is the care and minor maintenance of equipment using procedures that do not require detailed technical knowledge of the equipment's or system's function and design. This category of operational maintenance normally consists of inspecting, cleaning, servicing, preserving, lubricating, and adjusting, as required.
- c) <u>**Public infrastructure asset management:**</u> Infrastructure asset management is the integrated multidisciplinary set of strategies in sustaining public infrastructure or municipal assets such as water treatment facilities, sewer lines, roads, utility grids, bridges, and railways. It includes maintaining an inventory of all the public assets at disposal and making efficient use of the same.
- d) **Integrated operations and command center:** Leverage integrated command and operations center to monitor city services on real-time. Improve/synchronize maintenance activities to reduce downtime and improve maintenance effectiveness.

e) <u>**Citizen services:**</u> Public citizen services are the interface of the government with the public. These include but are not limited to bill payments, tax payments, registering complaints, etc.



## 11. Technology enablers for smart Urban Governance

Technology can play an important role by aiding in improving governance, collaboration and integration of these agencies to significantly improve the city services. City command and operations center can become the central hub for governance, collaboration and integration. Technology can also help in involving citizens by leveraging mobile and web channels for city management. Some of the technology enablers are as follows;

- a) **Business process automation:** Re-engineer, optimize and automate business processes using business process management solution to have a fully integrated and policy-driven set of automated business processes that increases efficiency and reduces service delivery costs.
- b) <u>Multi-channel citizen services:</u> Multi-channel citizen interface (mobile/web/ online/phone/face-to-face/kiosk/social media) for citizen services such as bill payment, tax payment, issuance of online certificates, grievances registration, etc.
- c) <u>**City performance dashboard:**</u> Monitor the performance of city subsystems through the use of digital technologies and big data analytics to manage city governance, efficient performance and proactive crisis management.
- d) <u>Integrated asset management solutions:</u> Integrated asset management of all governance infrastructure assets including the associated data, processes, information systems and governance for manageable operations and higher sustainability.
- e) <u>Multi-channel citizen communication:</u> Multi-channel customer interfaces (service desk/contact center/citizen services portal) help in recording citizens' requests/issues through multiple touch points depending on the convenience of the citizens.
- f) <u>Workforce and resource management</u>: Leverage the workforce and resource management solutions to improve workforce engagement and task management. Optimize the workforce with the help of workforce management solutions like planning, forecasting &scheduling, shift management, and mobile based applications.

The Technology enablers shall promote the availability and use of Public Key Infrastructure, payment gateways and authentication systems leveraging Aadhaar [11]. The success of a smart urban governance lies in creating an ecosystem for Internet and mobile driven Service Industry which leverages Internet and Web technologies for developing new products, technologies and businesses. The Urban Governance should enable seamless, ubiquitous, secure and personalized, measurable delivery of government and non-government services through Internet based and mobile based delivery of services throughout the city/state. Leveraging social media, mobility and Cloud technology, SaaS etc shall enable different business models for the citizens/stakeholders

## 12. Conclusion

- a) A key characteristic of smart governance would be the real-time engagement of technology and traditional wisdom through a citizen-centered process. Varied local technology solutions backed by open data rather than homogenous solutions that ignore local complexity may be the need of the hour.
- b) For a city to become a "smart city" it needs commitment from its government and citizens. The critical factors of smart city initiatives to be analyzed in future research are: management and organization, technology, governance, policy context, people and communities, Citizen Involvement, state economy, existing or inbuilt infrastructure and environment.
- c) In addition to putting IT in the cITy to enable better planning and efficient delivery of services, a common thread that should be applied to improve the urban governance across the efforts of governments is in leveraging12
  - i. Data to get holistic view on smart initiatives and governance.
  - ii. Innovative Ideas like crowd sourcing/voting for better public services and their delivery.
  - iii. Knowledge to provide smart apps to citizens which will enable them to play a constructive stakeholder role in development and delivery of smart governance.
  - iv. Innovative Business Models To leverage PPP business model in designing and implementing new services.

#### References

- 'World Health Day, Are you ready? What you need to know about aging.', WHO, 2012, http://www.salute.gov.it/imgs/C\_17\_pubblicazioni\_1726\_ ulterioriallegati\_ulterioreallegato\_0\_alleg. Pdf
- 2. World Health Day, Are you ready? What you need to know about aging.', WHO, 2012, http://www.salute.gov.it/imgs/C\_17\_pubblicazioni\_1726\_ ulterioriallegati\_ulterioreallegato\_0\_alleg. pdf
- Public Expenditure after the Global Financial Crisis', World Bank, 2010, http://siteresources.worldbank.org/EXTPREMNET/Resources/ C11TDAT\_193-206.pdf

- 4. Smart city governance for sustainability by Claudia Casbarra, Cristina C. Amitrano, Annunziata Alfano, Francesco Bifulco Department of Economics, Management, Institutions, University of Naples Federico II
- 5. A.V. Anttiroiko, P. Valkama and S.J. Bailey, Smart cities in the new service economy: building platforms for smart services, Al & Soc., Springer, 2013
- 6. Urban India Vol XXV, No. 2: 1-28 1 Institutional innovations of Urban Governance
- Virmani, A. (2005), 'Institutions, Governance and Policy Reform: A Framework for Analysis' Economic and Political Weekly of India XXXX(22) (May 28 – June 4)
- 8. https://www.accenture.com/us-en/insight-digital-government-pathwaysdelivering-public-services-future.aspx
- 9. Accenture Citizen Survey, November 2013
- 10. Comparative urban governance by Enid Slack and André Côté Institute on Municipal Finance and Governance, Munk School of Global Affairs, University of Toronto
- 11. National Policy on Information Technology, 2012
- 12. http://ickm.kis.osakafu-u.ac.jp/WIPP\_PP/07\_WIPP\_PP.pdf

## 19th National Conference on e-Governance

White Paper on

# "Cyber Security Framework for Citizen Centric Services"

**Developed by -**



A NASSCOM<sup>®</sup> Initiative

## Authors:

- Nandkumar Saravade, CEO, DSCI
- Abhishek Bansal, Principal Consultant, DSCI



## Contents

1.	Introduction	61
2.	Technology and Citizen Services	61
	Technology trends and maturity of Digital government	63
3.	Cyber Security: Need of the hour	64
	Cyber Security Threats for Citizen Centric Services	65
	Global Study	66
	Indian Scenario	68
	Identified Gaps and Suggestions to Improve	69
4.	Cyber Security Dilemmas	70
	Stimulate the economy vs National Security	70
	Open Data vs Data Protection	70
	Infrastructure modernization vs Critical Infrastructure Protection	71
5.	Cyber Security Framework	71
	Security Principles for Citizen Centric Services	74
	Key Components	76
6.	Conclusion	79
7.	About DSCI	80

# List of Figures

Figure 1:	Depiction of e-Gov initiatives (States)		
Figure 2: Digital Government Maturity Model		63	
Figure 3:	CIA Triad		
Figure 4:	Gaps and Suggestions to Improve		
Figure 5:	Dimension of National Power		
Figure 6:	gure 6: Baseline Cyber Security		
Figure 7:	Figure 7: Key Aspects of Cyber Security Framework		
Figure 8: Stages for e-Governance			
Figure 9: Security Principles for Citizen Services		75	
Figure 10:	Figure 10: Cyber Security Framework: Citizen Centric Services		
List of Tab	les		
Table 1:	Table 1:Mission Mode Project (MMP) Areas in India		
Table 2:	Notional representation of Critical Areas for		
	Citizen Services	63	
Table 3:	International perspectives on Citizen Service's vs Cyber Security Measures	67	

Table 4:	Implementation Roadmap	79

## Introduction

Adoption of new age technologies into the everyday lives of people, businesses and governments is helping to open up governments, giving rise to new forms of public engagement and relationships that transcend public, private and social spheres<sup>1</sup>. These digital technologies are offering opportunities for more collaborative and participatory relationships between citizens, businesses and government organizations.

Forward looking government of India working with agenda of 'Minimum Government, Maximum Governance' have started to deliver on the promise with its different citizen centric services under the umbrella of 31 Mission Mode Projects, schemes such as Jan Dhan Yojna and initiatives such as Digital India etc. On one hand these initiatives are unlocking a more harmonized approach to deliver citizen services and on the other these are also saving in the tax payer's money, which can be invested to advance the development activities.

While provision of these services is essential and need of the hour; growing threat landscape is also a reality haunting the cyberspace transactions. Recent compromise of 21.5 million people in massive data breach at Office of Personal Management - US, believed to be one of the biggest breaches of citizen's PII (Personally Identifiable Data) data; further raised the importance of cyber security for designing the citizen services.

Citizens living in digital era expect increased transparency about the government decisions, services and data. And these expectations are rising. To instill confidence in services, build trust, provide accessibility, reduce the digital divide and broaden it across social strata; security and privacy should be the key considerations for designing and implementing the e-Government strategies.

In the following sections a brief analysis on impact of technology on citizen services, cybersecurity threats, and dilemmas related to cyber security while providing citizen services are examined. The white paper also attempts to identify critical aspects, principles and components for Cyber Security Framework in context of provision of citizen centric services.

## **Technology and Citizen Services**

Building a modern and innovative citizen centric services requires utilization of new age digital technologies. Technology plays a significant role by enabling:

- a. Anywhere, anytime access for services
- b. Interoperability across multiple systems

It is not only a strategic driver for improving the public sector efficiency but can also support effectiveness of policies and create more open, transparent, innovative, participatory and trustworthy governments

In India, National e-Governance Plan comprises of 31 mission mode projects which are

1

OECD (Organisation for Economic Cooperation and Development) recommendation of the council on Digital Government Strategies

further classified as state, central and integrated projects<sup>2</sup>. Via use of technology various citizen services such as acknowledgment of birth and death, Issuance of certificates, Collection of water charges, Issuance of tax clearance certificates, Property tax, Trade License etc. and projects focusing on the aspects of electronic governance such as banking, land records or commercial taxes etc. are being digitised by different centre and state government departments. Table below depicts the different mission mode project areas classified as Central, State and Integrated.

