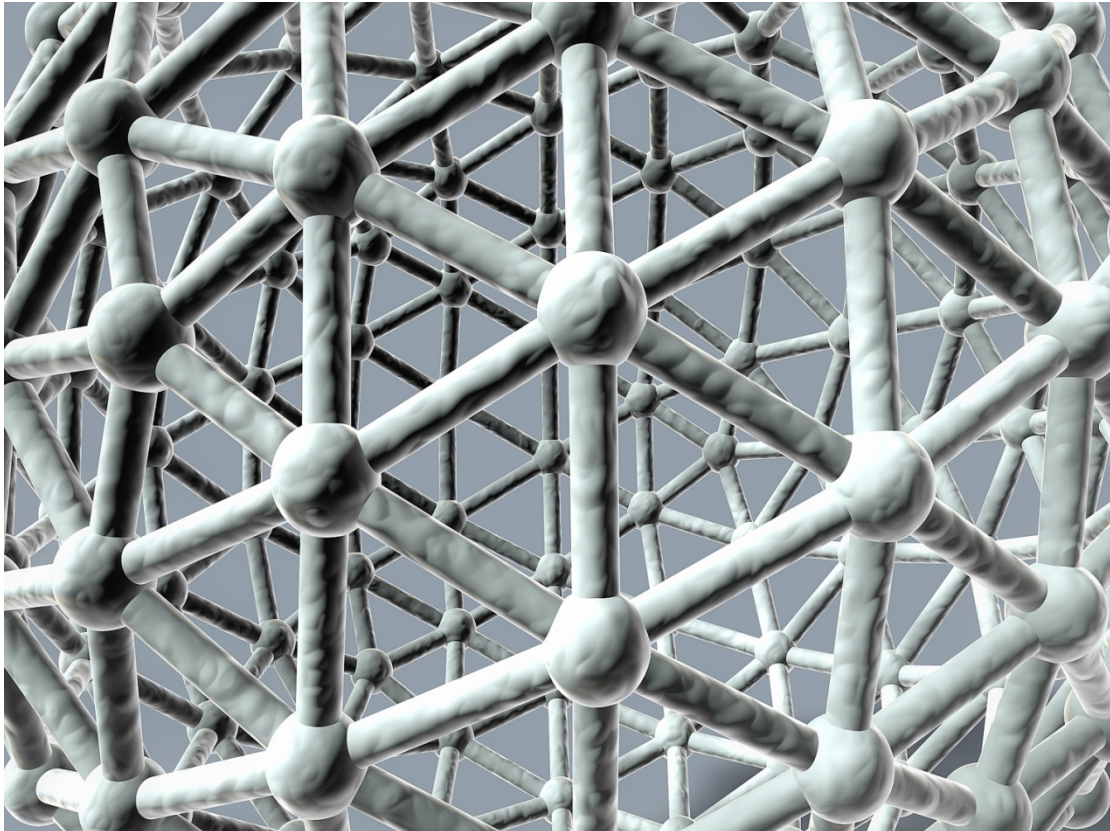


ENTERPRISE ARCHITECTURE AS PLATFORM FOR CONNECTED GOVERNMENT

Understanding the Impact of Enterprise Architecture on Connected Government A Qualitative Analysis



NUS – Microsoft Government Enterprise Architecture Research Project
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0 INTRODUCTION

0.1 DEFINING ENTERPRISE ARCHITECTURE

Enterprise Architecture is the inherent design and management approach essential for organizational coherence leading to alignment, agility and assurance¹.

Structured enterprise architecture (EA) approach is often used to plan and implement efficient and effective transformation efforts. However, the strongest driver for EA is to improve service delivery and overall performance within the organization's business segments. The principal challenge faced by chief architects today, is to institute an EA program that is able to coordinate sustainable changes throughout the enterprise, while simultaneously mentoring the specific transformation planning that is needed to support the mission.

