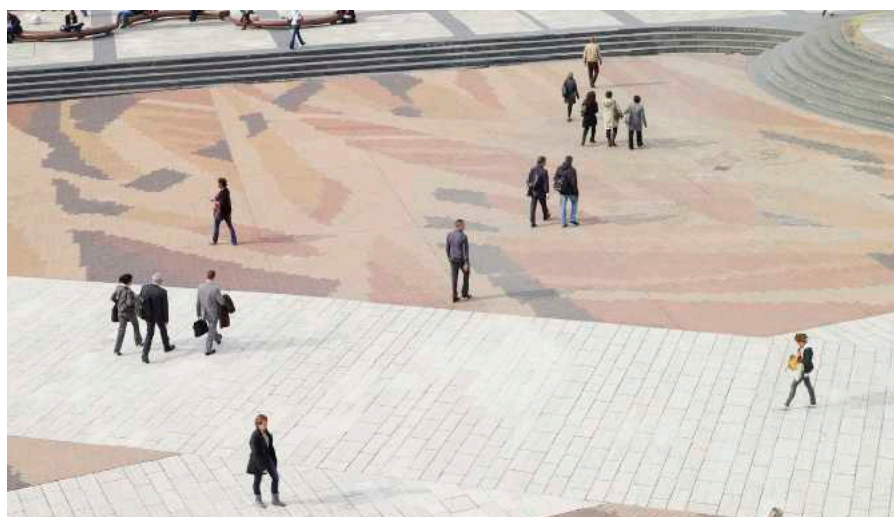




Smart governance and technology



www.pwc.in



Debdas Sen
Partner and
Technology
Consulting
Leader

It gives me immense pleasure to present the first edition of the 'Smart governance and technology' publication from the desks of our government technology consultants. The government technology practice in PwC India constantly strives at creating a unique value proposition for the government sector by marrying our technology implementation capabilities with our understanding of how governments operate. This publication is our attempt to delineate the importance of technology in any and every step taken towards achieving good governance in the public sector. I am optimistic that in the coming years, this publication will garner greater participation, include more technology disciplines and become a benchmark within the PwC network.

Our government technology practice has been working closely with the state and central governments of India and those of neighbouring countries over the last decade. We have been fortunate in partnering with various state governments in India in pioneering ICT initiatives in the country aimed at delivering on 'the citizen promise'. In countries such as Nepal, Bhutan and Sri Lanka, our association with the governments has started with virtually the birth of e-governance in the respective nations. Through this publication, we have tried to showcase our experience of working with these government bodies, in a bid to demystify the latest technology trends and initiatives being adopted in governments across countries. We have also incorporated few perspectives from decision makers among our public sector clients across varying geographies to foster a better understanding of the adoption of these trends and the values they bring to the table. We sincerely hope that this publication will aid you in conducting insightful discussions with your clients.



Pradip Bhowmick
Partner and Government
Technology Leader



Arunava Mitra
Managing
Consultant and
Government
Technology CoE
Leader

Within the technology consulting practice of PwC India, we endeavour to assist local governments in South Asia to adapt to the ever-changing technology trends, which are revolutionising the channels through which governments across nations interact with their citizens and businesses. Our association with the public sector, which had commenced a couple of decades back as strategy and policy level advisors, has been augmented manifold over the years by our technology implementation skills. Today, we are trusted advisors to governments at different levels, starting from the central governments of India, Nepal and Bhutan, the Indian state governments of West Bengal, Assam, Arunachal Pradesh, Maharashtra, Chhattisgarh, etc. local governments as well as bodies such as the Kolkata Municipal Corporation (managing the municipal affairs of a population exceeding six million) and the Kolkata Urban Services For the Poor (governing all the non-municipal urban local bodies of the state with assistance from the Department for International Development), in implementing and managing complex technology solutions for automating core business processes and creating unique values. The expertise in providing technology solutions for resolving multifarious government issues, accumulated from this longstanding association, has equipped our Technology Centre of Excellence to assist our colleagues within the network in executing similar transformational engagements in territories such as Jamaica, Sri Lanka, Australia and so on. This publication elucidates our points of view on technology-driven government transformation gathered from our experience of partnering with the public sector in its transformational journey towards 'building a smart government'.

A woman with long dark hair, wearing a black blazer over a grey top and a pearl necklace, is looking down at her smartphone. She is standing on a train platform, with a train visible in the background. The train has a white body with orange and yellow stripes. The woman is carrying a black handbag with gold-colored hardware.

Technology

A key pillar of national governance

PwC India has been the implementation partner of the Royal Government of Bhutan (RGoB) since the last two years, automating more than 100 government as well as citizen services across eight ministries of the RGoB. Phuntsho Tobgay, Director, Department of Information Technology and Telecom, RGoB shares his perspective on the pivotal role of technology in Bhutan's overall governance, with Sayan Basu, senior consultant from PwC India's technology consulting team



Phuntsho Tobgay
Director, Department of
Information Technology
and Telecom, Royal
Government of Bhutan

PwC: Since decades, Bhutan has been the prime advocate of monitoring the gross national happiness (GNH) index in the context of good governance. What has been the impact of technology in improving the GNH index of the country?

Tobgay: Education and health are two overarching pillars which the GNH index of the RGoB lay significant emphasis. Consequently, the ICT policies of the government have also been aligned along these two verticals. Bhutan has drawn inspiration from ICT practices and governance models followed in the Scandinavian countries, which also manifest a high national happiness index. The first IT park of the country has been constructed with the target of creating 1,000 plus employment opportunities within Bhutan. This park has been erected with the holistic objective of creating an ecosystem of entrepreneurship within Bhutan. It is steadily becoming a site for garnering new ideas as well as encouraging innovation among the youth in the country. Recent statistics reveal that out of the entire population trained in IT and IT-enabled services, 60% are retained within the IT industry, while the remaining 40% seek employment opportunities in diverse industries such as hospitality, tourism, civil sector, etc. This demonstrates the contribution of IT in improving citizen employability and the alignment of IT with the GNH principle of increasing citizen satisfaction.

Another important pillar of the GNH index is strengthening community vitality. Community centres that have primarily been set-up across the country with the objective of delivering government to citizen services to the citizens in an efficient manner, also have in place, learning facilities for imparting diverse skills among these citizens. These learning facilities provide an interactive platform for a huge population of citizens, and are therefore increasing community fraternity.

PwC India: Kindly elaborate on the technological initiatives that have been undertaken in Bhutan in recent times.

Tobgay: As elaborated in the 10th Five Year Plan of Bhutan, the primary focus of the government has been ICT infrastructure development in order to facilitate an effective dissemination of G2C services. Among the flagship technology initiatives undertaken by the government in the recent past, the establishment of the National Fibre Optic Network connecting the 20 *Dzongkhags* (districts) of the country deserves special mention. Community centres have been established in each of the 205 *Gewogs* (blocks) for increasing citizen access to such services. The National IT Park has been constructed in Thimphu in order to house a shared Technology Centre and Data Centre along with a Centre of Incubation for nurturing new ideas as well as promoting innovation.

From a policy perspective, the government has recently completed the formulation of the National e-Governance Master Plan and design of the e-Government Interoperability standards, and the ICT Management Framework. Four centralised data hubs will be created for consolidating nationwide information on citizenship, land ownership, businesses and vehicles. The e-Governance council, comprising the committee of secretaries and e-Governance review committees, consisting of nominated representatives from the Gross National Happiness Commission, the Department of Finance, etc. have been set-up in order to monitor and review all ongoing ICT initiatives of the country.

In the area of capacity development, the government has already undertaken its ambitious 'Chipen Rigpel' project which has a set-up of around 168 ICT labs across different schools in the country, and has already trained around 5,000 people on basic IT enablement curriculums.

PwC India: What are the roadblocks that the government has encountered during the implementation of such initiatives? What are the corrective measures being adopted in order to counter such challenges?

Tobgay: In the context of public service delivery within Bhutan, areas such as communication and transport have traditionally posed challenges. Bhutan is a country with a rugged mountainous terrain and hence, connectivity with remote locations has always been difficult. In order to ensure proliferation of G2C services across the nation, the government has been laying special emphasis on telecommunication network infrastructure. The recently undertaken National Broadband Master Plan project coupled with the Thimphu Wide Area Network implementation has significantly contributed towards mitigating the challenges pertaining to connectivity. In order to minimise over dependency on commercial telecom operators, the government has made direct investments in nationalising the Fibre Optic Network.

Another roadblock in the context of successful G2C service delivery was the lack of citizen awareness and confidence in accessing online G2C services. Towards this, the government has undertaken several citizen awareness as well as capacity development initiatives which have eventually ensured an exponential increase in citizen awareness and acceptance. The department of Information Technology and Telecom is currently planning to engage with the Bhutan ICT and Training Association in an attempt to explore other avenues of increasing citizen engagement.

PwC India: Emerging technologies such as cloud computing, mobility, software as service, etc. are redefining conventional technology channels. What is your take on the same, and how is Bhutan poised to embrace such technologies in the coming future?

Tobgay: With the completion of the National Data Centre in the Thimphu Tech Park, Bhutan will be in a perfect position to explore the potential of emerging technologies. Cloud computing is of foremost priority in the upcoming ICT plans of the government. Erection of a government cloud will undoubtedly help in the consolidation of IT assets as well as lowering the total costs of ownership.

We derived following themes as important agendas of the e-Governance mission for a smart government.

Getting it right at the first time

Architecture in the right direction
FOSS vs COTS
QA modelling

Enhancing efficiency in operations

Digital secretariat: Strategising adoption

Inclusive growth

Harvesting technology for the Indian farmer

Getting it right at the
first time

e-Government: Architecture in the right direction



Why is architecture important in e-Government transformation?

Governments, both state and central, seek to support growth and improve competitiveness, and strengthen their performance within the global economy through improved governance, sector modernisation, and enhanced regional integration. Lack of proper architectures, interoperability frameworks and e-Government standards may be deterrents to achieving harmonised enterprise architectures, interoperability frameworks and an e-Government standard framework across systems as well as services provided by ministerial departments and agencies to other governmental departments and the citizens.

The objective of various governments has always been to promote the efficiency, quality, and transparency of public services through the delivery of regionally integrated e-government applications that take advantage of economies of scale. Only a strong architectural blueprint on an industry standard foundation can pave the path for the implementation of harmonised regional e-Government frameworks and applications that are interoperable and deployable for users across regions. Such applications are expected to produce time and cost savings for governments, businesses, private citizens as well as ensure a greater quality of service provision, including increased transparency for users and the public in general.

Being the provider for G2C, G2G and G2B services, remote infrastructure services as well as business process outsourcing services, governments have been investing on multiple core business applications for various services over the last couple of years. This leads to complex conglomerates of tightly coupled disparate applications (interfacing through point-to-point communication) in heterogeneous platforms which made it difficult to manage, integrate, scale-up, and interoperate, thereby reducing operational efficiency.

Thus, there is a strong need for a business-IT alignment through simplified and standardised enterprise architecture as well as a governance model that will support

rapid growth and management of systems, add tangible value to processes by which the government will operate with lower total cost of ownership (TCO) and higher return on investment (ROI).

Governments have adapted the e-Government master plans with the objective of leveraging the full potential of information and communication technology (ICT) so as to improve the efficiency as well as the capability of government processes and services, with a specific focus on e-Services that will enable increased citizen participation and attempt to create an open, transparent environment, through the integration of different government information systems and services. To realise this objective, the government enterprise architecture is essential in order to deliver a common integrated interoperability platform or service delivery gateway for information exchange.

What are the problems if e-Government is not architected in the right way?

In recent times, enterprise architecture programmes have gained much attention within the government in particular and the public sector in general, as the provider of collaborative and comprehensive ICT designing, planning as well as managing processes for e-Government transformations so as to enable a sustainable connected whole-of-government model.

Enterprise architecture enables the translation of the e-Government vision as well as strategies into effective transformation change at the strategic (government-wide) as well as the segment level (such as ministries, department, agencies) by defining common, consistent and cohesive architectures for the whole-of-government to deliver these e-Services.

Current pain areas	How EA helps in delivering value
<ul style="list-style-type: none"> Mostly manual processes with low level of service automation This leads to high process turnaround time for end-to-end processing of government services 	<ul style="list-style-type: none"> Facilitates the transformation of current government processes and services to end-to-end streamlined automated processes, with standardised reusable citizen-centric services, thereby reducing process turnaround time
<ul style="list-style-type: none"> Fragmented and redundant ICT systems and technologies with ministry, departments and agencies MDAs working in silos driving their own ICT initiatives This leads to higher complexity, higher TCO, and a lack of interoperability 	<ul style="list-style-type: none"> Consolidates and rationalises a fragmented redundant ICT systems, technologies as well as data structure for cost reduction, reduced complexity and better interoperability of ICT systems across MDAs
<ul style="list-style-type: none"> Lack of government-wide consistent enterprise IT policies, principles, reference models and standards with MDAs adopting their own disparate standards 	<ul style="list-style-type: none"> Recommends and maintains government-wide technical standards, architecture principles, reference models and templates in order to facilitate the design, implementation as well as the delivery of ICT capability in a consistent, standardised, cost-effective and timely manner
<ul style="list-style-type: none"> Limited interconnection and collaboration across MDAs so as to share government data in real-time mode 	<ul style="list-style-type: none"> Improves the agility and interoperability with real-time information exchange across MDAs, with enhanced transparency, better co-ordination and communication
<ul style="list-style-type: none"> Ad-hoc reactive mode of decision making in ICT investments with limited investments in ICT 	<ul style="list-style-type: none"> Provides a basis for planned decision making in ICT investments
<ul style="list-style-type: none"> Lack of centralised governance to achieve the following: <ul style="list-style-type: none"> Plan and deliver EA initiatives that leads to delay in ICT projects Maintain and sustain EA standards 	<ul style="list-style-type: none"> Centralised architecture governance model in order to ensure better architecture planning, decision making and compliance of projects with enterprise standards Improved efficiency and turnaround time for ICT project roll-out

EA is thus one of the critical success factors for effective e-Government transformation.