Central MMPs	State MMPs	Integrated MMPs
<ul> <li>Banking</li> <li>Central Excise and Customs</li> <li>Income Tax (IT)</li> <li>Insurance</li> <li>MCA21</li> <li>Passport</li> <li>Immigration, VISA and Foreigners Registration and Tracking</li> <li>Pension</li> <li>E-Office</li> <li>Posts</li> <li>UID</li> </ul>	<ul> <li>Agriculture</li> <li>Commercial Taxes</li> <li>e-District</li> <li>Employment Ex- change</li> <li>Land Records (NL- RMP)</li> <li>Municipalities</li> <li>e-Panchayats</li> <li>Police (CCTNS)</li> <li>Road Transport</li> <li>Treasuries Computer- ization</li> <li>PDS</li> <li>Education</li> <li>Health</li> </ul>	<ul> <li>CSC</li> <li>e-Biz</li> <li>e-Courts</li> <li>e-Procurement</li> <li>EDI for eTrade</li> <li>National e-governance Service Delivery Gateway</li> <li>India Portal</li> </ul>

### Table 1: Mission Mode Project (MMP) Areas in India

Each state has selected few mission mode projects based on its specific requirements and needs. Figure below depicts the various programs in implementation by different states.



Figure 1: Depiction of e-Gov initiatives (States)

http://www.deity.gov.in/content/mission-mode-projects

2

#### Technology trends and maturity of Digital government

Digital government maturity model<sup>3</sup> in figure on the right depicts the transformation from electronic governance to smart governance with role of technology at each stage. Concept of 'civic moment', an event that triggers a series of cascading actions and data exchange across network of people, businesses and government will become possible with synergistic value from mobile, information (data analytics, cloud and social technologies supplemented by internet of things.



Figure 2: Digital Government Maturity Model

Below table provides a notional representation of some of the technology trends and how they will be impacting some of the essential services for citizens in next 10-15 years horizon<sup>4</sup>:

Areas	Vision	Issues	Trends
Education	Realizing the full po- tential of every Indian	<ul> <li>Literacy, Creativity and Skills</li> <li>Access: Anyone, Any- where and Anytime</li> <li>Integration, Aggrega- tion and Flexibility</li> </ul>	<ul> <li>Massive Open Online Courses</li> <li>Collaborative and Social Learning</li> <li>Virtual &amp; Game based Learning</li> <li>Remote labs and adaptive testing</li> </ul>

3 Maio A, Howard R, Archer G; September 2015, "Introducing the Gartner Digital Government Maturity Model"

4 http://www.tifac.org.in/index.php?option=com\_content&view=article&id=964:Technology%20 Vision%202035&catid=49:latest-news&Itemid=17

Areas	Vision	Issues	Trends
Medical Sci- ences and Healthcare	Ensuring affordable and accessible health- care to every Indian	<ul> <li>Increase Life expectancy in India from 66 years (2013)</li> <li>Reduce maternal mortality rate from 190 deaths/100000 live births</li> <li>Reduce infant mortality from 53/1000 live birth</li> <li>Increase the density of health workers (doctors-nurses-medical staff) from 1.29%</li> </ul>	<ul> <li>Robotic Surgical Systems</li> <li>Digital Health Delivery</li> <li>Synthetic biology</li> <li>Personalized medicines</li> <li>Next generation genomics</li> </ul>
Food and Ag- riculture	State of art technolo- gies to ensure	<ul> <li>Per capita net availabil- ity of food grains to be maintained</li> <li>Per capita availability of milk to be increased from 299g/day (2012- 2013)</li> </ul>	<ul> <li>Precision Agriculture and Robotic farming</li> <li>Multipurpose crops (Sucrose, Fodder, Fuel)</li> <li>Rapid diagnostic tools for detection of zoonotic diseases</li> </ul>
Water	Water Security for all	<ul> <li>More crop per drop in agriculture</li> <li>Challenges water quality (19 states – fluoride, 7 states arsenic, 16 – nitrate, 8 salinity ingress)</li> <li>Managing waste water</li> <li>Mitigating uncertainties and impact of calamities</li> </ul>	<ul> <li>New Generation RO membranes (rely less on energy to push wa- ter)</li> <li>Hydro fracturing during floods to maximize water recharge</li> <li>Non-contact sensors to measure water level anywhere across depth and width of river</li> </ul>
Infrastruc- ture	To build integrated, robust, technology driven, cutting edge infrastructure for in- clusive growth, sus- tainable development and a strong economy	<ul> <li>Cities with population of 1 million plus is ex- pected to increase from 53. (per 2011)</li> <li>Total road length 4.87 million KM (2012) to increase 3 fold by 2035</li> <li>Total road traffic, air traffic are going to in- crease multi-folds</li> </ul>	<ul> <li>Smart self-healing materials for faster construction</li> <li>Segmented and precast construc- tion in bridges</li> <li>High speed rail corridors of speed above 250 kmph with ad- vanced track technology, auto- mated signaling and train control</li> </ul>

There may be number of value added services which may be built around civic moments which do not exist today and will become possible with usage of data such as tax advice coming from tax agencies that have real time view of tax payer's situation, from preventive healthcare using data from environmental monitoring to smoother and rapid management of emergency situations based on data coming from various government and non-government sources.

#### Cyber Security: Need of the hour

Breakthrough innovations in technology and adoption of the same in modernizing government functions from digitization to transformational civic moments are making it simple for the common man to access these services and enjoy his rights on one hand;

but are also making it easier for malicious users to take advantage of the available information and vulnerabilities in systems.

Basic methodology to evaluate the security threats is measuring the need against the CIA (Confidentiality, Integrity and Availability) triad. For citizen centric services; Confidentiality of personal data; Integrity of data for citizen benefits and availability of services at time of need are of primary importance.

A recent example, when some of the major daily's and magazines reported a privacy nightmare and debacle in December, 2015 where it was mentioned that Chennai and



Figure 3: CIA Triad

Hyderabad's municipal corporation websites allowed anyone to search for birth and death certificate only requiring to fill in gender, and one criteria from registration number, person's name, Date of Birth, place of birth or mother and father's name<sup>5</sup>. It is not clear since when this loophole was open; but definitely depicts the dark side of technology resultant of either a human error or blind spot.

## **Cyber Security Threats for Citizen Centric Services**

Internet is under seize and the volume, velocity, variety and complexity of the threats to internet and globally connected infrastructures are steadily increasing. Critical infrastructure and classified data are much more susceptible to the malicious attacks. For administration, Cyber defense vs Cyber opportunity is always a debate which needs to be balanced out to reap the benefits of technology and assure citizens and nation's interest. Few elements for cyber security which have to be considered for citizen centric services <sup>6</sup> as mentioned in an international journal are:

- Dependency on information systems
- High information of information sharing
- Increase use of remote access
- Challenges of controlling information
- Laws relating to information security
- Dealing with highly sensitive citizen's and business data

http://www.medianama.com/2015/12/223-chennai-hyderabad-birth-death-certificates-online-user-privacy/
 Agrawal, P., Pandey, V., Kashyap, S. and Agrawal, M., "Security Issue of E-Governance", in

Agrawal, P., Pandey, V., Kashyap, S. and Agrawal, M., "Security Issue of E-Governance", in International Journal of Advances in Computer Networks and Security, Pages 68-71.

- National security
- Consequences of security breach can be detrimental

Typical concerns related to technology alone e-Government system are:

- Virus Attacks
- Outside and Inside Attacks
- User Frauds
  - False Identity/Impersonation
  - Unauthorized disclosure
  - Theft /Duplication of access token
  - Misinformation and Propaganda
  - Failure to recover business information
  - Loss or theft of monetary value

Cyber security is not just about technology and systems. It is about the people that use those systems and how their vulnerable behaviors can lead to their exploitation<sup>7</sup>.

Cyber security threats are not limited to systems utilized for provisioning, or specific services or information elements; a systematic attempt can even bring a nation to its knees. At the time of the state wide cyber-attacks in 2007, Estonia was one of the most developed nations in Europe regarding the ubiquitous use of information and communication technology in all the aspects of society. Over three weeks in spring of 2007, Estonia was hit by a series of politically motivated cyber-attacks. Web defacements carrying political messages targeting websites of political parties and government and commercial organizations suffered from different forms of denial of service or distributed denial of service (DDoS) attacks. Among the targets were Estonian governmental agencies and services, schools, banks, Internet Service Providers (ISPs), as well as media channels and private web sites<sup>8</sup>.