In a nutshell, EA is a robust planning function which helps organizations to understand the process by which business strategies turn into operational reality. Hence, establishing a standard methodology for conducting architecture planning and implementation is vital. Metaphorically, an EA is to an organization's operations and systems as a set of blueprints is to a city and its buildings. By following an architecture-based approach to systems development, organizations strive to address issues pertaining to: (1) business–IT alignment; (2) information accuracy and integrity; (3) infrastructure management; (4) security; (5) technology compatibility; (6) business value of IT; (7) IT governance; (8) business collaboration; and (8) procurement among others. Though EA is often assumed to follow an organization's strategy and to align IT with business objectives, increasingly, evidence of the reverse is also surfacing, in other words, organization strategies are being influenced by IT capabilities.

At a high-level, EA consists of a hierarchy of architectural domains that can be loosely associated with full EA delivery, as:

- ▶ The *business architecture* which defines the enterprise business outcomes, functions, capabilities and end-to-end business processes and their relationships to external entities required to execute business strategies;
- ▶ The *data / information architecture* which deals with the structure and utility of information within the organization, and its alignment with its strategic, tactical and operational needs;
- ▶ The *application architecture* which specifies the structure of individual systems based on defined technology; and
- ▶ The *technical architecture* which defines the technology environment and infrastructure in which all IT systems operate.

Successful EA not only captures the above four domains, but also the relationships between them. Having linkages between the four domains provides line-of-sight (or traceability) to the relevant stakeholders of the EA. Exhibit 0-1 depicts how EA is usually positioned within the organization. It is important to keep in mind that keeping EA linked upstream to

¹ **Source:** *Coherency Management – Architecting the Enterprise for Alignment, Agility and Assurance*; Gary Doucet, John Gotze, Pallab Saha & Scott Bernard; 2009.

strategic management and downstream to *portfolio management* and *system development lifecycle* provides an effective approach to business transformation. It thus allows for a complete lifecycle approach to business transformation.