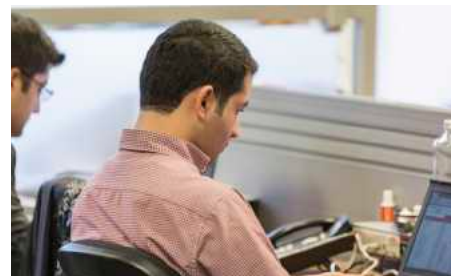
What initiatives are other governments undertaking?

Across the world there has been a wide scale adoption of the Government Enterprise Architecture (GEA) and appreciations thereof of the values delivered. The objective of these initiatives has been to design, develop, deploy and use the GEA and e-Government Interoperability Framework (e-GIF) for better strategies, processes, plans, structures, technologies and systems across the government. The GEA and e-GIF will be used to better tailor information systems for government agencies in order to achieve key objectives as well as outcomes, and thereby achieve increased interoperability, better asset management, reduced risk and lower operational cost.

- Governments in North America and Europe had already taken the right steps in establishing the EA programme for eGovernment transformation, though they are at various stages of EA maturity.
- In the US, the US Information Technology Management Reform Act of 1996, often referred to as the Clinger-Cohen Act, made it mandatory for all 116 US federal departments as well as agencies to develop and use EA for IT investment planning and decision making. Some of the benefits realised includes the following:
 - The United States Agency for International Development has reported cost savings to the tune of 12.3 million USD and cost avoidance of 9.5 million USD as a result of transitioning disparate human resource systems to a human resource shared services centre, using enterprise architecture.

It reported savings to the tune of 15.7 million USD from moving its e-mail service to a cloud-based solution (recommended by the EA programme).

- The US Department of Health and Human Service has been able to reuse 16% of its total governmental services.
 - The US Department of Education reports that development, modernisation, and enhancement funding within the IT portfolio increased from 10% of the total IT spending in fiscal year 2011, to 13% of the total IT spending in fiscal year 2012, through the use of the department's architecture segment modernisation planning process.
 - The US Department of Treasury that focussed on reducing duplication through its data centre consolidation initiative has reported a reduction of 1,283 in the number of servers, an increase from 25 to 36% of operating systems that were virtualised, and a reduction in the data centre square footage of 15,896 between 2010 and 2011.
 - The Australian government has established the Australian Government Programme with the objective to assist in the delivery of a consistent and cohesive service to its citizens, and support a cost-effective delivery of ICT services by the government.
 - New Zealand (NZ) is diligently working towards a connected government through the definition of New Zealand Federal Enterprise Architecture (FEA) derived from the US Federal Enterprise Architecture Framework (US FEAF).
- In recent times, countries in the Asia-Pacific region are also on the move to adopt enterprise architecture in order to demonstrate better control as well as management of ICT capabilities.
 - The Korea Government Enterprise Architecture, winner of the UN Public Service Award in 2013 has helped the government in the projected budget reduction of 400 billion KRW since the adoption of EA over the last five years.
 - The government of Singapore has established the whole-of-government EA with the objective to enable the government optimise its ICT assets by rigorously analysing as well as identifying strategic opportunities from its various lines of businesses, business information, software applications and technology investments.
 - The government of Nepal has adopted the GEA framework with the objective to realise its e-Government mission of providing a 'value networking Nepal' by building efficient, transparent as well as a citizen-centric government service through the use of ICT.
 - The Organisation of Eastern Caribbean States (with member countries namely Dominica, Grenada, Saint Lucia, Saint Vincent and the Grenadines, Antigua and Barbuda and St Kitts and Nevis) have established the enterprise architecture framework at the regional and the national level with the key objective of promoting the efficiency, quality, and transparency of public services through the delivery of regionally-integrated e-Government applications that take advantage of economies of scale.



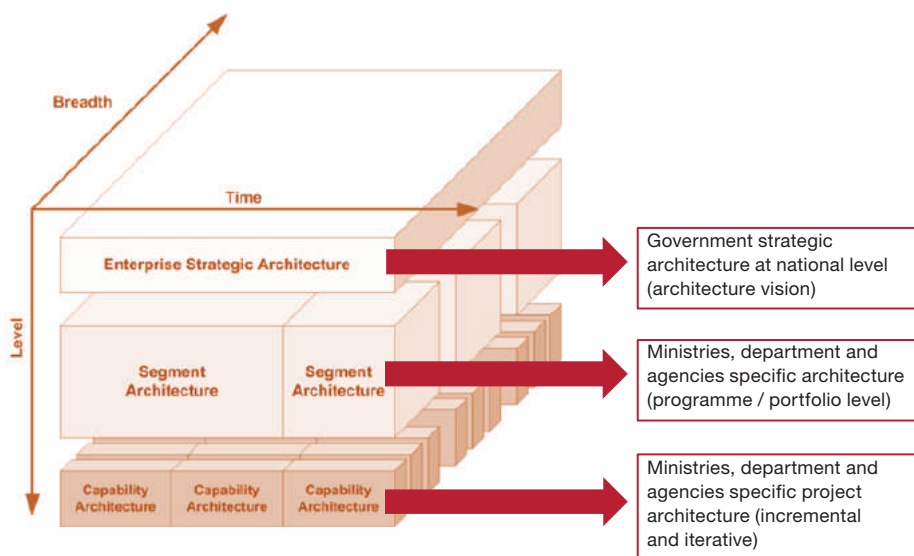
(Source: Ministry of Security and Public Administration)

What is the right way to approach the e-Government architecture?

TOGAF as the foundation for EA

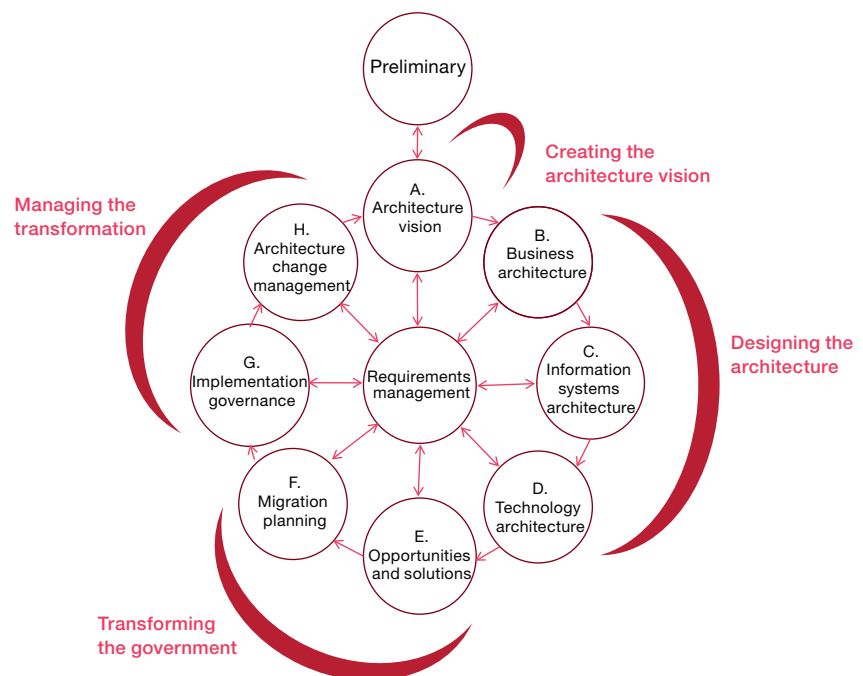
Adopting a well-planned collaborative and comprehensive national enterprise architecture framework is one of the key success factor for the transformation initiative.

The Open Group Architecture Framework (TOGAF), an open group standard, is the widely accepted architecture framework adopted by government as well as private sector organisations, in both the developed and developing countries across the world in recent times, for the development of a government national (strategic level) and regional (state, municipality, departments, agencies) level enterprise architecture framework.



The rising popularity of TOGAF as the architecture framework can be attributed to its core architecture development methodology (ADM), a step-by-step process oriented approach that will allow government architectures to be developed at various levels (at the strategic as well as segment levels) and across various architecture domains (business, data and technology) that are consistent, iterative, adopt industry best practices and provides a common language.

It has the flexibility to accommodate likely future needs of the government in an iterative manner.



Architecting e-Government transformation

Creating the architecture vision

The architecture vision articulates the translation of the whole-of-government transformation vision and objectives in order to serve the ICT strategic needs as well as the directions of the government. It demonstrates a value proposition responding to the ICT strategic transformation requirements and envisaging the future state government service delivery architecture.

The industry best practice driven guiding architecture principles and reference architecture models will serve

as the means of demonstrating and articulating this vision.

An essential precursor to the conceptualisation of this vision is to assess the capability maturity of the government architecture programme that will enable the process of goal setting for the future. EA capability maturity will provide a yardstick to periodically assess and measure improvement as well as allow governmental organisations to benchmark the status of current architecture programmes and commence the process of improving their effectiveness, or roll-out a new programme.

Architecture principles

The architecture principles reflect the architectural vision to support the business needs of the government and improved IT enablement. It provides a foundation for a consistent industry best practice-based architecture, and will guide ICT decisions and investments.

Reference architecture model

In most cases, the government ICT landscape is largely fragmented in nature, distributed with disparate multi-vendor solutions across MDAs, each maintaining their own architecture standards in silos. Adoption of a whole-of-government reference architecture model will provide a common, standardised and consistent taxonomy and framework solution in order to enable reuse and interoperability across government MDAs. It provides a context for decision making and helps MDAs to develop ICT capabilities in a way so as to operate across traditional boundaries in order to improve service delivery and deliver responsive ICT solutions.

The reference architecture model will act as the template and reference point for concrete realisation of the target architecture development and implementation either within a particular domain (e.g. application, data) or sets of domains (e.g. across all architecture segments). The technical reference architecture provides the foundation that will guide the selection of standards as well as enabling technologies.

- Architecture principles
- Business principles
 - Data principles
 - Application principles
 - Technology principles
 - Architecture governance principles

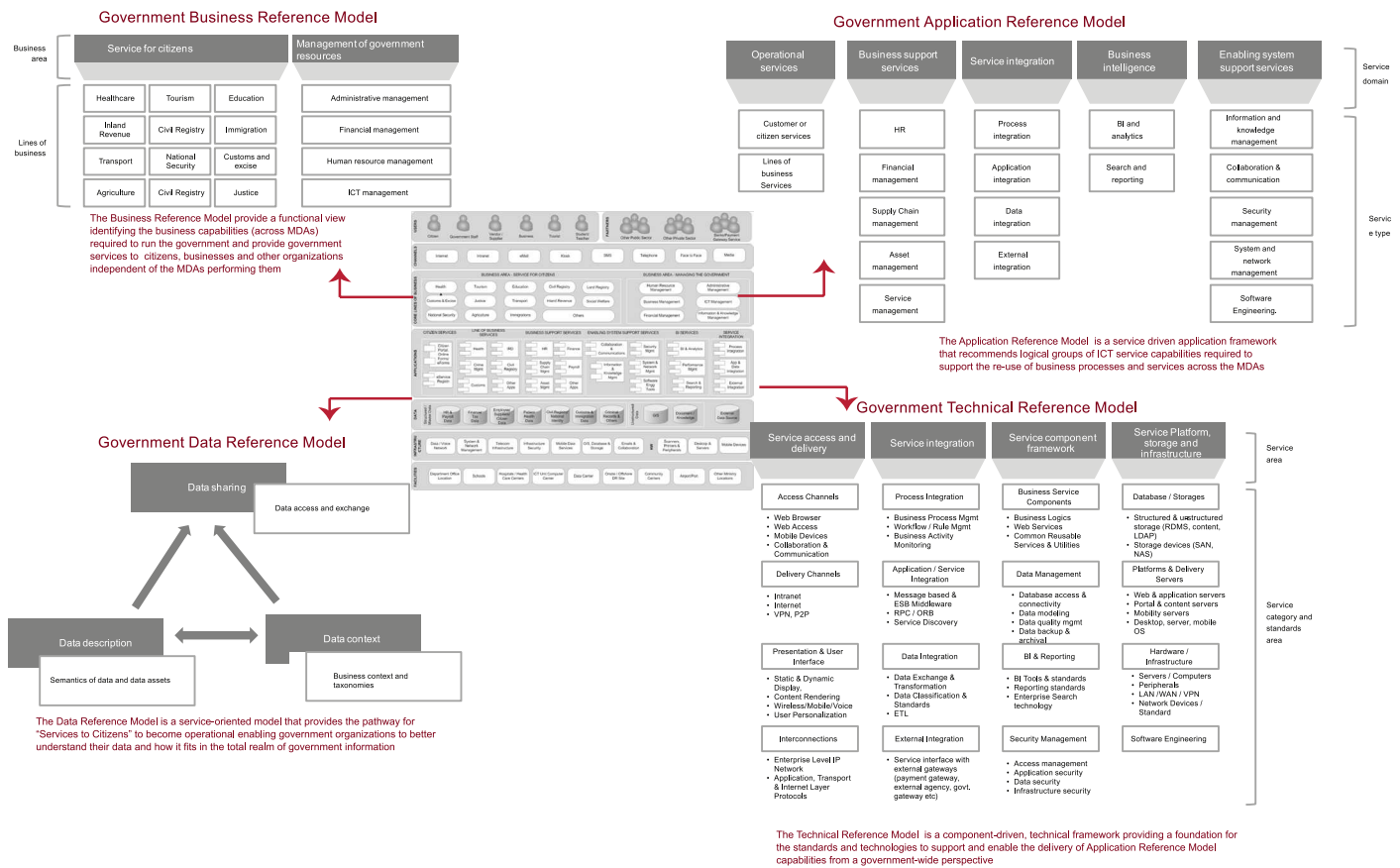
- Reference architecture models
- Enterprise level reference architecture
 - Data reference model
 - Application reference model
 - Technical reference model