### **Global Study**

In order to get a broader perspective of different measures, which countries across the globe are, taking to deal with the cyber security challenge especially in context of Digital initiatives in and around citizen services was studied as part of this paper. A brief analysis of some countries is depicted in the table below:

7 8

Evron, G. (2008). Battling botnets and online mobs: Estonia's defense efforts during the internet war. Georgetown Journal of International Affairs, 9(1), 121–126

Brian M. Bowen, Ramaswamy Devarajan, Salvatore Stolfo, 2011, "Measuring the Human Factor of Cyber Security", Columbia University Academic Commons,
Country	Citizen Centric Services	Measures
New Zealand	Government's Ultrafast Broadband & Rural Broadband	<ul> <li>Cyber Security Strategy with three priority areas:</li> <li>Increasing Awareness and Online Security</li> <li>Protecting Government Systems and Information</li> <li>Incident Response and Planning</li> </ul>
Australia	Digital Transformation Office <sup>9</sup>	- Centrelink philosophy of "no wrong door"
Europe	IDABC – Interoperable Delivery of European Government Services to public Administration, Businesses and Citizens	<ul> <li>All the 34 countries have both specific measures for their local lands and collective directives to safeguard citizen's sensitive information</li> <li>France: <ul> <li>Choice and Access to Citizen Services</li> <li>EU Data Protection Directive</li> </ul> </li> <li>Netherlands <ul> <li>Dutch government with e-Citizen Charter</li> </ul> </li> <li>Bulgaria <ul> <li>eID cards</li> <li>egov.bg: Official government portal</li> </ul> </li> <li>Croatia (e-Croatia Programme)</li> <li>ICT legal framework</li> <li>Convention on Cybercrime (OG 173/2003)</li> <li>Electronics Document Act (OG 150/2005)</li> </ul> <li>Estonia <ul> <li>Estonian ID Card Project</li> </ul> </li> <li>Germany <ul> <li>Federal Data Protection</li> <li>eSignatures Act</li> <li>Law on reuse of Public Sector Information</li> </ul> </li>

 Table 3: International perspectives on Citizen Service's vs Cyber Security Measures

https://www.dto.gov.au/

9

Canada	Government online (GoL) and Modernizing services for Canadians (MSC)	<ul> <li>Action plan 2010-2015 for Canada's Cyber security strategy<sup>10</sup> <ul> <li>Securing Government Systems</li> <li>Partnering to secure vital systems outside the federal government</li> <li>Helping Canadians to become secure online</li> </ul> </li> </ul>
Singapore	MyeCitizen Portal REACH	- National Cyber Security Masterplan 2018
Belgium	Kafka Plan	<ul> <li>AnySurfer accessibility standard</li> <li>EU Data Protection Directive</li> <li>Electronic ID cards to Citizens</li> </ul>
UK	Tech Clusters, <b>'Smartphone State'</b>	<ul> <li>Choice and Access to Citizen Services</li> <li>UK DPA</li> <li>National Identification Scheme</li> </ul>
US	Digital Government Strategy including: - Open Government Directive ( <u>https://www.whitehouse.gov/open</u> ) - National Strategy for trusted identities in cyberspace (NSTIC) - 25 point implementation plan to reform federal information technology management	<ul> <li>Section D: Security and Privacy<sup>11</sup></li> <li>Promote safe and secure adoption of new technologies</li> <li>Evaluate and streamline security and privacy processes</li> </ul>

## **Indian Scenario**

Cyber Security in India especially for citizen centric services can be envisaged as combination of three areas viz. current policy environment and cyber security strategies being adopted by government of India; awareness and education of citizens about the nuances and pitfalls and last is the architecture designed with specific security controls.

Policy: India has gamut of policies to safeguard the citizen interest such as Information

<sup>10</sup> http://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/ctn-pln-cbr-scrt/index-eng.aspx

<sup>11</sup> https://www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government. html

technology Act 2000, Information technology (Amendment) Act 2008 []<sup>12</sup>, IT Rules 2011 and National Cyber Security Policy 2013 (Under section 3, Objectives, point number 10, 11 and 12)

**Information Security Education and Awareness:** Though there are multiple awareness and education schemes by private enterprises such as banks, insurance firms etc. which are making the end citizen aware about the cyber-attacks and security pitfalls. This section highlights the schemes or focus by government while providing citizen centric services. Under the ambit of ISEA programs; government has been running the education and awareness programs since 2005. First phase of ISEA was focused on content preparation and back ground work for the material in multiple languages. Along with this, 17719 candidates<sup>13</sup> in total were either educated on the cyber security topics or were part of the awareness and training events. Next phase of the ISEA has been initiated on 28 Dec 2015 with a planned outcome for mass outreach of about 3 crore citizens.

**Architecture and Design:** A majority of critical eGovernance applications are hosted at the NIC data centers including over 700 government websites/portals, Exam results admission, e-counselling, Land records, IVFRT, National and State transport applications, CGHS, e-Procurement, e-Courts, e-Office, election results etc<sup>14</sup>. NIC largely provides the ICT infrastructure for the citizen centric services whether on premises or on cloud. Though the requisite security measures and controls have been ensured at infrastructure level such as NICNET gateways, NICNET data centers and NICNET PoPs (point of presence); applications, citizen behavior, access and transactions on top do not have uniform security practices.

#### Identified Gaps and Suggestions to Improve

	Policy	Awareness	Design
GAP	More focus on Citizen information rights infringement by 'body corporates' or individuals'	Limited content around the security concerns for citizen centric services	Services are hosted and built on infrastructure do not have standardised framework for implementing security
SUGGESTION	Right Amendments in IT AA 2008 Privacy Protection	Mass Awareness programs tailored for specific services: a. Possible Harms b. Legal Help that can be availed	Context based Security to be inculcated in design Security Organisation Structure

Figure 4: Gaps and Suggestions to Improve

<sup>12</sup> http://deity.gov.in/sites/upload\_files/dit/files/downloads/itact2000/it\_amendment\_act2008.pdf

<sup>13</sup> http://isea-pmu.in/home/

<sup>14</sup> https://cloud.gov.in/uploads/brochure.pdf

#### **Cyber Security Dilemmas**

Cyber security is a tool to achieve the economic growth, societal equality and good governance objectives such as greater transparency, integrity and citizen engagement; and not an end in itself. To achieve this, government has to deal with its own, overarching set of cyber security dilemmas. These dilemmas are critical to understand as both a strong and a weak posture can have economic and social costs.

#### Stimulate the economy vs National Security

Twin tension exist between expediting the economic benefits of ICT and Internet economy

while at the same time protecting intellectual property, securing critical infrastructure and providing for national security. Productivity promise which ICT brings to certain nations will approach is huge. This growth is being documented in policies and funded initiatives around the world. For example, European Union is pursuing the Digital Agenda, the United States is pursuing the Innovation Agenda and China is pursuing a policy of 'Informationisation'<sup>15</sup>. The components: agendas have common provision of high-speed internet to citizens and businesses modernization of critical infrastructures with new ICT components that can communicate with the internet and Figure 5: Dimension of National Power promotion of research and innovation to



ensure that innovative ideas can be turned into products and services that create growth and jobs and, ultimately, drive competitiveness<sup>16</sup>.

Besides the productivity aspects and securing the national assets; cyberspace is also one of the key instruments of national power. Figure on the right<sup>17</sup> depicts the same. This power can also become bane against national security and cyberspace be jeopardized through malwares, restriction and denial of services, physical destruction of controlled processes and espionage through monitoring of transmission as cyberspace has no boundaries.

#### **Open Data vs Data Protection**

Natural conflict between citizen's expectations and government's policy for data protection and preserving privacy vis-à-vis the need to share information across boundaries and borders (e.g.: government to industry, government to government, industry to industry interactions). Citizen expect protection from intrusions by both the private and government

<sup>15</sup> Dean et al., 'The Connected World: The Digital Manifesto: How Companies and Countries Can Win in the Digital Economy.'

<sup>16</sup> Alexander Klimberg, 'National Cyber Security Framework Manual', NATO Science for Peace and Security Program

<sup>17</sup> Fiddner D, 2015, "Defining a Framework for Decision Making in Cyberspace

actors. Sharing of the information from government to non-government departments for example about the health records, education details, patterns about specific service consumptions may lead to security and privacy issues for a citizen (if not provided adequate controls such as Need to Know, Anonymity etc.) E-Gov initiatives need to maintain a fine balance while exercising the access to data via "National Data Sharing and Accessibility Policy (NDSAP – 2012)" and safeguards in lieu of "National Cyber Security Policy" and "Indian IT Act 2000 (IT Rules 2011))

## **Infrastructure modernization vs Critical Infrastructure Protection**

Deploying the appropriate security measures to manage the risk to critical systems and assets is costly. The short-term economic gains of adopting new technologies and transforming the cyber infrastructure must be balanced against the medium and longer-term losses stemming from failing to adequately secure these systems and infrastructures. The administration is pushing initiatives for deeper integration of computer systems in other contexts, including the "smart grid," a computerized network that facilitates electricity and information flows between homes and electrical suppliers; computerized health records; and next-generation air-traffic management<sup>18</sup>. Stuxnet virus that ravaged Iran's Natanz nuclear facility, is known for reportedly destroying roughly a fifth of Iran's nuclear centrifuges by causing them to spin out of control<sup>19</sup>. This attack supposedly attributed to US and Israel has pushed back Iran's nuclear program by several years.

Owners and operators of these infrastructures have to play an active role in defining the standards that must be implemented to meet the government's mandate in assuring the essential services.

## **Cyber Security Framework**

There are multiple approaches, frameworks and standards such as ISO 27001, NIST, COBIT 5, ISA etc. which exist today; and all provide a very comprehensive view for implementing security and privacy. Question arises, is there a real need for separate framework? The answer to this question is both Yes and No. All these frameworks comprise of best practices and standards however they are generic in nature and unidirectional whereas technology evolution is enabling a participatory approach. Cyber security framework proposed as part of this paper, brings together the baseline security approach along with principles supporting new age requirements such as simplification of information security and attack driven defense approach in context of citizen services. Securing transaction data and appropriate sharing under the Context Aware mechanism is the primary feature to drive the design and implementation of controls. Sections below will discuss the baseline security structure, key aspects, security principle and components in relation to the evolving threat landscape which are then converged to the Cyber Security Framework for Citizen Centric Services.