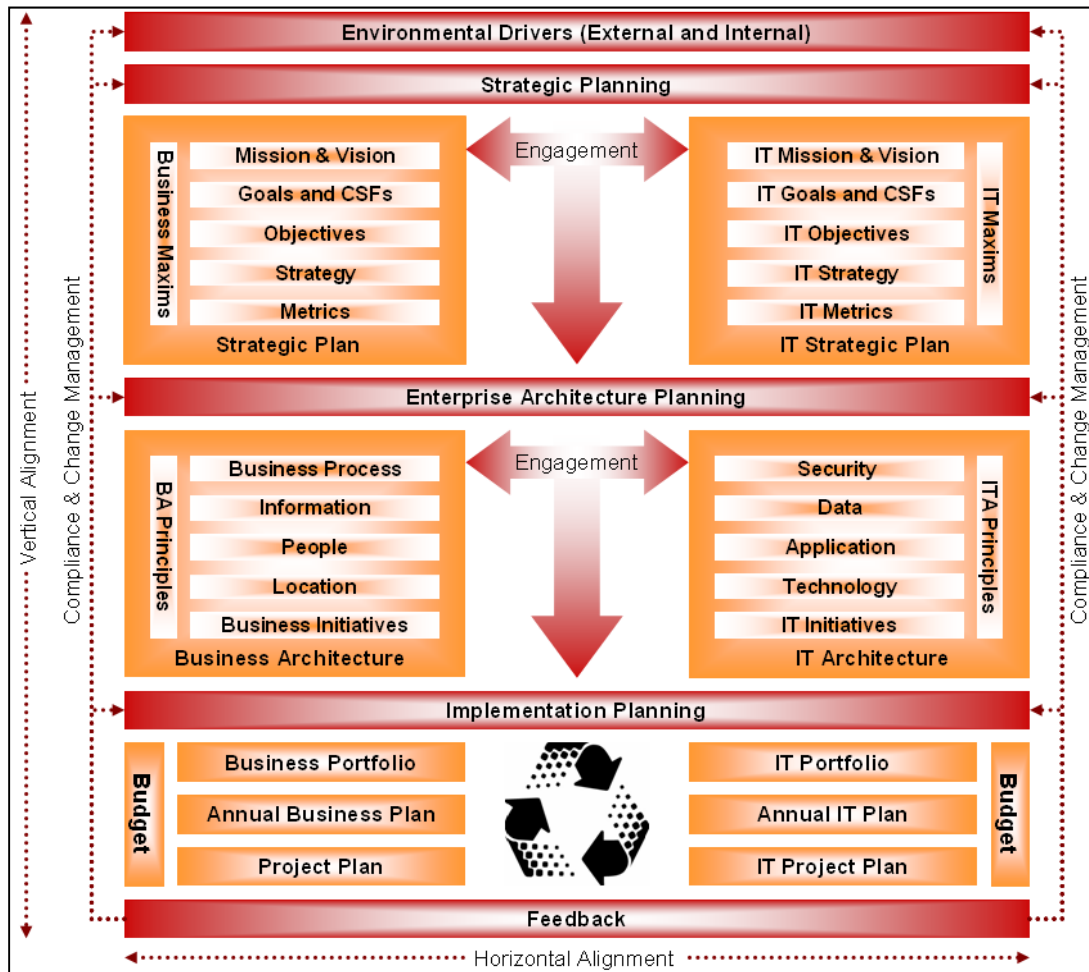


Exhibit 0-1: Enterprise Lifecycle with Architecture

EA effectively supports the business, enables information sharing across departments / divisions / organizations, enhances management's ability to deliver effective and timely services, and improves operational efficiencies. Committing to an on-going EA practice within an enterprise enables a business-aligned and technology-adaptive enterprise that is effective, efficient and agile.

0.2 WHY ENTERPRISE ARCHITECTURE MATTERS IN GOVERNMENT

Most governments worldwide are in the midst of substantial public sector transformation activities. A majority of these initiatives are triggered by the need to have better and seamless government services delivered online. The focus on automating government services often is a largely limited to specific ministries and agencies. However such initiatives lack the cross-ministry / agency viewpoint and coordination. This creates challenges in taking a whole-of-government (W-O-G) approach and concomitant benefits, which are much more than benefits derived by taking agency-centric viewpoints. These are clearly evident in the findings of the UN Global E-Government Survey 2010. According to the UN, the value of e-government will increasingly be defined by its contribution to national development. Lack of coherent strategy is often cited as the primary reason for under-development of e-

government. Moving forward, more and more countries are adopting national e-government strategies and multi-year action plans. And EA is the strategy that governments are increasingly looking towards. According to Haiyan Qian, Director of the Division for Public Administration and Development Management, United Nations Department of Economic and Social Affairs (UNDESA) “EA is an effective strategic planning tool for governments by [facilitating] creation of linkages and improving interoperability among government agencies, benefiting both internal operational processes as well as improved public service delivery to citizens.”

0.2.1 Understanding Connected Government

Connected government enables governments to connect seamlessly across functions, agencies, and jurisdictions to deliver effective and efficient services to citizens and businesses.

The United Nations (UN), in its Global E-Government Survey of 2008, used connected governance as its primary criteria to evaluate and rank national e-government programs. According to the survey report the concept of connected government is derived from whole-of-government approach which utilizes technology as a strategic tool and as an enabler for public service innovation and productivity growth, the two key outcomes being **innovation** and **productivity**. In continuation with this theme, the UN Global E-Government Survey of 2010 takes the concept of connected government even further and deeper, explicitly adding citizen-centricity as watchword. This approach to government service delivery requires countries to shift from a model of providing government services via traditional modes to integrated electronic modes wherein the value to the citizens and businesses gets enhanced. According to the UN such IT enabled services (e-services) can actually improve the rate and quality of public service delivery in times of economic crises.