Architecture principles

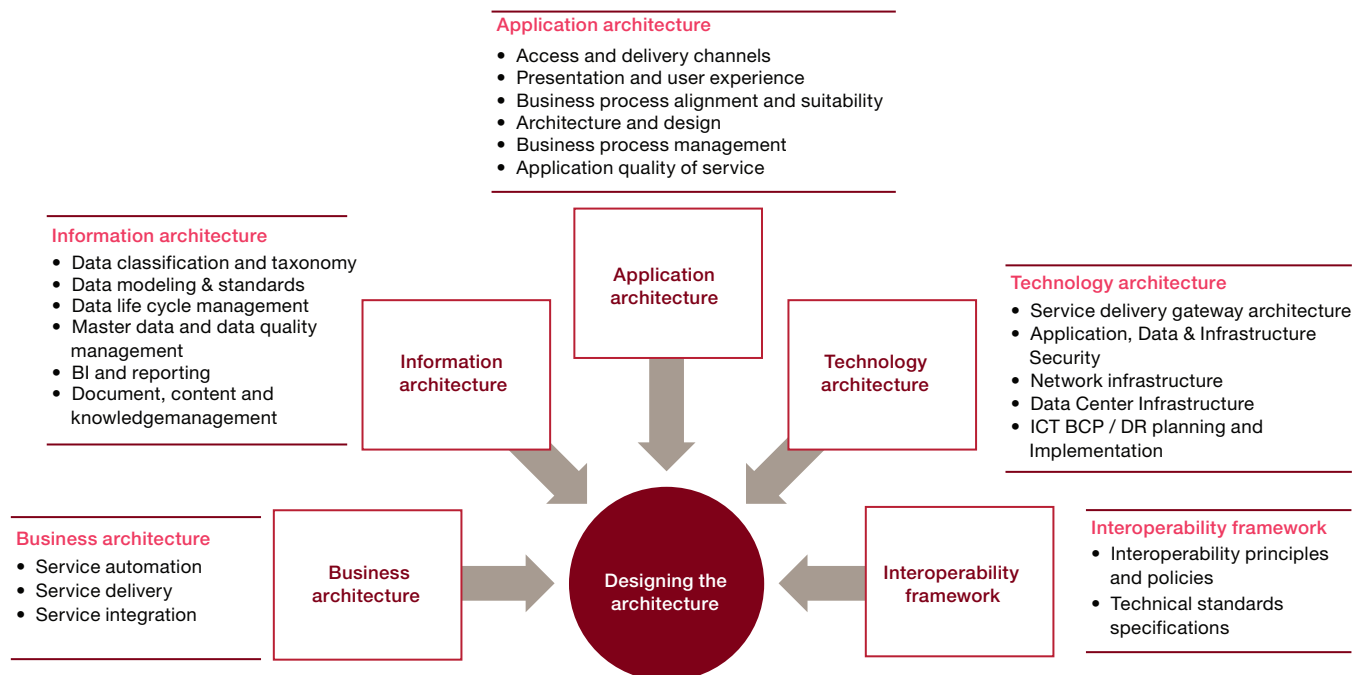
Reference architecture models



Reference architecture models



Designing the architecture



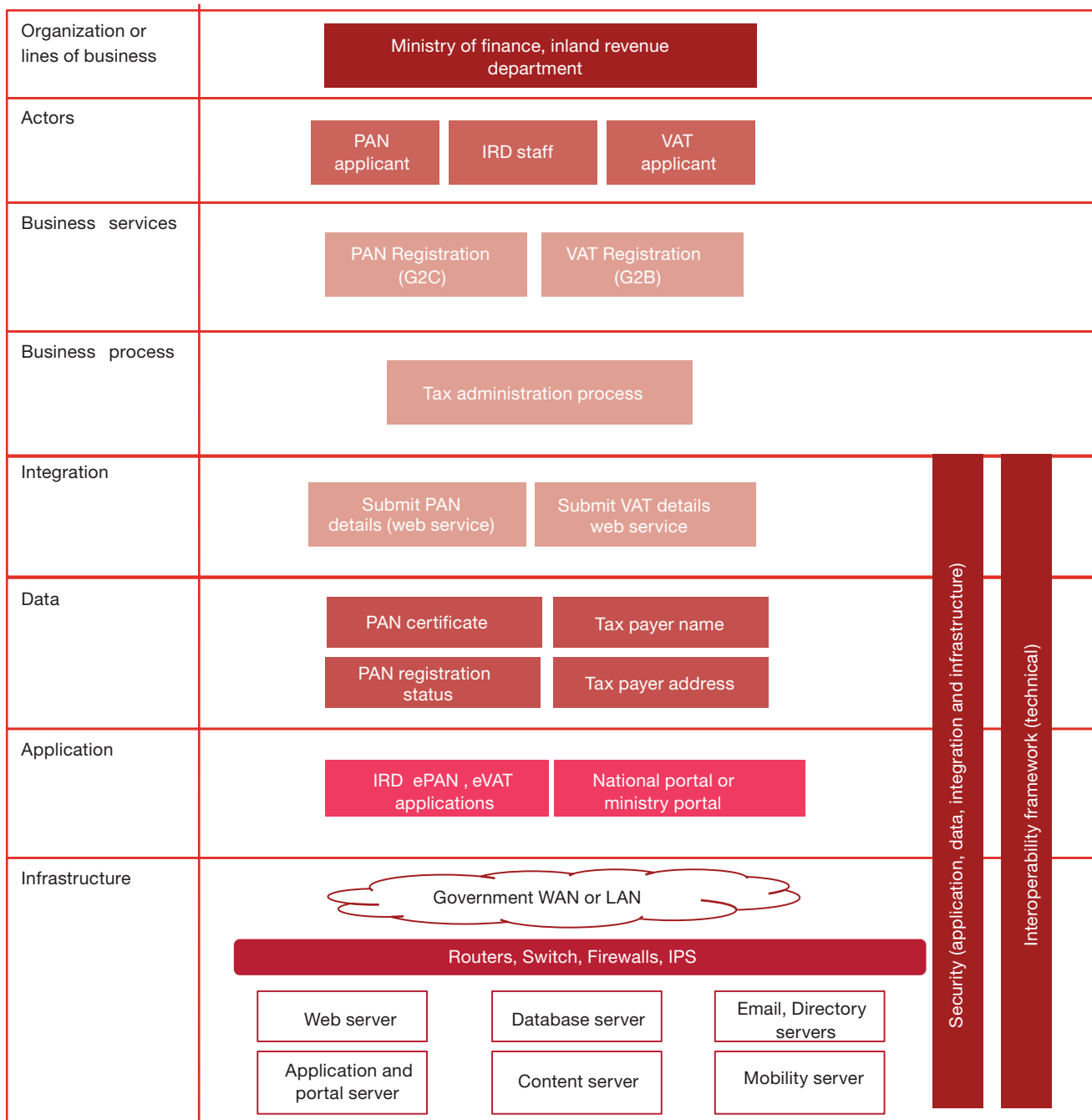
Collaborative domain architecture formulation

Designing the enterprise architecture for the whole-of-government involves collaborative development of the domain architecture across businesses,

information, application and technology architecture. The overarching architecture vision will provide directions and guidelines for subsequent designing of the domain architecture .



End-to-end collaborative domain architecture building blocks



Business or services architecture

Business or service architecture will capture the integrated whole-of-government service delivery operating model at the strategic level for accomplishing the e-Government vision, and individual functions, processes and government services at the segment level required to support the service delivery model.

Information architecture

The information architecture will define the integrated whole-of-government data standards, the structure of the governments' common logical and physical data assets required to support business services and address data management considerations. It reflects common domain entities, their relationships, schemas and establishes accountability for data integrity. Definition of data architecture needs to be incremental in nature in order to meet specific segment requirements.

Application architecture

The application architecture defines the blueprint for ICT application or service capabilities, their interactions, as well as their relationships to core business services of the MDAs.

It consolidates and rationalises the application portfolio of the government organisation as a whole required to support business processes of MDAs.

The definition of application architecture needs to be incremental in order to meet specific MDA functional requirements for new ICT initiatives.

Technology architecture

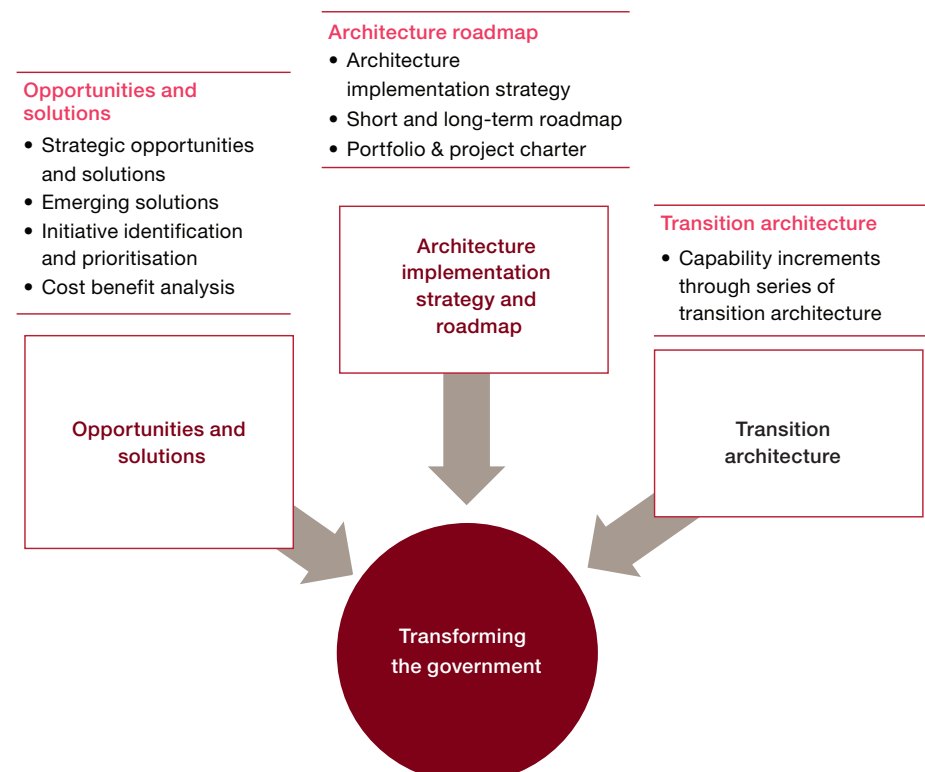
Technology architecture defines the blueprint for underlying ICT technical infrastructure capabilities required to support ICT application capabilities identified in the application architecture. It mostly focuses on the blueprint definition in the following domains:

- Integration architecture required to integrate ICT applications in order to enable real-time seamless information exchange across MDAs government-wide leveraging SOA-based approach
- Security architecture required to securely and economically protect its business functions, including public access to appropriate information as well as resources, while maintaining compliance with the legal requirements established by existing statutes pertaining to confidentiality, privacy, accessibility, availability, and integrity
- Infrastructure architecture required to lay down the network, data centre and infrastructure (hardware as well as software) foundation services for the deployment of ICT application solutions and provide operational support services

Interoperability framework

In order to achieve the goal to primarily setup an interoperable connected government, it is of utmost importance to create an open, transparent, interoperable environment in order to help government information systems work successfully together and in an integrated and seamless manner, regardless of underlying technology or application.

A government interoperability framework (GIF) is thus essential in order to define technical standards that a government can use so as to ensure that ministries, departments, agencies, citizens and partners interact with each other in a standardised manner.



Transforming the government

Critical to the transformation of the government is the adoption of an iterative and incremental strategy for the implementation of the government enterprise architecture. A best practice approach is the formulation of the architecture implementation roadmap that shows incremental progress from the baseline to the target through a series of transition architectures that delivers continuous business value (for e.g., capability increments) with the exploitation of opportunities.

There is a need to explore rationalisation initiatives, recommending improvement opportunities as well as solution options leveraging best practices, and the use of emerging technologies (such as SOA, cloud, mobile government and social media, unified communications, open government and big data) wherever applicable in order to improve business value and agility. Also, it is crucial to prioritise opportunities and identify quick wins so as to gain momentum.