If we treat government as business and citizen as customer, citizen data is the crown

<sup>18</sup> Jack Goldsmith and Melissa Hathaway, 'The cybersecurity changes we need,' The Washington Post, 29 May 2010.

<sup>19</sup> http://www.businessinsider.in/The-Stuxnet-Attack-On-Irans-Nuclear-Plant-Was-Far-More-Dangerous-Than-Previously-Thought/articleshow/26113763.cms

jewel and services offered can be classified based on the criticality of operations both of which are to be guarded by the government agencies. Differential controls are deployed at different layers i.e. Perimeter, Network, System, Application and Data to have defense in depth approach. These controls are governed from four different perspectives viz. Management Commitment & Control, Strategic direction, Operational efficiency and Technical competence.



Figure 6: Baseline Cyber Security

In addition to the layered approach focused only on data as asset, an important dimension for citizen centric services is to envisage the different services as transactions and build controls for the value chain starting from users to assets to events. Diagram below depicts the key aspects to be considered for ensuring cyber security for citizen services. Each of the aspect is described in brief as:



Figure 7: Key Aspects of Cyber Security Framework

**User/Actors:** In order to safeguard the security of cyberspace at the national level (especially the citizen centric services) cognizance of all the actors in cyberspace including the "enemies" operating should be understood and factored<sup>20</sup>.

- a. Users (Citizens), Operators, Administrators: These groups do not have a negative influence on cybersecurity. They are actors who lawfully provide cyberspace resources or consume them.
- b. Non-hostile Hackers: As a rule, they unintentionally have a negative impact on cybersecurity, whether they are doing so "just for fun" (settling a bet or dispute, for example) or to show off.
- c. Hostile Hackers: Their motives include revenge, envy, and self-interest.

d. Network Combatants: They can have a positive or negative impact on cybersecurity for their own purposes. In network law enforcement, activities are prescribed by

law and financed by the state. Other combatants may be secretly financed by state or private entities pursuing covert agendas.

- e. Cyber Criminals: Criminals using cyber as their weapons of choice.
- f. Cyber Terrorists: Terrorists using cyber as their weapons of choice.
- g. Governments: State bodies that may use cyberspace for military-political purposes.
- h. Nongovernmental organizations: Groups that may use cyberspace to promote their political agendas.



Figure 8: Stages for e-Governance

**Transactions:** Understanding the role of actor is an important factor for cyber security for which one must understand the information flow in different stages for e-Governance initiatives. The figure on the left depicts the four stages for the eGovernance; where in first three e-government can be seen as a process of modernization of the public sector from paper-based tasks and processes to digital ones <sup>21</sup>. The information in these stages is typically flow in one direction from government to public, with limited feedback from citizens. While the fourth stage of e-Gov initiatives is predominately Open government with more participation from citizens leading to transformative and participatory model. This will include the usage of web 2.0 technologies such as blogs, wikis, social networking hubs, communication modes, photo-sharing, video casts, audio sharing, virtual worlds etc.

These emerging e-government services will be increasingly advanced transaction types that will share personal data for personalisation and collaboration among government departments. Actor identity intelligence and behaviour of users forms a critical element for ensuring cyber security whether it is trusted insiders, end users or rogue actors.

<sup>20</sup> Dmitry I. Grigoriev, Global Cyber Deterrence, Views from Russia, East West Institute (April 2010)

<sup>21</sup> Chun S, Shulman S, Sandoval R, Hovy E, "Government 2.0: Making Connections between Citizens, Data and Government

**Assets:** Government organizations collect and maintain different kinds of data concerning the citizens. Sharing of personally identifiable information cannot be exchanged among different government organisations due to privacy related issues. [9] In paper based official processes the security requirements are generally accomplished by identifying the citizen by means of an identity card, deeds or witnesses. Confidentiality is generally provided by envelopes or by classified records. Handwritten signatures, forms, stamps and a notary public provide the integrity, data origin authentication and non-repudiation. The equivalences in electronic processes are well known by technologies such as encryption, digital signatures and PKI<sup>22</sup>.

**Analytics:** Incident reporting systems are integral part of operations of citizen centric services; however reporting of the raw number such as number of privacy breaches may not necessarily prevent the future incidents from happening. Why the incidents have occurred and what can be done to prevent them for future; should be analysed properly. Operational managers should understand the relationships that connect danger signals to potential changes in operations to improvement programs.

Government agencies are not immune to Advanced Persistent threats<sup>23</sup>. Detection of threats and vulnerabilities should not be limited to the signature based utilities rather there should be comprehensive pattern analysis for transactions and behaviour to unearth the zero day threats.

**Visibility:** Un-integrated security architecture and poor visibility across tools and processes provide ample opportunity for cyber criminals to exploit vulnerabilities and security holes<sup>24</sup>. Sophisticated cyber criminals are increasingly taking advantage of the rapid business digitization and the evolving IT infrastructure to exploit Internet-enabled enterprise networks; putting cyber threats at the top of enterprise and government decision-makers' minds.

**Integration:** Semantic interoperability is the ability of interacting network entities different agency systems, citizens and technology to have a consistent understanding of shared information and ability to resolve differences in the conceptualisation of entities. Privacy preserving data integration is a problem however integration is required for having a common platform for the security, identity and threat intelligence. Data sharing between controls is paramount to identify the root cause and take preventive/correctives measures based on the intelligence.

#### **Security Principles for Citizen Centric Services**

This section provides a foundation on which a more consistent and structured approach to design, development and implementation of cyber security capabilities can be considered.

While the primary focus of these principles is the implementation of technical controls, these principles highlight the fact that, to be effective, a system security design should also consider non-technical issues, such as policy, operational procedures, and user education.

<sup>22</sup> Leitold H, Hollosi A, Posch R, "Security Architecture of the Austrian Citizen Card Concept"

<sup>23</sup> Whitepaper: Combating Advanced Persistent Threats, McAfee (An Intel Company)

<sup>24</sup> Whitepaper: "The Cyber Resilient Enterprise: Harnessing your security intelligence", Symantec



Figure 9: Security Principles for Citizen Services

## 1. Attack driven defense:

Security is a moving target and if it is not being tracked and handled properly, one is bound to get hacked<sup>25</sup>.

- Data security is the most serious IT challenge
- Kaspersky: average cost per enterprise data breach is \$720000
- Businesses needing cybersecurity will propel the market to a \$170billion by 2020<sup>26</sup>
- Tools used by hackers are cheaper and easily available. Hackers thus enjoy an asymmetric advantage over cybersecurity professionals

This principle is extremely important in today's context to safeguard the citizenry data. For protection of citizen services stringent controls should be deployed to:

- a. Raise cost to attackers
- b. Increase the odds of detection
- c. Iterate defense based on real attack patterns

## 2. Simplifying security and building trust

Trust is an essential factor in any business-transaction system and much more so in the e-government domain<sup>27</sup>. Systems of e-government need to establish trust and confidence within and between agencies, across governments and, of course, with citizens and

<sup>25</sup> http://www.jwsecure.com/2015/11/01/the-weakest-link-enterprise-security-consumer-security-and-privacy/

<sup>26</sup> Cyber Security Market Worth \$170.21 Billion by 2020, PR Newswire, June 10, 2015.

<sup>27</sup> Abie H, Foyn B, Bing J, Blobel B, Pharow P, Delgado J, Tzovaras D, 2004 "Need for a digital rights management framework for the next generation of e-government services

businesses. This has to be reflected by the electronic services and citizens need the ability to control their privacy and information.

## Three steps in achieving fundamental level of trust are<sup>28</sup>:

- a. **Asset Discovery and Management:** Validating the user and device identity at system point of entry and maintaining a state of trust
- b. **Configuration Management & Remediation:** Identifying the misconfiguration and vulnerabilities so that corrective actions can occur to assure policy compliance and risk reduction
- c. **Architectural Optimization:** Design and feature application combined with best practices to create a threat resistant and risk tolerant infrastructure.

## 3. Risk based Security:

Making information security decisions based upon careful identification, analysis and prioritization of risks. Inventory of the assets and/or processes, putting an evaluation against them along with ownership, communication with businesses for the likely impact, anticipating the frequency and possibility of the risks crystallizing from the threat landscape – all these inputs should be factored before making investments on the controls points in accordance with the risk exposure.

## 4. Build Resilience:

Planning for failure will help minimize its actual consequences. Having backup systems in place allows IT department to continually monitor security measures and react quickly to a breach. If the breach is not serious the government function can keep operating on backup while the problem is still being addressed<sup>29</sup>.

## 5. Learn from each other:

The level of cyber security that would be optimal for a governance function or specific citizen service, in the absence of information sharing can be attained by the function/ service at a lesser cost when the information security information is shared<sup>30</sup>. Sharing provides benefits to each function and the total welfare also increases.

## **Key Components**

**Governance:** Proper governance of information security ensures alignment of information security with business strategies and objectives, value delivery and accountability. It supports the achievement of visibility, agility, efficiency, effectiveness and compliance. Three key areas which should be the focus of governance function are:

- a. Provide management oversight and direction for the program
- b. Spread awareness
- c. Build right skills

<sup>28</sup> Whitepaper CISCO, "Cybersecurity: Build Trust, Visibility and Resilience"

<sup>29</sup> https://www.techopedia.com/2/27825/security/the-basic-principles-of-it-security

<sup>30</sup> Gordon L, Loeb M, Lucyshyn W, "Sharing information on computer systems security: An economic analysis", Journal of accounting and public policy

Security organization structure specific to citizen services can help in improving the posture across the strategic, tactical and operational layers of securing citizen data.