Thus IT-enabled connected government, of which e-services are a crucial component, leads to several benefits, both internal to the provider agencies and governments and external to the consumer citizens and businesses. Exhibit 0-2 lists the benefits:

Benefits from IT-Enabled Connected Government	
Internal (To Provider Agencies and Governments)	External (To Consumer Citizens and Businesses)
<ol style="list-style-type: none"> 1. Avoidance of duplication 2. Reduction in transaction costs 3. Simplified bureaucratic procedures 4. Greater efficiencies 5. Richer communication & coordination 6. Enhanced transparency 7. Greater information sharing 8. Secure information management 	<ol style="list-style-type: none"> 1. Faster service delivery 2. Greater efficacy 3. Increased flexibility of service use 4. Innovation in service delivery 5. Greater participation and inclusion 6. Greater citizen empowerment 7. Greater openness and transparency

Exhibit 0-2: Benefits from IT-Enabled Connected Government

Government transformation is a long term endeavor which is seldom impacted by any short term technology trends. In their transition towards connected government, all governments must traverse through the four primary stages of e-government capability and maturity, each representing a progressively higher level in the government transformation continuum. The four widely used stages of e-government capability and maturity are; **web-presence**, **interaction**, **transaction** and **transformation**. Furthermore, connected government is the

desired state that countries strive to reach as part of the **transformation** level of e-government maturity. However, it is not very straightforward to describe what connected government actually means and its implications to countries.

Based on current state of practice and available literature, connected government is expected to entail certain characteristics and capabilities. These characteristics and capabilities, described below, are clearly stated to be the key contributors to e-government development according to the UN E-Government Survey 2010. These characteristics and capabilities, structured as dimensions, allow connected government to be viewed as a multi-dimensional construct. The dimensions of connected government are:

- ▶ **Citizen centricity:** This refers to viewing the government from outside-in, i.e. understanding the requirements and expectations of the citizens becomes the pre-eminent guiding principle for all government policies, programs and services. In short, this represents the service-dominant logic which requires the government to operate as one enterprise and organize around citizen demands and requirements. Aside from the citizens per se, other government constituents, such as businesses and civil organizations are captured in the **social inclusion** dimension described later.
- ▶ **Common infrastructure and interoperability:** This refers to the use of standards and best practices across governments so as to encourage and enable sharing of information in a seamless manner. Interoperability is the ability of organizations to share information and knowledge within and across organizational boundaries. The underlying foundation for effective interoperability comes from standardized common infrastructure;
- ▶ **Collaborative services and business operations:** Connected government requires ministries and agencies to collaborate. It is not difficult to uncover success stories about integration and interoperability at the technology level. However, to collaborate at the level of business services and functions needs political will. This is because collaboration at this level leads to shallower stovepipes, elimination of redundant or overlapping services and discovery of common and shared services, which in turn lead to loss of authority and control for some;
- ▶ **Public sector governance:** This refers to the decision rights and the accountability framework required to implement all the other strategies for connected government. Good governance is a non-negotiable factor in the success of the connected government, more so for countries that have multiple levels of governments (i.e. federal / central; state / provincial; and town / city) where various levels could be administered by different political parties;
- ▶ **Networked organizational model:** As Theresa Pardo and Brian Burke discuss in their work on government interoperability, this refers to the need to accommodate new organizational models wherein the enterprise (in this context the whole of government) is a network of relatively autonomous ministries and agencies working in a coherent manner to deliver value to both citizens and businesses. This makes the whole-of-government a networked virtual organization (NVO) that operates seamlessly towards a common mission.
- ▶ **Social inclusion:** This refers to the ability of governments in moving beyond horizontal and vertical integration of government service delivery to engaging the citizens and businesses at relevant points in the policy and decision making processes. E-democracy and social inclusion ensures that delivery of government

services is not a one-way interchange. Innovative ways of using technology to facilitate constituent participation and building a consultative approach is an imperative for the success of connected government; and

- **Transparent and open government:** This refers to the political doctrine which holds that the business of government and state administration should be opened at all levels to effective public scrutiny and oversight. In its broadest construction it opposes reason of state and national security considerations, which have tended to legitimize extensive state secrecy.