One needs to complete the portfolio and major project charters, with their deliverables being grouped into increments and scheduled for release within the transition architecture increments.

Managing the transformation

Enterprise architecture is not a one-time activity, but a living and breathing practice that needs to be governed and sustained. Without proper governance government MDAs can be following its own strategy, guidelines as well as standards without any alignment to the overall e-Government transformation vision.

An architecture governance structural model, comprising of an architecture review board and architecture management processes, needs to be institutionalised in order to review, monitor and ensure compliance of government MDA ICT projects (existing as well as new) with the proposed GEA standards and specifications.

The architecture change management process is essential to manage changes to the proposed architecture in a cohesive and architected way, and also ensure that it meets the target value as expected. This process will typically provide for the continual monitoring of new



developments in technology and also changes within the business environment, and for determining whether to formally initiate a new architecture evolution cycle. The architecture review board initiates the architecture change management process.

Defining a government-wide training strategy is essential at various levels in the government in order to handhold and create awareness of the recommended architecture standards and guidelines across MDAs, ensure successful implementation of all ICT initiatives and to endow them with a proper mindset for adapting to new ICT initiatives.

Critical success factors

Till date, adoption of a sustainable enterprise architecture for the whole-of-government has been quite challenging with limited success stories attributed mostly due to the following reasons:

- Fragmented decentralised ICT landscape across MDAs with an ad-hoc architecture development, with limited adoption of a well-defined, proven, comprehensive, consistent and iterative methodology for architecture development across all MDAs
- Limited senior management awareness as well as commitment, with limited involvement of EA in decision making and ICT investment

- Lack of a well-defined scope, with limited involvement of the right stakeholders possessing the right skill sets and at the right time

Thus, considerations of the following critical factors are essential for the success of the GEA programme :

- Ensure that the business scope, business requirements and the performance measures are clearly defined. Defining the architecture scope is essential so as to decide the appropriate type of architectural styles to be adopted (e.g. the top down approach, right from strategico segment to capability architecture) and hence, ensure the probability of success. The scope must be sufficiently significant so that the EA delivers value and should not be broad in nature
- Involvement of key stakeholders at various stages are essential in order to derive the right architecture requirements for the transformation, the critical issues and the challenges faced, the degree of alignment of the business processes with the ICT systems

- Business architecture drives the development of subsequent application and data architecture. Re-engineering of any ICT systems should not be done without determining the business requirements and the business value it will provide.
- Ensure that the proposed centralised architecture governance model has appropriate senior-management, MDA as well as ICT department representation in setting directions, influencing plans, and approving project decisions, and thus expediting ICT decision making capabilities
- Ensure that major planned ICT acquisitions are to be guided and governed by the EA with RFP content to be influenced by architecture standards
- Cost-benefits to be considered in identifying projects
- Ensure project compliance with enterprise standards through proactive auditing and compliance review process
- Encouraging continual refinement of architectural standards through an effective change management process
- Define the right architecture reference model aligned with industry trends
- Leverage the right skill sets in order to expedite the process and quickly get on the right track. This includes not only those directly involved in the EA process, such as the chief architect and domain architects, but also those involved in governing and applying the EA such as project managers, infrastructure SMEs, and application developers
- Communicating to the stakeholders the EA programme needs and its potential benefit to be derived, is paramount to its success. In order to be successful, communication planning must be done in order to ensure that the right communication is taking place at the right time
- Conduct architecture awareness and training programmes on a regular basis



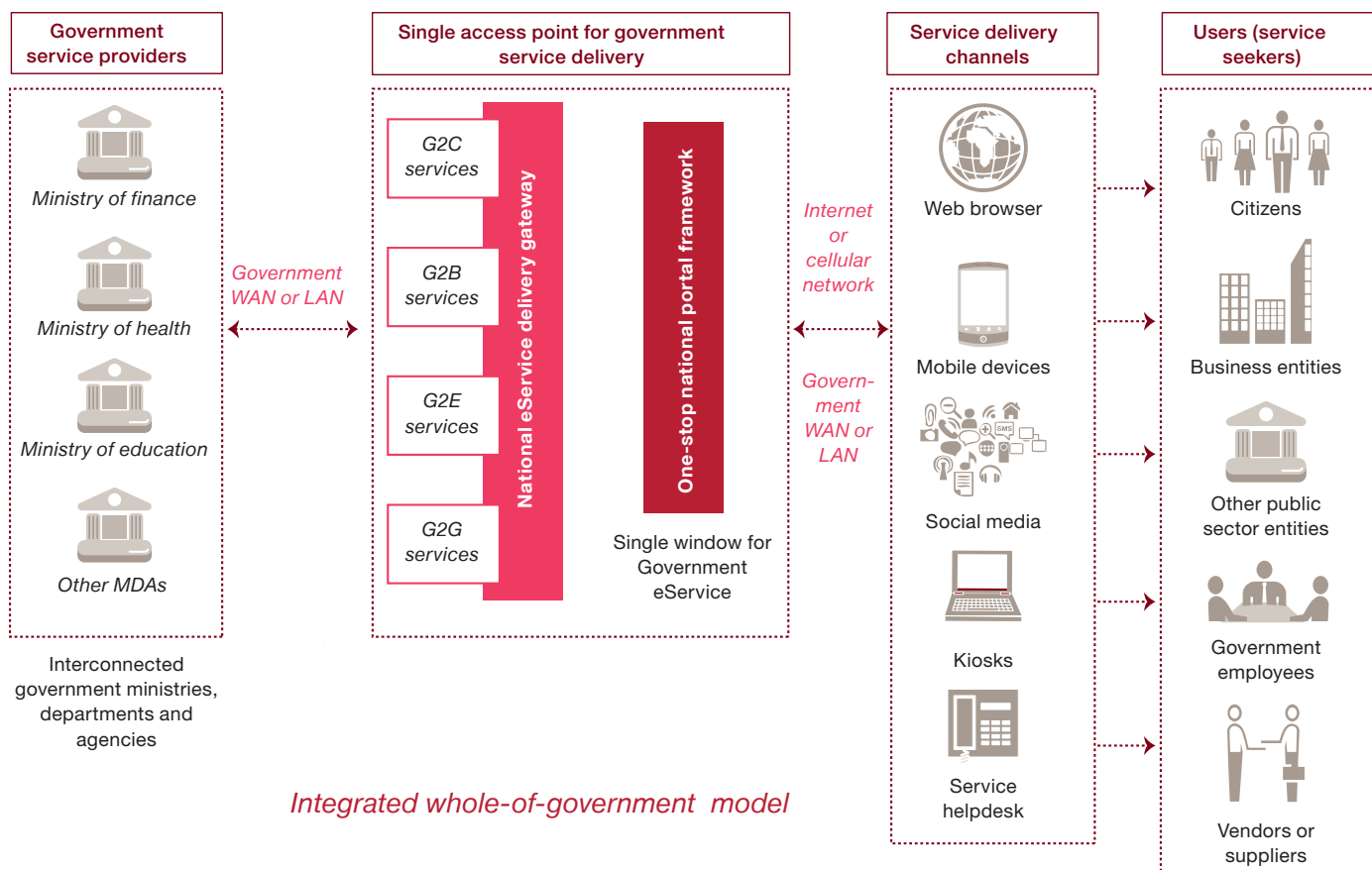
e-Government transformation: Move towards an integrated whole-of-government model

Recent trends worldwide in e-Government transformation (as per the UN e-Government survey 2012) reflects a shift from a decentralised siloed-based organisation model towards a cohesive, co-ordinated and integrated whole-of-government model, with greater online presence contributing to increased efficiency and agility, effectiveness and transparency in government service delivery.

The unified whole-of-government model aims at building a transparent, integrated government with interconnected ministries, departments and agencies (MDAs), leveraging the usage of ICT with a single government access point service delivery, where citizens can access most government services online, regardless of which government authority provides such services. Besides all possible service delivery channels (e.g. web, mobile, social media, kiosks) are being explored for government service provisioning in order to develop a sustainable government.

However, e-Government transformation from the siloed-based model to the connected whole-of-government model necessitates the following:

- Long-term e-Government vision, policies and a strategic framework in order to deliver sustainable citizen-centric and citizen-driven services
- Better and holistic collaboration, streamlined processes, standardised services as well as ICT systems across government MDAs
- Leveraging the advances in technology in order to strengthen the underlying technical infrastructure for ICT systems, with a focus on integrated service delivery gateways so as to facilitate online delivery of government services, promote interoperability and seamlessly share government data across MDAs

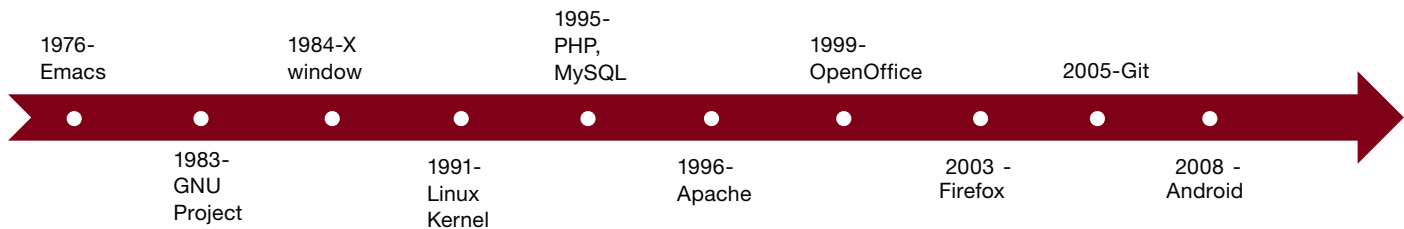


FOSS versus COTS

The rising dilemma

The advent and evolution of free and open source software (FOSS) has etched an indelible mark on the overall technological landscape and in the minds of key stakeholders. FOSS has brought about a change which is welcome, but at the same time disruptive in nature.

Foss development timeline



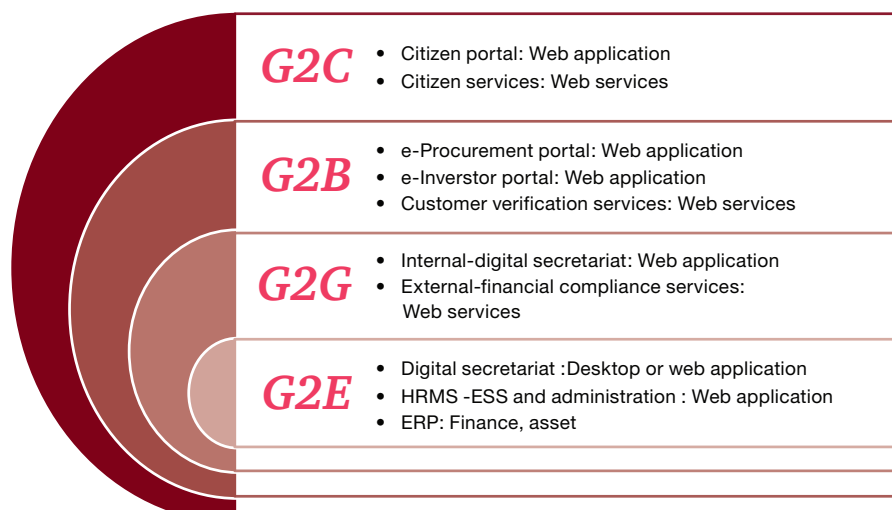
FOSS has brought us to an era where individuals as well as small, medium and large enterprises have to allocate a certain amount of budget primarily for hardware and support. However, the rate of FOSS adoption, though increasing, is still laden with doubts in the minds of IT decision makers across the globe.

This brings us to the disruptive part of the change. The advent of FOSS has stood out as a viable alternative for the pre-existing proprietary and commercial off-the-shelf (COTS) software. This has put decision makers in a situation where suddenly they have myriad viable options to choose from. This apprehension is especially prominent within the

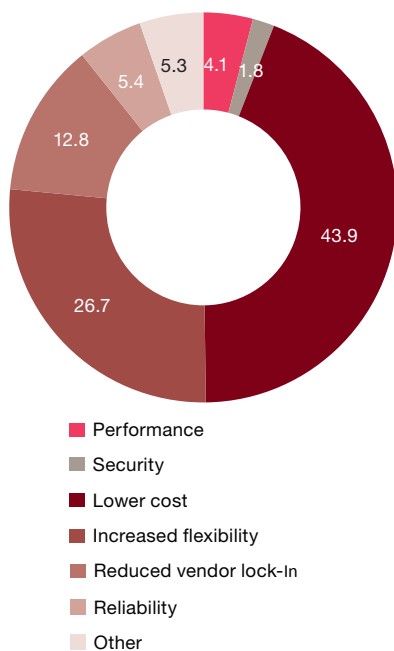
government sector where in many cases, factors such as revenue generation or profit-making are not the driving factors for IT implementation.

The e-Governance initiatives should ultimately converge to the single goal of enhanced and inclusive public services delivery. In order to understand the dilemma in technology adoption for the government, we can browse through the distribution of technology across various delivery models of e-Government, where the target of all the initiatives is enhanced service delivery.