**Identification and Authorization:** E-government projects are information intensive and often involve large scale sharing of data, much of it is personal data about the citizen, and an important aspect of providing secure services is to ensure proper identification and authentication of the individual citizens as they consume electronic public services.

Governments in individual countries are adopting one of three Identity Framework models in pursuit of their national digitization vision and e-authentication initiatives<sup>31</sup>.

#### Model 1: Multi-channel identity framework based on national e ID

Countries that have pursued a multi-channel identity framework based on the government acting as the primary provider of a national e ID as a root identity to provide faster and more secure public services to their populations include the Sultanate of Oman (the first smart card-based national ID solution deployed in the Middle East), the United Arab Emirates, and Estonia.

## Model 2: Structured identity framework delivered via a federation

Countries pursuing a structured identity framework delivered by a federation of endorsed identity providers include Sweden, Finland, Singapore and Norway. In Norway, for example, the single sign-on portal gives citizens access to over 300 government services and supports multiple levels of authentication that include PIN code authentication, bank-issued electronic ID and certificates stored in USB pens issued by a private company.

#### Model 3: Open identity framework with no national scheme

The UK and the US currently operate an open identity framework without a national ID scheme.

Irrespective of the model adoption for providing varied citizen services below mentioned points should be considered: <sup>32</sup>

- a. **Privacy:** A digital identity solution should be respectful to user's rights to privacy and should not disclose personal information without the explicit consent.
- b. **Minimal disclosure:** Need to know principle with collection limitation should be applied to enable access with least set of credentials needed for the service
- c. **Anonymity support:** Many services do not need to know the real identity of a user. Pseudonyms, multiple digital identities and even anonymous accesses must be adopted where possible

**Data Security:** An important component comprising of the aspects such as Data Localization, Encryption and Interoperability through. Secure Communication

a. **Data Localisation:** From a national security perspective, cyberspace is a shared domain which requires a shared responsibility between stakeholders at national and global level. Many countries have taken concrete steps to safeguard and protect

<sup>31</sup> Enabling the e-Government 2020 Vision: the role of Trusted Digital Identity

<sup>32</sup> Mitrakas, A, "Book: Secure E-Government Web Services", Pg 170,

their sensitive national data in cyberspace against cyber threat such as foreign intelligence services<sup>33</sup>. In today's economy, cross border data flows have become an integral part. All the economic sectors rely on secure, cost efficient and real time access to data. Specific to Citizen Services involving personally identifiable data, countries across the globe exercise great caution to an extent of even limiting the cross border flow. It is suggested that government of India should take reasonable security steps especially when inappropriate access can harm citizen's privacy and/ or national security.

b. **Secure Communications:** For delivery of certain citizen services multiple channels may be used, for example, for Passport Seva Project channels such as bi-lingual online portal, National Call Centre in 17 languages, Email based helpdesk, Mobile App, SMS Alert Facebook and Twitter are in use. Security traditionally relies on encryption via a separation principle in a layered architecture.

#### **Threat Management:**

- a. **Profiling:** Psychological research advocates that the behaviour and preference of a person can be explained to a great extent by psychological constructs called personality traits, which could then possibly indicate the likelihood of an individual being a potential insider threat. By considering how browsing content relates to psychological constructs (such as OCEAN Openness to Experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism), and how an individual's browsing behaviour deviates over time, potential insider-threats could be uncovered before significant damage is caused<sup>34</sup>.
- b. **Protect:** This function supports the ability to limit or contain the impact of the potential cyber security event. It includes protective technologies and controls identified after assessing the risks under risk based security
- c. **Detect:** This function enables the timely discovery of the cyber security events. It includes Anomalies and Events, Security Continuous Monitoring and Detection Processes. Focus should be laid on shortening the time for detection and remediation.
- d. **Response:** This function supports the ability to contain the impact of potential cyber security event. It includes capabilities such as Incident Response Planning, Communications, Analysis, Mitigation and Improvements<sup>35</sup>.

**Building Resilience:** In this digital age where resiliency and uptime are paramount to the citizen service operations, attacks that are disruptive enough are on the rise. Criminals have added DDoS as-a-service to the menu of illegal enterprises<sup>36</sup>. DDoS mitigation and DNS availability in the Resiliency Plan. It includes specific design tenants such as Risk based decisions, Across Data Flows and People centric Security.

<sup>33</sup> Y. Nugraha, I. Brown, and A.S. Sastrosubroto. An adaptive wideband delphi method to study state cyber-defence requirements. Emerging Topics in Computing, IEEE Transactions on, PP(99):1–1, 2015

<sup>34</sup> Alahmadi B, Legg P, Nurse J, "Using Internet Activity Profiling for Insider Threat Detection"

<sup>35</sup> NIST Framework for improving Critical Infrastructure Cyber Security, Feb 2014

<sup>36</sup> https://www.verisign.com/assets/white-paper-resiliency-strategy.pdf

Diagram below depicts the framework constructed from the analysis and inputs discussed above.



Figure 10: Cyber Security Framework: Citizen Centric Services

## Conclusion

Aforementioned sections analyses the determinants of cyber security framework for citizen services. This whitepaper identifies the key considerations, principles and components in addition to baseline security controls as comprehensive framework to deal with the challenges of evolving threat landscape. Cyberspace directly impacts every facet of human existence including economic, social, cultural and political developments and the rate of change is not likely to stop anytime soon. Security and Privacy for e-government services designed to meet the needs of culturally diverse population in terms of education, language and internet experience is a complex task. Robust cyber security framework is required to meet the needs of user identity and privacy preferences; build trust and assurance in services and instill confidence for sharing the personal data. It is essential element to not only increase the adoption of the services but also act as enabler for smart nation. Table below depicts the notional roadmap to implement the suggestions made in this paper:

Areas		Action	ı Plan	Tentative Timeline
Policy ment	Environ-	a.	Study of laws and policies consid- ering all the impacted disciplines such as Trade, Relations and Na- tional Interest	Around 2-3 Years
		b.	Public Consultation for policy en- vironment	
		c.	Appropriate changes to be made	

Table 4:	Implen	<i>ientation</i>	Roadmap
----------	--------	------------------	---------

Citizen Awareness	a.	Create Citizen Awareness Deliv- ery Framework (Less than a year)	Ongoing
	b.	Tailored security messages at dif- ferent interventions of specific services	
	C.	Roll out initiatives to increase the outreach to entire citizen base us- ing services by enrolment of new agencies, mass media campaigns	
Secure Design	a.	Conduct risk assessment for po- tential threats for all citizen ser- vice transactions	Around 2-3 Years
	b.	Deploy context based security controls	
	C.	Security & Privacy certification of citizen services	
	d.	Institutionalize the organisation structure for citizen services e.g.: CISO for services	

## **About DSCI**

Data Security Council of India (DSCI) is a premier industry body on data protection in India, setup by NASSCOM®, committed to making the cyberspace safe, secure and trusted by establishing best practices, standards and initiatives in cyber security and privacy. DSCI brings together national governments and their agencies, industry sectors including IT-BPM, BFSI, Telecom, industry associations, data protection authorities and think tanks for public advocacy, thought leadership, capacity building and outreach initiatives.

To further its objectives, DSCI engages with governments, regulators, industry associations and think tanks on policy matters. To strengthen thought leadership in cyber security and privacy, DSCI develops best practices and frameworks, publishes studies, surveys and papers. It builds capacity in security, privacy and cyber forensics through training and certification program for professionals and law enforcement agencies and engages stakeholders through various outreach initiatives including events, awards, chapters, consultations and membership programs. DSCI also endeavors to increase India's share in the global security product and services market through global trade development initiatives. These aim to strengthen the security and privacy culture in the India.

## **19th National Conference on e-Governance** White Paper on **"Technology enabled Education"**

**Developed by -**



Author:

• Dr. Sandhya Chintala VP NASSCOM; Executive Director IT-ITeS Sector Skills Council NASSCOM



## Contents

1.	Introduction	85
2.	Future Disruptions	86
3.	Workforce of the Future	86
4.	Transforming Skills & Education Impact- Technology	
	in Education	89
5.	'Technology' Transforming Higher Education & Skills Develop	pment
	Leading to an Improved Employability landscape	89
6.	Questionable Perceptions: United States Higher Education System and other Examples	tem 92
7.	Shared Challenges	93
8.	Systemic Transformation: The Role of Technology in the Path to the Future	94
9.	Navigating Culture	95
10.	Scaling Best Practices	96
11.	Conclusion and Recommendations	97





## **Technology in Education**

"Technology Transforming Education, Transforming India"

#### Introduction

Let's crystal gaze into the near future and see how India is positioned in the global context and how 'technology in education' can enable India achieving its potential.

It is imperative to explore the transformative role of technology in education and its direct impact on education per say and how it can facilitate a talent pipeline qualified to address future requirements of lifelong learning and employability. The ability to learn, unlearn and relearn at the pace required can mostly be facilitated by technology which can provide an ecosystem nurturing equity of access, inclusiveness and affordability.

This transformation requires a human resource capable of integrating knowledge, skills and tools across multiple fields to design and develop solutions/products to address present and future engineering design requirements, intersecting across various industry sectors ranging from IT-ITeS, Manufacturing, Telecom, Automotive, Aerospace, Construction and Heavy Engineering, Healthcare, Electronics, BFSI, Tourism, Media and Entertainment etc., and eventually permeate into IOT (Internet of Things).

Technology as a catalyst to innovation in higher education and skills development towards transnational employability in India are important focus areas w.r.t. this 'White Paper'. This 'White Paper' explores future disruptions, global workforce requirements and India's demographic dividend as interlinked forces in exploring the role of 'Technology of Education' in India.