The levers that contribute to performance along the dimensions are presented in Section 0.4 of this report. In addition, connected government is expanded to include four evolutionary stages, described in Section 2 of this report. Together, they allow much greater clarity and granularity in the description, role, structure and implications of connected government that so many countries are seeking to achieve.

0.2.2 Role of Government Enterprise Architecture

According to the UN, moving to connected government requires a holistic and coherent framework, which cannot be achieved by piecemeal approaches and mechanisms. Such a framework recognizes the integrated presence of e-government both as an internal driver of transformation within the public sector and an external driver of better governance.

Typically governments are the largest organizations. They are further characterized by complex federated structures where individual government organizations work in their respective silos. Often this leads to fragmented business processes and duplicated systems and technologies, creating obstacles in cross agency interoperability. Government-wide architecture allows end-to-end business processes, standard technologies, rationalized data structure and modularized e-services that can be assembled as required to deliver e-services.

EA is a critical success factor for all types, scale and intensities of e-government programs. The key goal of EA in government organizations is to make them citizen-centered, results-oriented and market-based. Governments usually pass through different evolutionary stages in their EA journeys. The MIT Center for Information Systems Research identifies four such evolutionary stages; **business silos, standardized technology, rationalized data and applications** and **business modularity**. Even though standardization of technology is strictly not a prerequisite, it is a valid entry point into the EA journey for many countries. The primary reasons being: (1) EA programmes are largely driven by the CIO / IT Department, hence they have maximum control over the technology infrastructure; (2) this is an area where tangible benefits can be demonstrated fairly quickly. These two reasons make technology standardization as an attractive entry point, even though countries (and governments) must move beyond this to other stages of EA evolution to derive full benefits. However, the caveat is that transitioning to higher levels of evolution requires greater involvement of a broad range of stakeholders and government constituents.

Interestingly, there exists a positive correlation between the **desired level of e-government capability and maturity** and the **required level of architectural maturity**. Exhibit 0-3 depicts this relationship.

E-Government Maturity Stages	Government EA Maturity Stages			
	Business Silos	Standardized Technology	Rationalised Data and Applications	Business Modularity
1. Web Presence	√			
2. Interaction	√	√		
3. Transaction		√√	√	
4. Transformation (Connected Government)			√√	√√√

Exhibit 0-3: High Level Relationship of Government EA and E-Government Maturity

0.3 ABOUT THE RESEARCH

Sections 0.1 and 0.2 are intended to provide a general overview about the key components of this research, namely; **enterprise architecture, e-government (connected government) and the relationship between the two.**

Connected government as a goal is gaining acceptance and popularity. This is demonstrated by various e-government surveys that are conducted regularly by different organizations including the UN. The expanding role of EA as a central component for e-government programs is substantiated by the fact that several countries have taken a legislative approach to embracing and adopting EA. Furthermore, there have been several EA surveys conducted in the past few years. Hence, individually (e-government and EA) are well understood, richly documented and regularly assessed and researched.

This research addresses the gap in current literature in terms of linking and understanding the relationship between e-government and government EA. Within this broader context, the focus is specifically on uncovering and comprehending the relationship between government EA and connected government. The primary reason for focusing on connected government is because this is the area where government EA has the highest potential for influence and as a result the highest levels of benefits derivation.

In summary, the aim is to address the questions “**can enterprise architecture act as a platform for connected government?**” and “**what will it take for enterprise architecture to do so?**” substantiating this with empirical evidence.

0.3.1 Objectives

This research aims to:

- A. Identify and develop the dimensions of connected government and position it as a multi-dimensional construct.
- B. Specify the levers that positively influence the various dimensions of connected government.
- C. Understand the role of enterprise architecture (either as facilitator or inhibitor) in achieving connected government.
- D. Identify the enterprise architecture capabilities and structure them as meta-framework so as to act as a positive factor to connected government.

- E. Document case studies and experience reports of successful use of enterprise architecture in transitioning to some or all stages of connected government.

0.3.2 Structure of the Research

This work is organized into four logically sequenced phases. Collectively, the four phases address all the above research objectives.