Applications in e-Government



Global factors for FOSS adoption

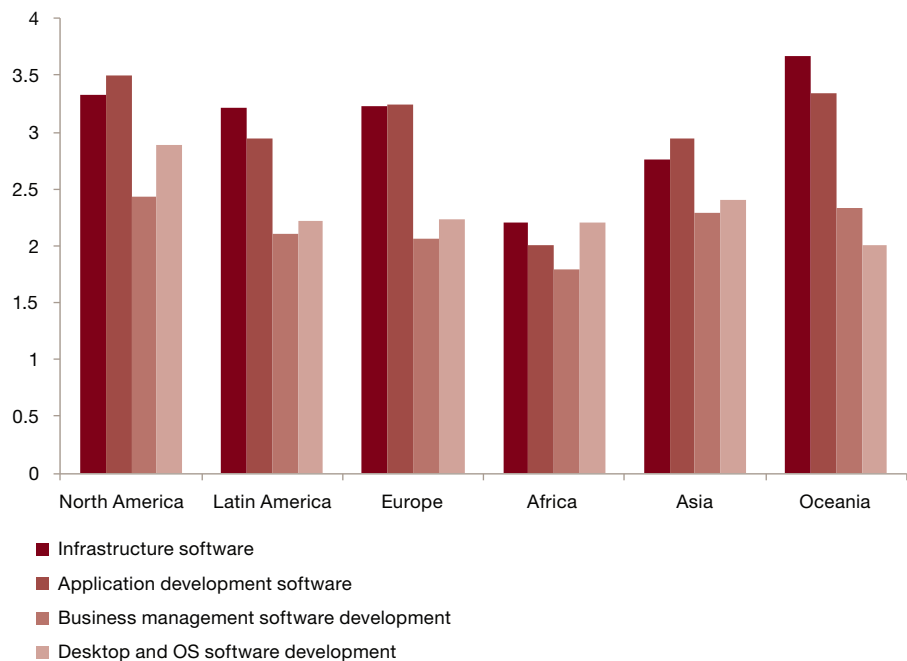


Source : Coetzee N. 2002, *Free and Open Source Software in Africa*, Finish Government report

In order to understand the adoption of COTS within the government sector, we must understand the major technology categories that comprise a government enterprise. These include the following:

- Infrastructure software
- Application development software
- Business management software development
- Desktop and OS software development

OSS technology category distribution over regions



Source: CENATIC foundation, 2010, *report on the International Status of Open Source Software 2010*

The least penetration for FOSS is found in the avenues of business management and desktop OS software development reporting a 2.17 and 2.33 average adoption score respectively. This leads us to believe that the penetration of COTS is prominent in these two areas. The reasons can be envisioned as follows:

- Business management softwares such as enterprise resource planning(ERP) and human resource management system(HRMS) are packaged products provided by companies such as Oracle, IBM, SAP et al. These products have a baseline implementation that come out-of-the-box. They are then customised according to the enterprise. At a basic level, these products are ready to be deployed and production- ready.
- These products cater to critical modules that directly impact the operations of an enterprise, including financial accounting, asset management, purchase, etc.

- A bottom-up development of these solutions will require a large amount of involvement of business users, and will also demand a certain amount of technical expertise on their part that is hard to attain.
- Defined technical and functional teams have been put in place for such products.
- In the area of desktop operating system(OS) software, worldwide penetration of Microsoft Windows, as the leading OS for desktops as well as laptops, mandates the use of COTS products.
- Across the globe, computer education at the basic educational level, is largely Windows-based in nature.
- The aforesaid factors have impacted the growth of Linux as a desktop OS in comparison to Linux as a server.



Important considerations for FOSS adoption

Legal clarity over FOSS licences: FOSS licences can be broadly categorised into 'copyleft' and 'copyright' licences. The copyleft licence is provided by the GNU general public licence (GPL) and the copyright licence is provided by the academia as well as foundations such as the following:

- MIT public licence
- BSD licence
- Mozilla public licence version
- Apache licence
- The academic free licence

The distribution of derived work using a GPL license needs to be properly validated by scrutinising the licence text.

Authenticity or stability of the product: Proper checks as well as balances need to be established within the government organisation or a governing body needs to be setup in order to review all open source initiatives within the organization so as to avoid the use of malicious softwares and the unstable version of an authentic product.

Important considerations for COTS software adoption

- Initial and recurring cost involved in a COTS software implementation needs to be justified with the adoption and usability of the solution in the short and long-term.

- A rigorous change management initiative needs to be taken within a government organisation in order to ensure adoption through user training.
- Processes within a government organisation are usually well-defined and tested over time. COTS software implementation will at sometime demand a realignment of such processes, which might be resisted by the concerned stakeholders. This is especially true for a packaged solution.
- A proper gap analysis need to be executed between the as-is process and the process defined in the COTS solution. This will generate a fitment report, and the cost of the gap that needs to be filled in by customisation needs to be justified.
- In order to ensure portability as well as integration, adherence to open standards needs to be ensured for the proposed COTS solution.
- e-Government context : G2C (includes G2B), G2G and G2E
- Approved budget (AB) : Austere, sufficient and visionary
- Current organisational maturity (COM) : Low, medium and high
- Current IT maturity (CIM) : Low, medium and high
- Adaptability to process change (APC) : Adaptive, resistive and rigid

We have seen that the above parameters are largely independent of each other with the subtle exception of the fact that the 'current organisational maturity' can sometimes affect the 'adaptability to process change'. For example, an organisation in its formative stage will be more adaptive to change.

We have devised a matrix that will bring out various stages that a government organisation can be categorised into. The matrix will in turn, transform the organisation to a higher IT maturity level, and thereby provide clarity on FOSS and COTS adoption strategy.

FOSS and COTS adoption strategy : PwC's point-of-view

We believe that at the conceptual level, the solution to this issue can be addressed by mandating the use of open standards as the baseline. A balanced solution can be achieved by the proper mix of both FOSS as well as COTS solutions. Having said so, we will also like to enumerate the critical parameters that should drive the decision for the same. This includes the following:

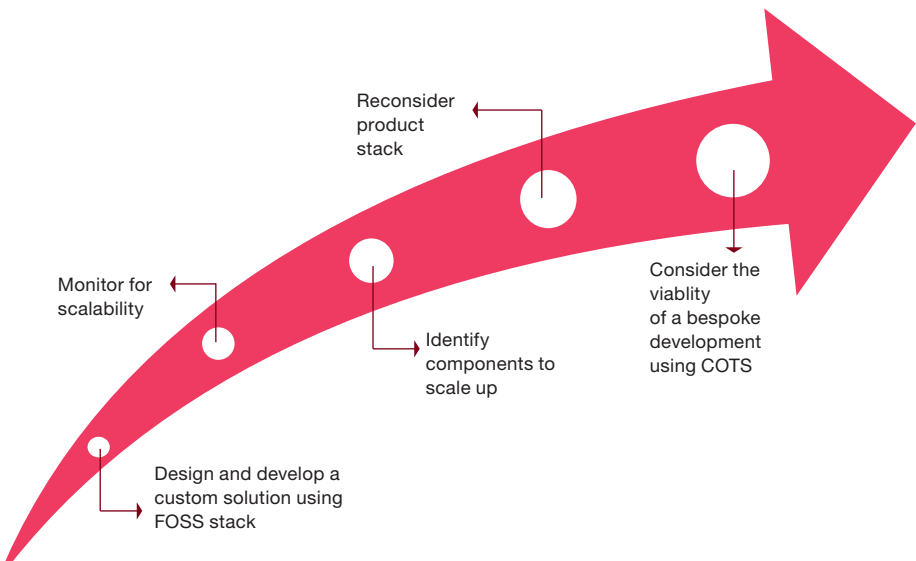
e-Government context : G2C

G2C application transformation

Transformation

Parameter / Stage	AP	COM	CIM	APC
Stage 1	Austere	Low	Low	Adaptive
Stage 2	Sufficient	Medium	Medium	Resistive
Stage 3	Visionary	High	High	Rigid

FOSS and COTS adoption roadmap for a G2C initiative



Our experience

The aforesaid scenario has been implemented in the G2C portal and services of one of our clients. The FOSS solution that was implemented initially had an enterprise content management (ECM) component. This component was gradually loaded with a considerable number of documents and started facing performance issues. A COTS ECM product was envisaged and reviewed at this point of time, since the application was mature by then, and usability and citizen engagement issues were decimated. ECM evolution stages

Initial FOSS stack

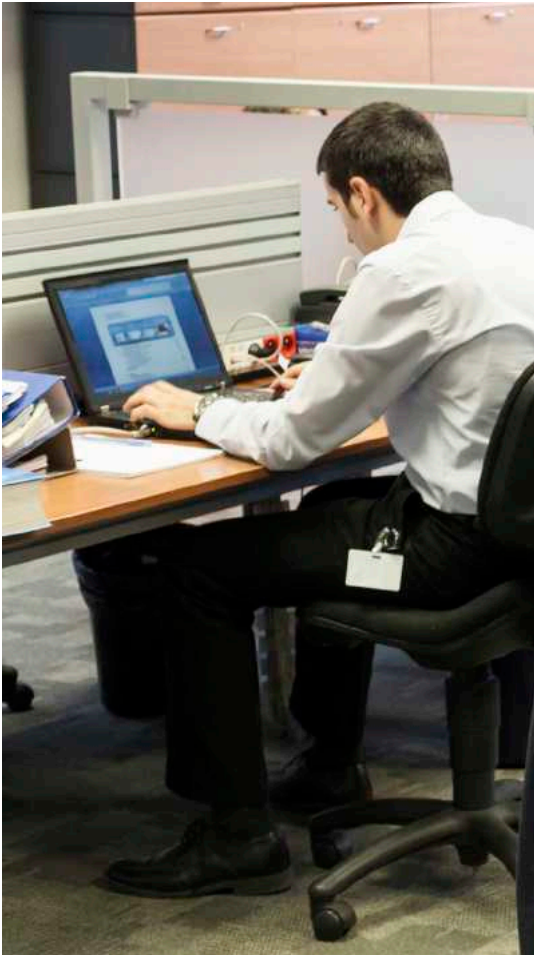
- JBoss AS
- MySQL(DB)
- Alfresco
- Community(ECM)
- JasperReport

Alfresco performance issue

- Large volume
- Client had a community licence and no enterprise support

Evaluation of COTS ECM

- Oracle UCM
- IBM FileNet
- Documentum



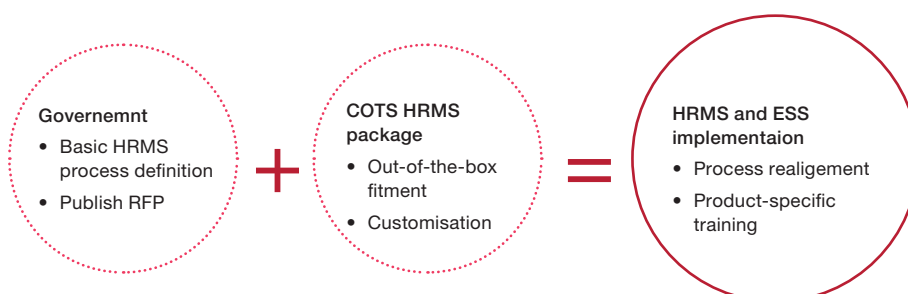


e-Government context : G2E

G2E services have often presented us with more challenging scenarios, thereby leading several delays in decision making, from the technology finalisation perspective from the client side. The stage definition in this case has to be ad-hoc rather than transformative in nature. We will use our experience to define the client status. The roadmap will be defined for a ERP, HRMS and employee self- service portal implementation for a typical government organisation, since these types of projects have seen a number of failures due to the lack of a proper roadmap.

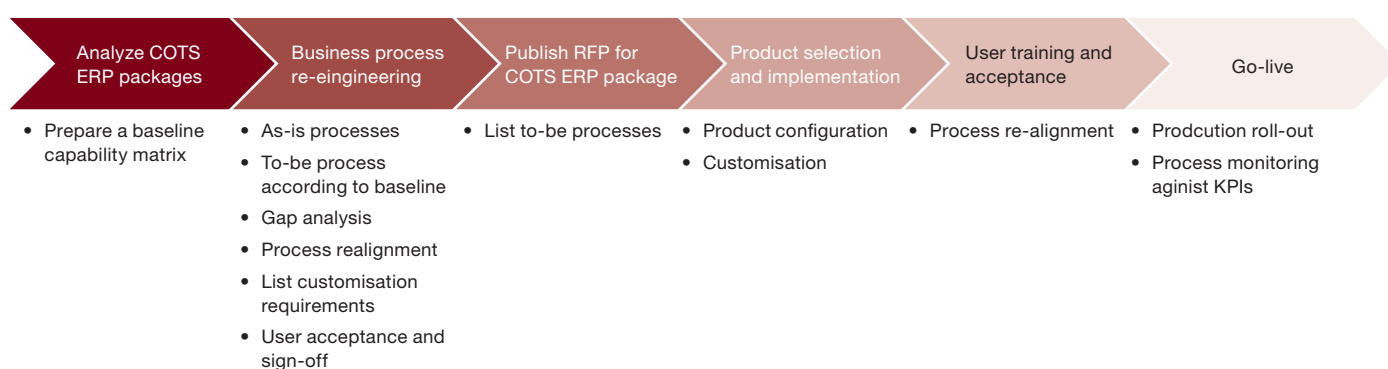
Scenario 1: A newly formed government organisation has taken up a HRMS and ESS implementation for its employees. Sufficient budget has been allocated for the project, and as such the organisation wants to go for the best-of-breed solution. Being at the formative stage they are adaptive to change, and therefore will like to align themselves to the product chosen. This is a typical scenario where a COTS HRMS package implementation can be proposed.