Understanding the global human resource needs of the future, India has restructured itself by enabling policy and strategy leading to the establishment of a systemic process for skill development linked to its existing educational program, and the governance of the same.

The skill development ecosystem in India is operationalized by Sector Skills Councils (SSC) representing industry organizations. SSC's design, develop and assess job standards for national and transnational job/employment requirement for their representative industry sectors. However, to achieve its potential, India needs to address inclusiveness, affordability, equity of access and the development of quality capacity. The use of technology in the present educational system in India is a critical enabler. Increasingly, developing capabilities and competency of both the teacher and the taught is a necessary investment, which has to be continuously addressed both by industry and academia.

IT-ITeS Sector Skills Council NASSCOM (SSC NASSCOM) the skill standard setting body of the IT-BPM Industry which is an integral part of NASSCOM is the education & skill development initiative of NASSCOM; works with its industry members and select academic and skill development institutions to help improve the quality and quantity of the employable workforce available to this industry. SSC NASSCOM explores the role of technology as an enabler and the challenges thereof in the educational ecosystem in India.

#### **Future Disruptions**

Massive multiple disruptions predicted in the next 10 years, is driven by humungous urbanization, technology, an aging global population and connectivity. There will be more than a trillion objects connected to the internet by 2025. These disruptions will dictate the way we live, learn and work and redefine new age entrepreneurs and jobs thereof.

In the present context it is inevitable that India will experience massive technology disruptions and the demographic dividend. However the way the two can be linked to advantage India will depend on four key pillars related to the design of i) a country specific systemic education & skills architecture, ii) governance policy w.r.t. the same ii) quality in implementation of procedures espoused and finally iv) a responsive change management system/s. This will lead to an effective human resource/ talent pool where both formal and non-formal systems of education will be able to contribute equitably.

Here are some technologies on the horizon that are poised to change our life. It is a definitive that the next 10 years will be an era of unprecedented connectivity. It will build upon the social networks, both real and virtual, some of which are indicated below.

<u>Light Peak</u> technology, a method of super-high-data-transfer, will enable more than 100 Gigabytes per second and <u>eventually whole terabytes per second</u> within everyday consumer electronics. This enables the copying of entire hard drives in a matter of seconds, although by this time the standard hard drive is probably well over 2TB.

<u>Web 3.0</u>, while Web 1.0 was based only upon hyperlinks, and Web 2.0 is based on the social, person-to-person sharing of links, then Web 3.0 uses a combination of socially-sourced information, curated by a highly refined, personalizable algorithm called the Semantic Web.

<u>4G will be the new standard</u> in cell phone networks. What this means is that mobile phones will be able to download data about as fast as our home computer can, which will essentially bring broadband-level speeds to wireless devices on cell networks. It won't do away with standard internet providers, but it will bring "worldwide WiFi" capabilities to anyone with a 4G data plan.

<u>Ultrabooks</u>: The last two years have been all about the tablet laptops, with their "untouchable" screens, but shortly we will have ultraportable notebooks.' Ultrabooks', bringing a complete computing experience into areas of life which, until now, have only been partially filled by smaller technologies such as tablets and smartphones. These lightweight devices with flash-based hard drives will deliver zippy-quick startup and download times.

#### Workforce of the Future

In the next 20 years the workforce in the industrialized world is expected to decline by 4%, while in India it will increase by 32%. This is rationalized by the fact that in India because of its demographic dividend the estimated average age in India by 2020 will be 29 as against 46, 40 and 47 in Europe USA and Japan.

However the global workforce demand will continue to increase but will call for evolved skill sets relevant to the ever increasing technological disruptions of the future. India if aptly educated and skilled can be the global HR warehouse for the globe.

In view of this the Prime Minister of India desires of making India the "Global Human Resource Capital" – wherein the skilled Indian labor workforce could not only meet Indian needs but also fill-in the global shortfall.

The rising size of the global workforce presents an opportunity to drive economic expansion and increase gross domestic product (GDP), but it also presents many challenges, according to new research by the Worldwatch Institute for Vital Signs Online. About two-thirds of the world's population, or 4.6 billion people in total (as in 2011), are of working age, the highest share in the last 60 years. The United Nations projects that the potential labor force will continue to grow through the second half of the century.

"This development will have important implications for the world economy," said Elizabeth Leahy Madsen, an independent consultant who conducted the research for Worldwatch. "Many developing countries will face the challenge of expanding their labor markets to provide jobs for a growing workforce. Meanwhile, industrialized countries will face important policy decisions about productivity in an aging workforce and about their openness to migration."

To appropriate the requisite transformation in India, to meet the global demand, much will depend on the use of technology in education for increased outreach, addressing equity of access and quality of customized content.

In this context, to be gainfully employed, the Indian workforce needs certain critical skillsets. Communication skills, critical thinking, analytical ability, team work, decision making and an ability to collaborate across a cocktail of multiple media continue to be essential for the future. However ten new key skills sets are identified below:

#### 1. Ability to build virtual worlds

Virtual reality is moving from entertainment to everyday life, including classrooms, like Khan Academy, where millions of children connect and learn every day. These virtual worlds will expand beyond the realm of entertainment to become extensions of the workplace environment and people will have to know how to move through them, manipulate them and create them.

#### 2. Ability to think holistically

Resources will be limited and more will have to be done with less. We believe that resource limitations create brutal competition, but in reality successful competitors are often collaborators who can see a greater value in a collective enterprise effort.

Already, companies like Patagonia and Zappos are asking their employees to focus on more than just the bottom line and are reaping benefits from it.

#### 3. Mental and physical change management to respond to challenges

Adaptation is a must, and as a species we must become as flexible as our devices. The future workforce must expand their minds to envision what can be done when technology and nature are no longer separate and whole new categories of diversity become commonplace.

#### 4. Ability to convert information into matter and vice versa

Many people will become makers, creating prototypes on demand for all sorts of products. Today, anyone can build things that only factories could produce, using their personal computer and a 3D printer that fits on their desk.

## 5. Ability to work without direct leadership in temporary organizations that will act independently

The ability to build quick relationships is a must as well as the ability to manage oneself with little external input. Analytical and critical thinking combined with decision making will no longer be the prerogative of leadership and must be activated by smaller tight groups within the larger enterprise.

#### 6. Adapt to lack of long-term secure employment

Most service industries will have shed much of their workforce to automation, so many low skilled employees will find work in collectivized companies, which will fulfill niches that large multinational corporations will miss or ignore. Right now, the 7th largest firm in the U.S. is an employee owned company, Publix. In such situations, everyone, from the dishwasher to the chief executive, will need a good business sense. This is lead to employee-owned and -operated companies.

#### 7. Many future skills will relate to mind-machine interfaces

Humans will have to become part machine themselves if they are to compete with machines in any meaningful way. This way, humans are not in competition with machines, but working in concert with them. Already, contact lenses that can take pictures exist.

#### 8. Data analyst's skills

Will trillions of bite of data that are available it takes a trained mind to parse out which information is relevant. Even now, a simple internet search can turn up millions of links that one must analyze for relevance and need.

#### 9. Communication and narrative skills

The ability to tell a good story will be valued over spreadsheets, graphs, and data points. Data is fine, but people will still need to be convinced that a particular course of action is worth time and resources, and this is where the skills and abilities of a telling the data driven proof in a narrative way will become an important technique.

#### 10. Expertise in multiple software, platforms, and services

Specialists, will continue to fulfill important niches, but considering the speed of change, no one platform can be expected to dominate a field forever. The biggest foundation skill the new workforce will need, is the ability to develop a working knowledge of new systems in very short time frame, either to fulfill the expectations of their job, or the ability to work with the specialists who will be able to do the needful.

Interestingly, while India will have the youngest employable population in the world by 2020, multiple surveys finds that as flexibility and ease of work goes up, the average retirement age will also increase. This will result in the workforce of the future being multi-generational and more diverse (age-wise) than ever before. It is essential to build a

workforce that acknowledges, respects and appreciates colleagues for their contribution, rather than their age. The Indian workforce of the future is willing to re-train to remain relevant, indicating adaptability. The implicit acknowledgement that change is inevitable, and can be an opportunity rather than a threat is a significant step in the evolution of the workforce.

A vast majority of the Indian employable population feels that technology will improve their prospects for the future. This will enable them to embrace the new and leverage technological advances at the workplace. They also recognize the role of rapid urbanization, resource scarcity and climate change in the future of work.

#### **Transforming Skills & Education Impact- Technology in Education**

The focus of this paper is to explore how technology can be leveraged as a platform and an enabler addressing the following areas of inclusiveness, affordability and increased efficiencies in the education& skill development sector. Overall, the aim is to recognize the scope and role of technology in enabling lifelong learning and the employability of the human resource thereof.

At the start of the century, Ray Kurzweil, Futurist and Chief Engineer at Google predicted that "20,000 years of evolution would be crammed into the next 100." Thus far, he appears to have been right; and if anything, change appears to be accelerating at an even quicker pace. When it comes to the way we work, tremendous forces are radically reshaping the world of work as we know it.

PwC has identified five global megatrends that underpin the business landscape of today and will impact the future of work. As a result, businesses are adapting to volatility and uncertainty as a way of life. The best way for organisations to compete in this future is to understand it and prepare for it adequately.

For all India's prowess in IT, large parts of its economy have yet to benefit from new technologies. That is about to change. New research by the McKinsey Global Institute (MGI) claims to have analyzed twelve technologies, ranging from the mobile Internet to cloud computing to advanced genomics that could have a profound impact on growth and social progress and add \$550 billion to a trillion dollars a year of economic value in India by 2025.