AP	COM	CIM	APC
Sufficient	Low	Low	Adaptive



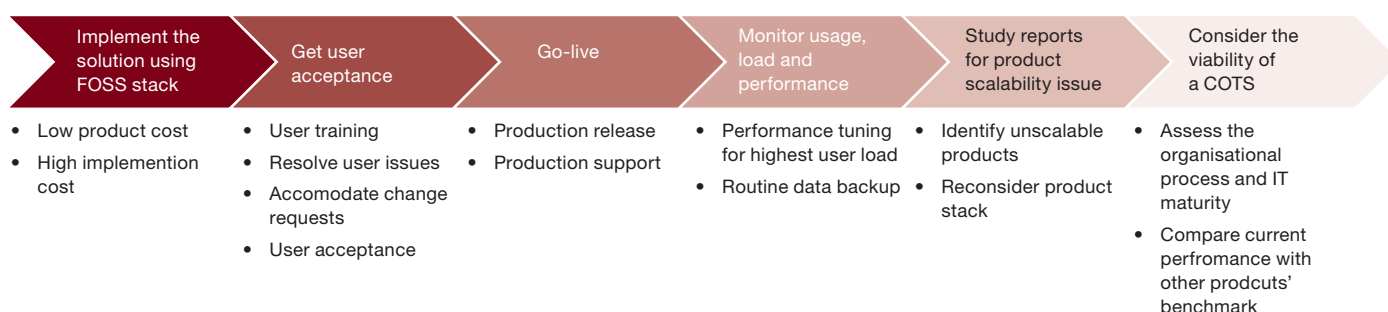
Scenario 2: An existing government organisation with medium organisational and IT maturity and with a sufficient amount of allocated budget is planning a complete ERP implementation, including financial accounting. The organisation is resistive to change, and therefore a smooth transition has to be ensured with pre-implementation user buy in. The business processes within the organisation are already defined yet have scope of improvement.

AP	COM	CIM	APC
Sufficient	Medium	Medium	Resistive



Scenario 3: An existing government organisation with high organisational maturity and low IT maturity, and with a visionary budget is planning a complete ERP implementation, including financial accounting. The organisation is rigid about its processes, and therefore a bottom-up custom development has to be proposed for the organisation. Looking at its low IT maturity and rigid core processes, user acceptability is a big challenge for this project.

AP	COM	CIM	APC
Visionary	High	Low	Rigid



PwC evaluation metrics

PwC uses evaluation metrics and a weighted approach in order to evaluate the FOSS and COTS adoption decision.

The terms of references (TORs) of the requirement play a major part in the evaluation process, but generic considerations also have to be carefully evaluated for the products in question

Considerations for evaluation	
Cost	<ul style="list-style-type: none"> • Cost of product • Product support and annual maintenance cost (AMC) • Implementation cost • Implementation support cost
Flexibility	<ul style="list-style-type: none"> • Availability of source code • Ability to change source code • Source code redistribution and derived licence
Reliability	<ul style="list-style-type: none"> • High availability support
Performance	<ul style="list-style-type: none"> • Peak user load • Duration of peak user load • Concurrent user load • Published performance benchmark
Security	<ul style="list-style-type: none"> • Authentication mechanism • Adherence to open standard cryptography

All the above parameters are weighed, and the weights are agreed upon with the client's IT team. A specific government initiative is quantitatively evaluated against these parameters around the two

prominent e-Government dimensions. These include the following:

- Delivery model
- Level of governance

		Factors	Level of governance		
			National	State	Local
e-Government delivery models	G2C and G2B	Cost	High	Medium	Low
		Flexibility	High	High	High
		Reliability	High	High	High
		Performance	High	Medium	Low
		Security	High	High	High
	G2E	Cost	High	High	High
		Flexibility	High	High	High
		Reliability	High	High	High
		Performance	Low	Low	Low
		Security	Medium	Medium	Medium

IT initiatives within the government sector have steadily emerged as a functional domain in itself. Both the open source community as well as product vendors have started aligning their products to fit the domain. Where both FOSS as well as COTS products populate the major technology platforms emerging out of accepted open standards, FOSS provides a clear cost advantage. Packaged business applications are a strong-hold of COTS product vendors, and we definitely envision robust investment pipeline around that. However, the COTS vendors need to rethink their pricing model for the government sector, since they are going to be challenged by the g-Cloud initiative taken up by various governments.



QA modelling

A critical success factor for governments

The Daily Mail, 9 July 2013

Thousands of air travellers faced flight chaos today after 'technical problems' hit Britain's main air traffic control centre. The problem led to National Air Traffic Services (NATS) restricting the number of aircraft flying across the south of England and those taking off from airports. A NATS spokesman said, 'There will be delays, although we are not sure how long they will be.' One airport spoke of 'a widespread air traffic control issue'. A computer glitch was to blame for the disruption.¹

The Wall Street Journal, 6 October 2013

Six days into the launch of insurance marketplaces created by the new healthcare law, the federal government acknowledged for the first time Sunday that it needed to fix design and software problems that have kept customers from applying online for coverage.²

The New York Times, 7 October 2013

The technical problems that have hampered enrollment in the online health insurance exchanges resulted from the failure of a major software component, designed by private contractors, that crashed under the weight of millions of users last week, federal officials said Monday. Todd Park, President Obama's top technology advisor, said the failure occurred in the part of the website that lets people create user accounts at the beginning of the insurance sign-up process. The crash prevented many from viewing any of their insurance options or gaining access to information on what federal subsidies might be available.³

¹ <http://www.dailymail.co.uk/news/article-2358791/National-Air-Traffic-Services-hit-glitches-control-centre.html#ixzz2jD5wCJmB>

² <http://online.wsj.com/news/articles/SB10001424052702304441404579119740283413018>

³ [http://www.nytimes.com/2013/10/08/us/health-exchange-delays-tied-to-software-crash-in-early-rush.html?_r=0#h\[\]](http://www.nytimes.com/2013/10/08/us/health-exchange-delays-tied-to-software-crash-in-early-rush.html?_r=0#h[])

In today's globalised environment, the cycles of economy experience longer slowdowns and recessions. Governments across the world are expected to provide better services for their citizens and corporates at lower costs. Towards this, they make large ICT investments for public services such as pension systems, healthcare, financial services and other citizen centric services with the objective of greater efficiencies at lower cost in the long run.

The six periods of global recession since the 1970s and six periods of financial crises in the 21st century sharply reduced the tax revenues of governments. Governments felt a new level of urgency to invest their citizens' hard earned money in efficient IT systems to ensure that they generate a return to the best possible extent, keeping the costs low. Thereafter, government agencies faced the daunting challenge of maintaining the highest standards of quality with budgets lower than ever. Governments became cautious as citizens are now empowered with the power to know how their money is being spent and how investments are working towards their benefit. Eg with the introduction of the RTI Act on 15 June 2005, India, a developing country, allows its citizens the power to know how their funds are being utilised for the betterment of society. Such citizen empowerment poses greater challenges to government entities to utilise public funds carefully and efficiently. Today, agencies are looking even more closely at how IT projects and initiatives are funded.

In recent times, government agencies have tried to deliver successful software development and implementation projects through advanced project management approaches. However, project management primarily focusses on evaluating cost, risk and schedule variances. More often, it lacks the adequate objectivity required to provide the necessary evaluation of project quality. A good PMO⁴ is not sufficient for a successful initiative. However, a team of qualified QA⁵ professionals can objectively assess the IT application's risks and help maintain the highest level of quality. Efficient project management together with QA can make significant

improvements in overall project success. A recent Gartner survey (ID:G00231952) shows that 17% respondents for small IT projects and 11% respondents for large IT projects believed that quality issues are among the key factors for unsuccessful IT projects.

However, from the PwC point of view, government IT projects need a completely different set of skills and standards specifically customised to the needs of the government. Some of the typical problems include the following:

- Unclear state of QA maturity
- No QA guiding principles
- Ad hoc QA processes mostly driven by private QA service providers
- No QA practice visibility
- Lack of interest in taking QA ownerships
- Limited enterprise wide visibility of QA tools and processes across government departments
- Limited awareness about QA standards
- Limited use of QA tools
- Lack of use of external QA standards

Addressing the above challenges from the government perspective requires a simple, low-cost yet powerful QA model. We, at PwC, created a customised QA model for governments. This is designed on good QA practices and external open standards that suit the need of the governments.

The QA model for governments

We created a QA model for governments using our experience in challenging assignments across many QA activities spread across many countries. The developed model was intentionally kept simple considering the challenges within government structures. However, each of the quadrants is further divided in smaller tangible and achievable activities.

The maturity levels are the basis for the principles, process areas and practices. We created five maturity levels, six guiding principles, 15 process areas and 10 practices.

The QA model can be made operational in any government agency through any industry standard- methodology, which can be initiated through an assessment of current QA maturity. The assessment can be easily done through the survey of government officials associated with software project management, monitoring project progress or associated with government quality initiatives.



A summary of the QA maturity levels is shown below:

Level 1	Level 2	Level 3	Level 4	Level 5
QA processes are usually ad hoc Success in these situations depends on the competence and undocumented knowledge of the people on the job and not on the use of proven QA processes Produce products and services that work; however, they frequently exceed the budget and schedule and provides poor software qualities	QA processes are planned, performed, measured, and controlled Existing QA practices are retained during times of crises The status of the QA work and the delivery of services are visible to the government at defined points	QA processes are well characterised and understood, and are described in standards, procedures, tools and methods The QA standards, process descriptions, and procedures for a department or ministries are tailored from the government's set of standard processes to suit a particular department or ministry	QA sub-processes are selected to significantly contribute to overall QA process performance Selected QA sub-processes are controlled using statistical and other quantitative techniques through automated tools Quantitative objectives for quality and process performance are established and used as criteria in managing processes	Focuses on continuous improvement on QA process performance through both incremental and innovative technology improvements Quantitative QA process-improvement objectives are established, continually revised to reflect changing business objectives, and used as criteria in managing QA process improvement The effects of deployed QA process improvements are measured and evaluated against the quantitative process-improvement objectives

After the assessment of QA maturity of government agencies, design principles are tailored to suit target QA maturity level. The design principles commonly used in governments are as follows:

- QA policies and procedures need to underpin the QA model at all levels.
- QA needs to be an integral part of the government IT project management.
- QA needs to include regular evaluation of QA process and practices through independent monitoring bodies or agencies.
- QA needs to include context, input, process and output dimensions for any IT projects under consideration, while giving emphasis to outputs and learning outcomes.

- QA systems need to include the following elements at the minimum:
 - Clear and measurable objectives and standards, guidelines for implementation, including stakeholder involvement
 - Consistent evaluation methods, associating self-assessment and external review
 - Feedback mechanisms and procedures for improvement in QA processes
 - Widely accessible evaluation results for government staffs

- QA needs to be a cooperative process across government agencies, ministries and departments, involving all relevant stakeholders and systems.

Once design principles have been finalised for a targeted QA maturity, the construction of QA processes begins. The QA process is defined against each of the maturity levels as shown below:

Level 1	Level 2	Level 3	Level 4	Level 5
Not applicable	QA policy QA planning Monitoring and control Design and execution QA environment	QA methodology and implementation training QA lifecycle and integration QA automation QA reviews	Quantitative measurement Software quality evaluation through quantitative techniques	Quality prevention Statistical predictability of quality dimensions QA control and optimisation

Once QA processes are established to address a targeted maturity, practices begin to develop. We developed 10 specific practices that can be tailored to meet the specific needs of any government agency around the world.

Establish an organisational policy for QA for all IT projects
Plan and document the QA process
Provide QA resources (people, skills, tools and trainings)
Assign responsibilities
Train people to use and implement QA in IT projects
Manage configurations for QA activities
Identify and involve relevant stakeholders for QA practices
Monitor and control the QA process
Objectively evaluate adherence with QA processes
Review QA status with higher level management periodically

The final QA model for governments will look like the following:

Level 1	Level 2	Level 3	Level 4	Level 5
Guiding principles				
Not applicable	<ul style="list-style-type: none"> • QA policy • QA planning • Monitoring and control • Design and execution • QA environment 	<ul style="list-style-type: none"> • QA methodology and implementation training • QA lifecycle and integration • QA automation • QA reviews 	<ul style="list-style-type: none"> • Quantitative measurement • Software quality evaluation through quantitative techniques 	<ul style="list-style-type: none"> • Quality prevention • Statistical predictability of quality dimensions • QA control and optimisation
Not applicable	<ul style="list-style-type: none"> • Plan and document the QA process • Provide QA resources (people, skills, tools, and trainings) • Assign QA responsibilities 	<ul style="list-style-type: none"> • Establish an organisational policy for quality assurance for all IT projects • Train people to use and implement QA in IT projects • Identify and involve relevant stakeholders for QA practices 	<ul style="list-style-type: none"> • Manage configurations for QA activities • Review QA status with higher level management periodically 	<ul style="list-style-type: none"> • Monitor and control the QA process • Objectively evaluate adherence with QA processes

Benefits of QA modelling

The QA model for government provides the following benefits:

- Clear state of QA maturity helps governments plan steps to enhance QA maturity if at all required.
- Existing QA maturity can be maintained with ease since the QA model explicitly states the required process, practices and principles.
- Governments are not required to invest money for a sudden jump in QA activities based on external QA advising companies.
- Ad hoc QA processes mostly driven by private QA service providers could be eliminated or controlled by existing process, practices and principles based on defined maturity.
- Good enterprise wide visibility of QA practices across governments departments
- Governments can designate specific QA ownerships to its staffs to increase overall quality of the applications under use.
- The QA model encourages governments to create its own standards instead of using costly external standards which are difficult to follow by governments aging workforces.