MGI assessed more than 100 technologies that are advancing rapidly around the world and identified twelve that are likely to have the most impact on addressing India's challenges. The new report, India's technology opportunity: Transforming work, empowering people groups the 12 technologies into three areas:

- **Technologies that digitize life and work:** the mobile Internet, the cloud, the automation of knowledge work, digital payments, and verifiable digital identity.
- **Smart physical systems:** the Internet of Things, intelligent transportation and distribution systems, advanced geographic information systems (GIS), and next-generation genomics.
- **Technologies for rethinking energy:** unconventional oil and gas (horizontal drilling and hydraulic fracturing), renewable energy, and advanced energy storage.

Used together, these technologies could account for 20-30 percent of India's GDP growth between 2012 and 2025 and help millions achieve a better quality of life, according to the report.

"The spread of digital technologies, as well as advances in energy and genomics, can be one of the most dominant drivers of productivity in India, redefine how basic services are delivered, and contribute to higher living standards for millions of Indians by raising education levels and improving healthcare outcomes," says Noshir Kaka, Managing Director of McKinsey & Company in India.

#### **Education and skills**

Technology can transform education. School performance can be improved through e-administration, digital identity-based attendance systems, and online teacher certification and training. Blended learning with MOOCs (massive open online courses) can bring high-quality courses to students, and learning simulations can boost hands-on training in nursing and other disciplines. MGI estimates an economic impact of \$60 billion to \$90 billion per year by 2025 from the higher productivity of more highly educated workers. India could have about 24 million more high school- and college-educated workers and 18 million to 33 million more vocationally trained workers by 2025 due to use of digital technologies in the education sector.

## **'Technology' Transforming Higher Education & Skills Development Leading to an Improved Employability landscape**

Across the nation colleges and universities are being challenged to transform their systems of higher learning. While each institution is different, they share common problems:

- They must contend with outdated teaching methods, crushing budget pressures, and the need to deliver a relevant education that adequately and effectively prepares the workforce of the future.
- As a result, educators are being faced with the need to make significant revisions to less-than-optimal systems, in an environment that is dictating that change needs to be made.
- Institutions that adapt to these imperatives will thrive, while those that are incapable of change will meet their demise.

While change is difficult, it is also inevitable. It is the only constant in a world that is experiencing exponential population growth, a limited supply of natural resources to meet demand, and accelerating technological innovation. Higher education institutions are central in preparing students to address these challenges and in solving some of the most difficult problems we as a global society have ever faced.

## It is therefore critical to examine:

- Where change is happening successfully?
- What is working and what is not?
- How to scale improvement nationally and globally?

- Understand the role of technology as an enabler.
- Have a systemic change management system in place, to address the constant disruption brought forth by technology.

The need to change is a powerful catalyst that often drives innovative approaches to problem solving. Jeff Bezos, founder and CEO of Amazon, has said, "I think frugality drives innovation, just like other constraints do. One of the only ways to get out of a tight box is to invent your way out."

Along with many other sectors in our society, cash strapped universities in the India like in other countries are being forced to "innovate themselves" out of some very tight corners. We need to understand how the most innovative institutions are using technology to transform teaching and learning, improve administrative management, and drive research initiatives.

## **Case Study:**

## General

The formal education system does not allow students who drop out of the formal education to continue and complete their graduation in future. Thereby a large number of students miss out the opportunity to earn a formal degree. Moreover students in the formal education lack practice and hands-on experience which the industry requires. This results in employability issues among students. To address the above gaps and facilitate industry oriented educations, Bachelor of Vocational (BVoc) has been evangelized by UGC & AICTE.

## **Bachelor of Vocation (BVoc):**

BVoc will be developed as a specialized undergraduate bachelor's degree that will qualify the graduate as a vocational degree holder. BVoc will be a 3 years' vocation education program (~1000 hrs of training per year) that will be offered in following industry sectors by AICTE & UGC.

- 1. IT- ITES
- 2. Telecommunication
- 3. Media & Entertainment
- 4. Hospitality
- 5. Banking Finance, retail & Insurance
- 6. Infrastructure
- 7. Automotive
- 8. Agriculture
- 9. Paramedical
- 10. Construction
- 11. Printing and publishing,
- 12. Applied arts and many other new and emerging sectors

Students graduating from BVoc will have hand on experience in the stream they choose, and have flexibility to join main stream education after completing BVoc.

- Courseware for BVoc ERD & ITS would be first developed and run as a pilot program
- BVoc ERD & ITS to also be a 4 year program so that capable of being used between any 4 year Engg Stream and the suitable credit allocation be feasible
- Regular Engg. Program's Year I, II& III to also address ITS & ERD industry outcomes, as articulated in EPP (Engineering Proficiency Program) and FSIT (Foundation Skills in IT).
- BVoc Year III and Year IV to offer Qualification Packs /Job Roles & specialization as electives so that the individual who passes the 4 year program is job ready.
- BVoc BPM is planned to be a 3-year program.

#### **Specific I -SSC NASSCOM Initiative:**

14 Universities and colleges across Andhra Pradesh and Telangana have signed up for integrating job roles /Qualification Packs training along with their regular academic degree programs. Each Qualification Pack /job role training which is about a 400 hours is implemented via a 50 hour theory and practical package of face to face sessions and the rest are via online collaborations, e-content dissemination, interactive online practical simulations and used cases. Assessments for these QPs, validating competency in the QP/job role is via online assessments with high end simulations and gamming principles, conducted by SSC NASSCOM on the lines on GRE and GMAT.

#### **Specific II- SSC NASSCOM Initiative:**

Anna University has adopted the FSIPD (Foundation Skills in Integrated Product Development) program across 600 colleges. The faculty development (ToT program.) for about 2000 faculty is facilitated via a blended process using both online and offline methods for pedagogy and domain training.

# Questionable Perceptions: United States Higher Education System and other Examples

Researchers at the University of Melbourne's Institute of Applied Economic and Social Research examined data from 48 countries and territories across different measures. Their findings stated that overall, the top-five countries nominally providing the 'best' higher education were the United States, Sweden, Canada, Finland and Denmark...unsurprisingly, The United States dominates the total output of research journal articles, but when viewed as a percentage of articles per head of population, Sweden is top of the ranking." (U21 Rankings of National Higher Education Systems 2012)

What many steeped in the system may not know is that higher education in the United States is struggling under the pressures of demands that can't be met, soaring costs, decreasing

budgets, and a product traditional education leading to a lack of student engagement in the curriculum.

Likewise our system in India is literally teetering on the edge of implosion. There will always be a place for well-known university brands, but smaller liberal colleges literally may not survive, and state systems have no choice but to change.

In India the price of college tuition has increased more than any other major good or service for the last 20 years. In many ways, our higher education system, while great, suffers from Clayton Christensen's phenomena, described in The Innovators' Dilemma: It simply cannot change from within its existing constructs. Some of the most promising advances are coming from outside of the traditional, existing system, with movements such as the Open Education Resources Movement, Massive Open Online Courses, and the edX joint venture. Interestingly, these movements are all being enabled and driven by the creative use and application of technology.

### **Case Study:**

<u>Specific III: SSC NASSCOM</u> in collaboration IIT Madras and the 6 other original IITs has launched MOOCS (Massive online Open Courseware) covering subjects like ,Algorithms, Data Structures, OOPS etc.

#### **Shared Challenges**

Universities in India and across the globe share similar challenges: inadequate access, dated teaching methodologies, and perceived irrelevance of our current programs.

- First, we have a problem of access: We simply do not have enough capacity to meet demand.
- Second, yesterday's teaching methods aren't consistently effective for students today and tomorrow. In a world that is increasingly digital and connected, many students have a low level of engagement in traditional educational settings. Most university instruction hasn't changed much; globally, professors are mostly educating students as we did hundreds of years ago.
- Approaches to changing higher education requirement to meet workforce requirements are causing a new pressures. At the same time, new, massive open online courses (MOOCs) are showing that different approaches really can work. This is forcing colleges and universities to examine closely the current mode of traditional lecture courses.
- Third, there is a perception that higher education is increasingly irrelevant. We are facing a highly complex global economic environment that forces our institutions of higher learning to turn out graduates who can make our countries more economically and socially competitive. We have to adapt quickly to place our students in positions demanded by companies that comprise the network of our economies. This requires speed, agility, an understanding of key market transitions,

and the direction that our companies are taking.

NASSCOM member share this interest in obtaining employees who can contribute to a competitive, creative, and effective workforce by being job ready

However we at NASSCOM believe that by thoughtfully applying technology and by sharing what's working well, we can help to more effectively address these shared challenges and transform higher education systems in India and globally.

"To capture the full potential value of these technologies, India will need to address both supply-side barriers such as limited broadband infrastructure and demand-side barriers such as a lack of computer literacy and market fragmentation due to multiple languages" says Pradeep Parameswaran, a partner of McKinsey & Company.

#### Systemic Transformation: The Role of Technology in the Path to the Future

It is observed that higher education institutions in India, those who are implementing change well, are laser-focused on three critical areas:

- The ability to address questions of culture, to modernize teaching and learning, and to scale and propagate change across multiple, often divided, silos within their institutions. Also, these institutions are using technology to manage each area more effectively.
- Technology plays a critical role within each of these sectors, and if used wisely and artfully, can help to accelerate innovation and change.
- For institutions to change as quickly as they need to, they need a solid core infrastructure, wired and wireless networks that enable ubiquitous connectivity, collaboration tools that provide seamless and robust communications, and new social collaboration platforms that support and extend the interaction of multiple communities, and ultimately, create a federated higher education society.

However to address these problems a federal systemic process has been instituted in India. under the new Ministry of Skills Development and Entrepreneurship. Sector Skills Councils representing their industry sectors are skills standard setting and assessment bodies under the aegis of National Skill Development Corporation a non-profit company, registered under the Companies Act, 1956.

NSDC is established as a public private partnership with the object of developing unskilled and semi-skilled labour force into productive and skilled labour and to establish, manage, run and support institutes and polytechnics for achieving this objective. The primary activity of NSDC is to utilize and manage the funds transferred to it by National Skill Development Fund ("NSDF"). These funds are invested by NSDC into various skill developments projects for achieving India's skills development objectives.



## Navigating Culture

In India universities must have a clear vision of the future and what they need to do to deliver solid academic experiences. In fact, a number of institutions have lengthy strategic plans, defined goals and objectives, and clear tactics. But more often than not, these plans fall short because they do not take the institution's culture nor that of industries into account.

Shawn Parr, in his Fast Company article "Culture Eats Strategy for Lunch," says, "Culture is the environment in which your strategy and your brand thrives or dies a slow death." (Parr, Fast Company) This could not be truer anywhere than in higher education. Like companies, colleges and universities have their own unique (and very powerful) cultures that limit their ability to change.

It is found that the single most important component in helping higher education institutions to navigate often complex cultures is in getting the right people to the table when discussing and designing change. Ensuring that all key stakeholders have a part in planning and execution reduces the effect of silos, and increases the likelihood that change will be embraced.

However, while it is one thing to have the right stakeholders at the table, it's another thing entirely to provide them with the ability to communicate and collaborate in the most effective ways possible to support their change of goals and objectives.

Technology is a critical enabler in this area and can facilitate collaboration between faculty, staff, students, and the larger community. Increasing their ability to collaborate has helped university administrators and faculty to streamline processes, engage students, and increase access to learning opportunities.

#### Modernizing Teaching and Learning

Higher education leaders know that in addition to addressing their culture, they also need to modernize teaching and learning. The most innovative educators are using new technologies to do this. Rather than implementing technology for technology's sake, these educators are closely examining their current curriculum and instruction methods, and thoughtfully implementing technology where it makes the most sense and can have the greatest impact.

Students are very comfortable using a variety of technologies, and our higher education customers are finding that a technology-infused curriculum increases student engagement, because it easily adapts to students' individual learning styles.

New, "flipped" learning models provide students with lecture content that they can review in advance of class, so they can be fully prepared to engage in discussion when they arrive in class. Instead of listening to a professor deliver static lectures, students can be prepared to have a challenging, interactive discussion that drives critical thinking skills and forces participation in a dialogue.

Using pervasive video technologies to give students with a media-rich learning experience that engages them in their courses, and provides them with anywhere, anytime, any-device access to lectures, course materials, and other learning resources.

#### **Scaling Best Practices**

We need outstanding examples of long term change, and understand the difference between one-time interventions that tend to be unsustainable. We've seen a number of video implementations in India (NPTEL for example) that have gone nowhere because they were not part of a larger strategy or plan, and training and culture that were never addressed.

Across the country, outdated, disconnected audio - video equipment lays scattered in classrooms, lecture halls, and IT departments. How can we ensure that these improvements can intrinsically change our higher education system in India, and across the globe?

We strongly believe that technology can help in this area as well. The idea is to provide content LAN. WAN based that is easier to use than other systems, and provides a high-quality, immersive experience that rivals live interaction in the classroom.

- Provide a National Research and Education Network, to connect with universities and other higher education institutions to deliver joint classes. With just one teacher provide telepresence, instruction that can be delivered to students at multiple colleges simultaneously.
- Use telepresence to create a virtual lecture hall, and expand the reach of such programs beyond India, thereby increasing access and generating new revenue streams.
- Colleges and students can access professors, guest lecturers, and business leaders from around the world. In this way, Duke University (USA) is extending the inperson classroom environment across multiple campuses and into the business world.

- Enterprise collaboration platforms that combines the power of social networking, content creation, and real-time communications and collaboration can also be used providing faculty, staff, and students with a single, unified platform to access learning management systems, student information systems, and other applications for academics, extracurricular activities, and career information.
- Such platforms have the power to drive the sustainable change required by higher education systems across the world. Such platforms can also be coupled with tools for voice and video collaboration. As a result, the traditional experience can evolve into dynamic, group-based learning that often takes place outside of the traditional classroom setting.

Using technology as indicated above, it will enable higher education systems worldwide to connect and collaborate, and share best practices, course content, resources, and more, helping drive the scale required to transform the entire system. We believe that such technologies are effective agents for change, and will revolutionize the way in which higher education institutions deliver the business of education. The power of technology extended to developing e-content that can be customized to multiple learning styles, using the principle of blending learning is found to be highly efficient. All of the above with the requisite connectivity and bandwidth will facilitate the required inclusiveness, and make quality education and skills development affordable.

#### **Conclusion and Recommendations**

Educators share a common crisis in the delivery of higher learning. They suffer many of the same challenges, with regard to access to quality education experiences, the need to replace outdated teaching methodologies, and the imperative to prepare students to become part of the workforce of the future.

The global higher education community would do well to share a common approach in helping to transform its systems, using technology to modernize teaching and learning so that learners are fully prepared for next generation careers.

Support research for next-generation information and communications technology is critical. Research that will foster the next wave of innovation in information and communications technologies, such as "cognitive radio" that allows for the efficient sharing of spectrum, quantum computing, efficient programming of parallel computers, cyber-physical systems, secure computers and networks, data-intensive supercomputers, and Nano-electronics that enables the continuation of Moore's Law for decades to come is important.

(Moor's Law: The number of transistors in a dense integrated circuit doubles every two years)

#### SSC NASSCOM recommends the following:

1. Identify best practices that are working in colleges and universities across the world where technology is used leading the innovation within HE. Learn what others are doing that is working, and identify the technologies and approaches they are using that will resonate with and meet the needs of faculty, staff, and students in Indian colleges.

- 2. Identify those Universities and colleges in India who can help to develop a different kind of culture within their institutions.
- 3. Post these practices in a social collaboration portal, and invite members to join. Create a dialogue for change within this online medium. Meet regularly over video to share ideas, discuss what works, and find ways to improve learning.
- 4. Expand the list of educational partners, with SSC NASSCOM and make use of this community to help build out our vision and strategy. Consider technology vendors, nonprofit organizations, and other institutions that can help us to execute our strategy.
- 5. Experience today's video and collaboration technologies to see for oneself how much easier they are to use, and to get a sense of how their reach and impact can help one deliver one's university's mission.
- 6. Consider how one will scale our transformation across our system and between systems.

Pioneer a cost-conscious, scalable alternative; online platforms like iTunes U, TED and eduFire now enable everyone to enjoy the best lectures worldwide free of charge.

7. While change can be daunting, the need to change can be an important catalyst for innovation. Many college and university systems are strapped for financial resources. But those organizations that identify and drive innovation from within can often operate on a drastically reduced budget.

Steve Jobs said, "Innovation has nothing to do with how many R&D dollars you have. When Apple came up with the Mac, IBM was spending at least 100 times more on R & D. It's not about money. It's about the people you have, how you're led, and how much you get it."

- 8. The same applies to educational transformation: Innovation comes from within, and technology is a critical enabler to help accelerate change.
- 9. Systemic innovation has to be deliberately cultivated as this is the need of the hour; more deliberate innovation to cultivate a more diverse HE landscape is better suited to the complex needs of modern society.
- 10. There are three challenges to achieving scale:
  - First, constraints on the resources of education providers, such as finding qualified faculty and investing in expansion;
  - Second, insufficient opportunities to provide youth with hands-on learning;
  - The hesitancy of employers to invest in training unless it involves specialized skills.

#### There are solutions for each as indicated below:

In the first instance, coupling technology—the Internet and other low-cost outlets—and a highly standardized curriculum can help to supplement faculty and spread consistent instruction at a modest cost.

For the second challenge, apprenticeships traditionally have provided hands-on experience, but there are not enough spaces to meet demand. Technology, in the form of "serious games" and other kinds of simulations, can help here, too, by offering tailored, detailed, practical experience to large numbers at a comparatively low cost. Serious-game simulation could become the apprenticeship of the 21st century. In a sense, the future of hands-on learning may well be hands-off.

With reference to the third, employers often are willing to invest only in those specialized skills whose value they can fully capture; they do not want to spend money on employees who might take their expertise elsewhere.

For education providers, it is expensive to develop solutions for every employer. One proven approach is to combine customization and scale by offering a standard core curriculum complemented by employer-specific top ups.

IT-ITeS Sector Skills Council NASSCOM has provided the above recommended requirements w.r.t. clarity of skills (Core skills, Professional Skills and Technical Skills) in 74 Entry Level job roles across 48 occupations in 4 industry sub-sectors, ITS, BPM, ERD, & SPD. Career paths are clearly articulated for each occupation (Entry, Middle & Leadership roles) for horizontal and vertical mobility, where QP certified individuals can use their certificates as currency for global mobility. In consideration of the above colleges and companies are working closely to design and develop highly standardized courseware in areas of great demand.

As of today, there is a paradigm shift occurring in the IT-BPM sector that is pushing educational institutions both formal and non – formal, towards making education and skills development more student-centric. A key development in this area is the emergence of ondemand model of education whose foundation rests on offering more choices to students. These choices range from curriculum, mode of teaching and delivery and pace of learning. This is an area where technology is already playing a significant role at the global level.

The advent of newer technologies is a clear pointer to these institutional priorities with IT being seen not just as an enabler but as a standalone priority that presents a defined competitive advantage which cannot be side-lined.