Conclusion

PwC's QA model helps governments drive down the cost of software development and implementation without adopting specific external standards. In the context of governments across the world, it's a daunting task to implement external standards such as CMMI, Six Sigma, IEEE Standard for Software Verification and Validations for a large workforce with mostly outdated skills. Hence, governments need a simple yet efficient QA model which does not require high CAPEX or top-of-the-line skill sets and yet meets the requirements of lowering project cost and improving citizen's services.

Farmer oriented architecture

Harvesting technology for the Indian farmer

Out of India's 1.2 billion people, almost 60% depend on agriculture for their livelihood. Agriculture and allied sectors contribute to 13.7% of the GDP



Information and services: Perspectives from Indian agriculture

Historically, the comparatively marginal Indian farmers have remained isolated from the larger agricultural market. A host of intermediaries have always existed between the farmer and the retail market. This has given rise to market anomalies which are detrimental to the farmers' interests.

In many cases, farmers are unable to make the correct decision about the seed to be sown, the amount of fertilizer to be used and the price at which the produce is to be sold; all due to the lack of timely information. Their primary information sources are other progressive farmers. Radio, television and newspaper are the other major sources of information for the Indian farmer. Surprisingly, while extension workers reach only 5.8% farmers, Krishi Vigyan Kendras (KVKs) have been able to reach out to an even lesser agricultural workforce which is less than 1%. Clearly, the public agricultural extension system has been inaccessible to a very large section of our farmers.

The recent spate of farmer suicides has highlighted the issue of availability and affordability of the agricultural credit service. More than 40% of these households do not have access to any institutional credit. One in every four households depends on a money lender for loan. The interest on these loans is prohibitively high and the farmers are trapped in the vicious cycle of taking fresh loans to repay earlier loans.

The widening farm to retail price spread in India is leading to losses both for the farmer and the retail consumer. Onion is a case in point. There has been a spurt in onion prices in the last decade at an alarming rate. The Competition Commission of India (CCI) notes that during the onion crisis of 2010, while the wholesale prices of onions were around 34 INR per kg, the retail price was 80 INR per kg; a whopping margin of 135%.

Farmers with no
access to information

60%

Source : Strengthening pluralistic agricultural
information delivery systems in India, P. Adhiguru et al

36%

Modal interest rate paid by farmers

Source : Nature and dimensions of
farmers' indebtedness in India and
Karnataka, Meenakshi Rajeev et al

Strategic challenges	Greater access to markets and elimination of middlemen	Accessing agricultural markets where the farmer can directly negotiate the price of his produce with multiple sellers still remains a key challenge.
	Availability of institutional support systems	Central and state governments run numerous schemes and incentive programs to support the farmer community. Due to the lack of awareness, many farmers are unable to benefit from such government support systems.
Operational challenges	Dissemination of real-time, localised information	Critical farming information like weather and soil are not localised enough to benefit the farmers. Even when local information like weather forecast is available to the government, it does not reach the farmers in time for them to benefit from such forecasts.
	Leakages in government delivery mechanisms	Government delivers services to the farmers through organisations like agricultural marketing boards and banks. Due to leakages in these delivery mechanisms, farmers are not adequately benefited.
	Paperwork at government offices	In the Indian context, small farmers are uncomfortable while interacting with the government due to the amount of paperwork involved.

Bridging the digital divide

With the digital revolution, the world has been ushered into the information age. Each day we are inundated with information from a multitude of channels. Yet, agricultural information is found to be unavailable to a staggering 60% of India's farmers with small landholdings. They do not have access to formal credit and pay interest rates in the excess of 30%. While the retail prices are soaring, farm prices show hardly any increase.

The Indian farmer is losing out primarily as a result of information asymmetry. The asymmetry is fuelled by the fact that he is often at the wrong end of the digital divide. Widespread adoption and consequent success of the agricultural extension services depends largely on whether these services have been engineered to bridge this digital divide.

The failure of public agricultural extension services in India can partly be attributed to lack of technology. Technology can help create the right platform for an effective delivery of information and services.

While technology can potentially create a level playing field, crude implementation of technology can lead to alienation of the users for whom the technology has been introduced in the first place. Nowhere is this alienation more prominent than the delivery of government services to citizens, especially the under-privileged section of the society.

Any technology implementation in the agricultural sector must not only be sensitive to the special needs of farmers but also devise elaborate change management strategies for ensuring a successful adoption. We believe that the guiding principles for such implementations should be:

- push, not pull
- localisation and pilot

Service delivery mechanisms must be engineered to reach the farmer's doorstep and the advent of mobile telephony has made this easier. Information can be provided to the farmer through SMS.

The information stream can also be used to create a pull by encouraging the farmer to visit the nearby mandi or KVK.

Localisation is critical to the success of any delivery mechanism targeting the agricultural community. In India, local conditions can vary vastly from one district to another. Be it the soil type, the rainfall pattern or the fertilizer needed, all information provided must be specific to the place where the farmer resides.

Due to the heterogeneous nature of the population being served, it is very difficult to foresee the issues that may arise from a technology implementation for a government service delivery. Therefore, it is suggested that before beginning directly with a big bang approach, an incremental approach will help in assessing and incorporating feedback before a wider section of the population uses the technology.

Farmer oriented architecture

The process of integrating technology with the delivery of agricultural extension services must focus on the farmers. Technology integration also provides us an opportunity for reengineering archaic processes and making them leaner.

Here we propose the 'farmer oriented architecture'. It is a digital model with the farmer at its centre. It has the following three parts:

- information related services (IRS)
- transaction related services (TRS)
- back office operations (BOO)

IRS

Issues like high interest rates and wide farm to retail price spread can be addressed if the government is able to provide the farmer correct and timely information. If a farmer is aware of the government loan schemes and where they can be availed, he will probably not have to take recourse to the local money lender. Similarly, if the current wholesale and retail prices are known, the farmer can bargain his selling price more effectively. Thus, this dissemination of information is the most crucial part of the architecture. Multiple information access channels must be made available to the farmer. We propose three access channels:

- Call centres
- SMS gateways
- Farmer Information Facilitation Centres (FIFC)

Along with these, we also propose a self-help farmer portal for those farmers who have access to internet. While the

Call centre and SMS gateway options can be both outbound and inbound, FIFCs and the farmer portal will be exclusively inbound.

TRS

Leakages in the government delivery mechanisms reduce the efficiency of agricultural extension services. These leakages can be plugged by the deployment of online systems for transaction management. Once transaction management goes online, the transaction details of individual farmers can be made available through the information access channels. Such ready availability of transaction data will ensure a kind of community audit. The formal audit of transactions will become easier and more insightful resulting in effective audit suggestions.

BOO

Due to inefficiencies in the process design, a lot of effort in government organisations is directed towards internal processes. This reduces the focus on the customer, in this case, the farmer. If the internal processes are automated and streamlined, fewer personnel will be required and more resources can be deployed to serve the farmer. The different modules that will comprise BOO are:

- Human resource management and payroll
- Budgeting and expenditure
- Finance and accounting
- Asset management

A day in the life of a farmer

On a bright sunny morning over a cup of tea, Ravi is engrossed in reading the newspaper article about how the state Agriculture Marketing Produce Committee (APMC) has completed its transformation journey from an offline organisation to a completely integrated online organisation and how this will benefit farmers like him. His reading is interrupted when his mobile beeps. It's a reminder from the local mandi officer about the workshop on the next season by a panel of agricultural scientists. It promises to be a helpful session and Ravi starts from home to attend it.

On returning from the workshop, he finds his son using the computer to look at the new farmer portal inaugurated by APMC. Ravi finds that the portal is in English but his son informs him that he can view it in Hindi as well. The site has been designed keeping a farmer's life in mind. It has a section on farming with advice on seeds, pest management, fertilizers and soil. He browses through the soil section and finds that the soil condition in his block is also available. Ravi's son points out that after considering the soil type; the portal recommends the cultivation of cereals during off season to boost income. Ravi finds this idea appealing. The weather section predicts it may rain heavily the following week and Ravi realises he will have to sell off his harvest before the downpour.

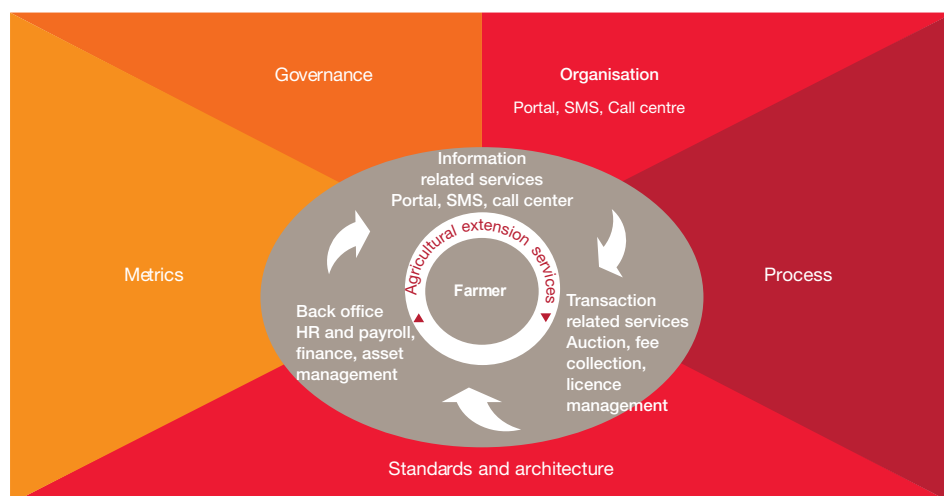
He calls the FIFC help desk to enquire about the last day's highest and lowest paddy prices during the auction. He makes a note of them and prepares to take his harvest to the mandi for auctioning.

He knows that the prices in the auction over the last few days have been good and knows what price he will settle for.

At the mandi office, the transaction is quickly entered into the new system and he gets a signed transaction certificate right away. With the help of the officer, he gets to know the update on a fertilizer query he had raised and a grievance that he had registered. The officer tells him that he will receive intimation on his mobile once the grievance is resolved.

On his way back, he remembers that he needs to contact a veterinary doctor for his ailing cow. He punches a code in his mobile and within a few seconds, a veterinary doctor's contact details reach him through SMS.

A smile lights up Ravi's face. Life is better, he thinks.



Digital secretariat

Strategising adoption: Making change work



Structural overview of a government office in India



Within the government organisational context, information plays a vital role. Each day, myriad files are handled by government offices and it becomes important to streamline the flow of data inside this organisational structure. Information is created, stored and forwarded by means of files, letters, notices, etc. across various departments.

Prevailing issues within the current system

Despite exponential technological progress, most governments continue to manually process the operation of activities. Major challenges faced by government offices in India are as follows:

Multiple levels of processing

Government offices follow multiple levels of processing of files, which in turn delays the decision-making process. Also, tracking a particular file becomes a difficult process.

Inter-departmental consultations

In many cases, inter-departmental consultations are required from time-to-time. Consultations between departments such as finance and law, etc. are quite common, before any decision over a file is taken. Files need to be sent to other departments for their comments, and this usually lengthens the process.

Volume of records

Handling large volume of records is one of the biggest problems within government organisations. This problem has multiple dimensions, including space and preservation, indexing and searchability issues, among others.

Prioritisation of files

Prioritisation is another important aspect, which is critical as well as difficult to manage. Out of several files lying with any individual, it is essential to prioritise only a certain number of files.

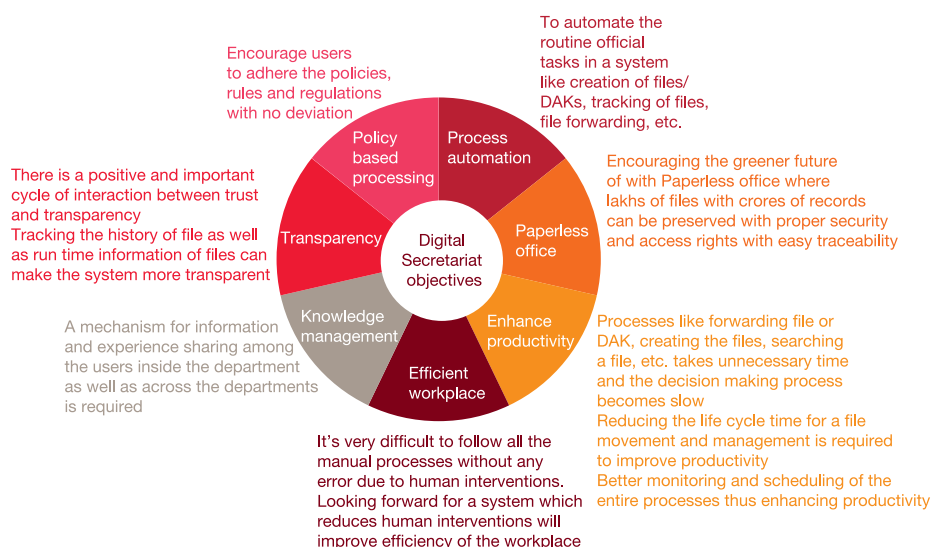
Effective file tracking and tracing

It is a herculean task to traverse through several sheets of pages among countless files in order to locate specific information. Above all, the sheer management of old files and records while retaining the ability to search for specific files become all the more difficult with the passage of time. This creates hurdles in the operational flow within and between government departments.

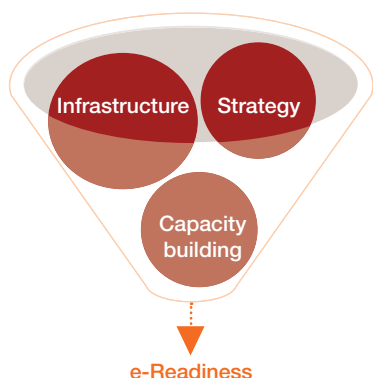
Need of the hour

Operational audit

Often, there are regulatory compliance issues which go unnoticed and unaudited due to the manual processes followed within government departments. These obstacles, while searching files and seamlessly locating information within them, also compounds to the problems associated with the process audit and verification.



PwC's point of view: Building up e-Readiness



Strategy

- Redesign archaic business processes so as to align them with contemporary practices and technology
- Redefine policies and regulations so as to incorporate ICT as a driving force for office management

Infrastructure

- Prepare a robust infrastructure so as to smoothen the process of automation
Basic amenities such as desktops, networks, servers, etc need to be in place

Capacity building

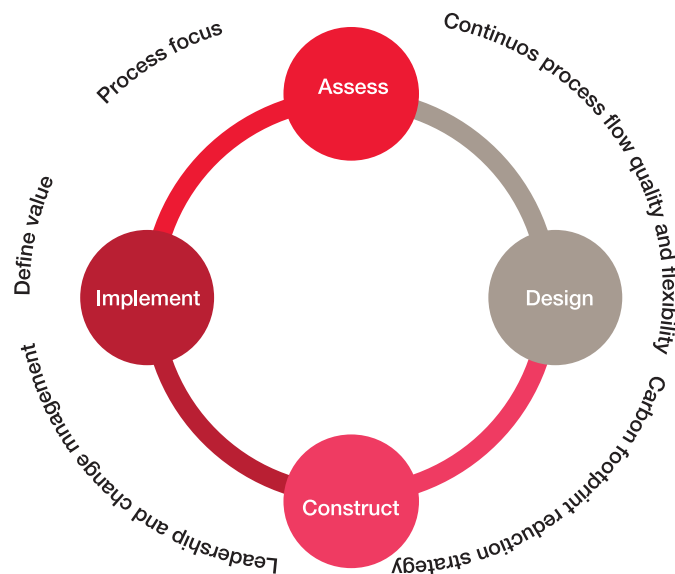
- Train the end users with the requisite knowledge of computers so that they can conveniently use the new system

PwC's point of view: Need for a paradigm shift

I am waiting for a file	<ul style="list-style-type: none"> • Request the responsible staff to provide the file • Staff members search for the file • The staff processes the file and sends it across
I am working on a file	<ul style="list-style-type: none"> • Go through the file content (both correspondence as well as notesheet entry) • Insert the notesheet comments • Add documents as and when necessary • Forward the file
I want to know the whereabouts of a file	<ul style="list-style-type: none"> • Request the dealing officer for a particular file • If the file is in another department either the users have to wait for the file to come back or have to communicate with the external department to know the whereabouts of the file
I am outside my office	<ul style="list-style-type: none"> • Difficult to implement the above mentioned steps due to my absence • Need to go back to receive or work on a file • Communication becomes difficult due to my absence • Either I have to assign a link officer or wait to get back to office
I am waiting for a file	<ul style="list-style-type: none"> • Able to search for a file from an automated system, and can track its whereabouts (reduces dependency on others) • The process of searching and forwarding has to be fast and easy
I am working on a file	<ul style="list-style-type: none"> • To easily refer to older relevant documents • To easily refer to other files by a simple search mechanism • Easily insert flags (even with a specified page number) before forwarding the concerned file
I want to know the whereabouts of a file	<ul style="list-style-type: none"> • Instantly get the history of a file with precise time stamps and allotted employee list through MIS reports • Need to have multiple reports such as the letter report, the file tracker and the user status in order to get the entire picture readily
I am outside my office	<ul style="list-style-type: none"> • Can connect to my iPad or laptop in order to receive the concerned files in my inbox • Proper authentication shall ensure security • Able to process the file on the move and forward the same • Helps to resolve urgent tasks while I am outside the Mantralaya

A successful approach

PwC's value delivery methodology



Values delivered

The three most important values delivered during digital adoption are as follows:

Smart and agile system

- The most critical aspect is to design the office automation system, which will enable users to electronically create, store as well as move their files and records.
- The system needs to be designed in such a way that it complies with all the rules and regulations followed in the manual process.
- Keeping the system user-friendly in nature is also another preference, so that the users who are accustomed to the manual system, face minimal difficulties while adopting the automated system. Some of the focus areas emphasised upon so as to keep the system user-friendly are as follows:

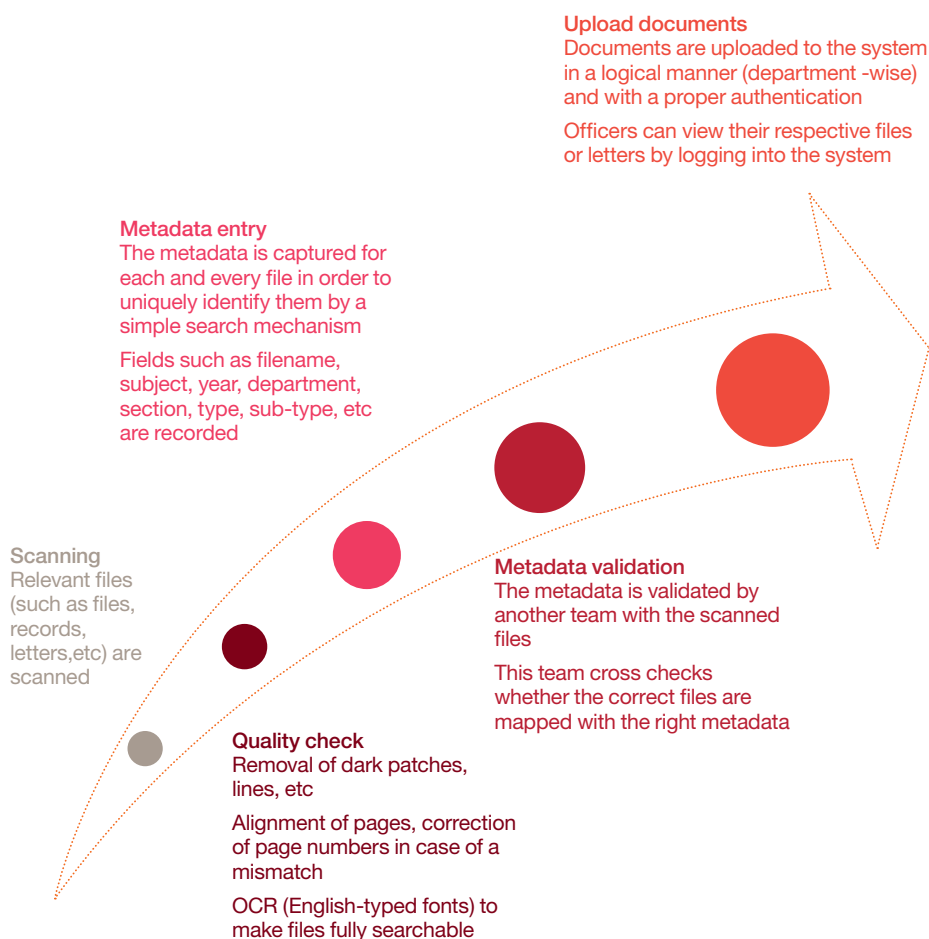
- Flexibility: Mail-like features (such as inbox, attachments, select recipient, etc.) for the convenience of the users. Also, it should not be too rigid in nature so as to ensure that the needs of the users in exceptional cases can be easily handled.
- Look and feel: The system, look and feel-wise, is designed such a way that it remains similar to the manual templates. For example, the notesheets used in the files of government organisations has a typical format. The user interface of such a system has been carefully designed so as to match a particular pattern, and so that users feel comfortable while using such a system.
- Other features for monitoring purposes have also been provided. Various MIS reports have been introduced into the system in order to get a birds-eye-view of the entire organisation

from different levels. This will lead to transparency and better control over the entire office.

Seamless usage of the automated solution

- PwC has carefully analysed the processes and has thereby derived an observation that merely designing the system will not be enough for digital adoption
- If the manual system runs parallel to the automated system, in such a situation, adoption then becomes a difficult process. Globally, various digital transformation programmes failed in past since this aspect was neglected
- Hence, PwC considers the operational part, i.e. digitisation of existing documents as a critical part of the programme
- Simply digitising documents, and preserving them as static data will only encourage repeat scanning, and thus the objective of a paperless office environment cannot be achieved
- These documents are important records and need to be stored carefully so that they can be referred to at any given point of time in future.
- All relevant documents of organisations need to be scanned and stored within the system, so that it can be referred to and forwarded only through the system. This provides benefits in the following ways:
 - Preservation of documents: The process of scanning helps in preserving huge volumes of documents. Also, in cases of disasters such as fire, earthquake, flood, theft, etc. preservation of manual records always remains a challenge.
 - Ease of search: During the process of scanning, the metadata for all files as well as documents are captured in order to save them logically. Thus, it gives an added benefit for users to easily conduct a search by providing certain parameters such as date, subject, name, type, department, owner or creator etc.
- The system has to be designed such that it can also deal with external files as well as letters that come in its manual form.

Steps for digitisation



Mobility

- Breaking the barriers of geography and time are some of the most important values added while adopting the digital processes
- Generally, activities at the workplace are constrained by the office hours as well as space. Myriad decisions get delayed due to these barriers
- Since every decision-making process needs multiple processing of files in various levels and in multiple departments, often huge time and effort are being wasted in the transmission phase
- PwC has analysed this issue and has developed a web-based system with the necessary security enablement for digital transformation, so that the users can get access to the files as well as letters of the concerned department at any given point of time and from any place
- Availability of the system from mobile devices such as laptops and smartphones help users perform their tasks on the move. Proper authentication will ensure the security of confidential documents
- Helps officials to resolve urgent tasks while they are away from office, thus making the entire process fast and smooth

Adoption of digital transformation for file management and movement has taken the entire process to the next level. It has opened new dimensions for fast and transparent governance with adequate mobility in the system by reducing administrative burdens. Today, I can check my files and work on them in a cab, airport or even from another city. I feel like I am carrying the entire office on my laptop or tablet. PwC was a great partner in this technology transformation.



Mr. Parial
CEO, Chhattisgarh Infotech & Biotech
Promotion Society, CHiPS

About PwC

PwC helps organisations and individuals create the value they're looking for. We're a network of firms in 157 countries with more than 184,000 people who are committed to delivering quality in Assurance, Tax and Advisory services. Tell us what matters to you and find out more by visiting us at www.pwc.com.

In India, PwC has offices in these cities: Ahmedabad, Bangalore, Chennai, Delhi NCR, Hyderabad, Kolkata, Mumbai and Pune. For more information about PwC India's service offerings, visit www.pwc.com/in

PwC refers to the PwC network and / or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details.

You can connect with us on:



facebook.com/PwCIndia



twitter.com/PwC_IN



linkedin.com/company/pwc-india



youtube.com/pwc

Contacts

Pradip Bhowmick

Partner

PwC India

Phone: +91-33-44043293

Email: pradip.bhowmick@in.pwc.com

Arunava Mitra

Managing consultant

PwC India

Phone: 091-9836610106

Email: arunava.mitra@in.pwc.com

Editorial team

Indrasis Acharya

Sayan Basu

Subham Chattopadhyay

Sumit Rudra

Abhisek Laha

Author

Biswadeep Biswas

Dipika Das

Indrasis Acharya

Sayan Basu

Wriddhi Majumber

Nilanjan Bose

Debesh Majumdar

Rajat Chatterjee

Somdeb Chakraborty

pwc.in

Data Classification: DCO

This publication does not constitute professional advice. The information in this publication has been obtained or derived from sources believed by PricewaterhouseCoopers Private Limited (PwCPL) to be reliable but PwCPL does not represent that this information is accurate or complete. Any opinions or estimates contained in this publication represent the judgment of PwCPL at this time and are subject to change without notice. Readers of this publication are advised to seek their own professional advice before taking any course of action or decision, for which they are entirely responsible, based on the contents of this publication. PwCPL neither accepts or assumes any responsibility or liability to any reader of this publication in respect of the information contained within it or for any decisions readers may take or decide not to or fail to take.

© 2013 PricewaterhouseCoopers Private Limited. All rights reserved. In this document, "PwC" refers to PricewaterhouseCoopers Private Limited (a limited liability company in India having Corporate Identity Number or CIN : U74140WB1983PTC036093), which is a member firm of PricewaterhouseCoopers International Limited (PwCIL), each member firm of which is a separate legal entity.

NJ 116 - Nov 2013 IDA-Publication.indd
Designed by Brand and Communication, India