- **Phase 1: Phase 1 report** (this report) documents the part of the research that focuses primarily on Objective A and establishes the context and background for Objectives B, C and D;
- **Phase 2: Phase 2 report** documents the part of the research that focuses primarily on Objectives B and C;
- **Phase 3: Phase 3 report** documents the part of the research that focuses primarily on Objective D; and
- **Phase 4: Phase 4 report** documents the part of the research that focuses primarily on Objective E. In addition, this report also integrates and summarizes the findings across the four phases.

0.4 ASSESSMENT FRAMEWORK

In order to study and analyze government EA frameworks and associated activities an assessment framework has been established and utilized for the rest of the study. In alignment with the research objectives in Section 0.3.1, the **Enterprise Architecture Assessment Framework for Connected Government (EAAF-CG)** is based on the dimensions of connected government presented in Section 0.2.1. Exhibit 0-4 summarizes the established assessment framework along with the **dimensions** and **levers**. Connected government is systemic in nature. This makes the relationships between **dimensions** and **levers** causal and mutually reinforcing among and between themselves by design.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Levers to Connected Government Dimensions
1. Citizen Centricity	A. Citizen requirements & expectations B. Government appears and operates as one C. Multiple channels of engagement D. Adaptability of government services
2. Common Infrastructure & Interoperability	A. Technology standards B. Government-wide applications & systems C. Data exchange standards D. ICT & infrastructure management
3. Collaborative Services & Business Operations	A. Collaborative business functions B. Shared services C. Shared information D. Service innovation & back office reorganization
4. Public Sector Governance	A. Business function ownership B. Business outcome accountability C. Governance structures, policies and practices D. Institutionalization of governance
5. Networked Organizational Model	A. Multi-stakeholder cooperation B. Ministry / agency and government level autonomy C. Cluster based approach and common mission D. Value network

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Levers to Connected Government Dimensions
6. Social Inclusion	A. Citizen engagement at various levels B. Citizen outreach C. Responsive government
7. Transparent & Open Government	A. Public scrutiny and oversight B. Data discovery, availability and accessibility C. Performance management and accountability D. Legal Framework(s)

Exhibit 0-4: Enterprise Architecture Assessment Framework for Connected Government

1 SURVEY OF GOVERNMENT ENTERPRISE ARCHITECTURE

This section presents a qualitative evaluation of the role of government EA programs in achieving connected government. The evaluation, based on publicly available information (i.e. information available via government websites and other literature) focuses on countries in the Asia-Pacific region.

To put this study in perspective, key points that influenced the research design and objectives are explained below.

- A. In the past few years several surveys on EA have been conducted both in the government and the private sectors. However, the underlying commonality in all of these surveys is the primary objective of assessing the maturity of EA itself as a stand-alone strategic technology management practice. In other words, these surveys typically tend to evaluate EA as an **end**. Currently there are no surveys that investigate the role and influence (impact) of government EA to various aspects of e-government, i.e. evaluating EA as a **lever** to connected government.
- B. The assessment of government EA programs are based on publicly available information. In the situation wherein government websites for countries in the Asia-Pacific region may not share all the information, the survey findings are adequately tempered. The intention of the survey in this phase is not to pin-point inadequacies but to derive a general sense and direction in an aggregated manner. This phase builds the foundation, while Phase 2 of this research goes into specifics and collects primary data through a questionnaire survey.
- C. Government EA efforts in the North America and Western Europe are well studied. It is on purpose that this research focuses on countries in the Asia-Pacific region. There simply are no studies addressing this region. Nonetheless, it is clear that this research is timely because countries in the Asia-Pacific region are expending serious efforts in improving their respective e-government programs. This provides an excellent investigative canvas to the study.

Section 0-2 identified and described the dimensions of connected government and Section 0-4 presented the levers that contribute to the dimensions of connected government. The EA assessment framework is derived out these two, wherein the impact of government EA on levers and dimensions of connected government are analyzed. Exhibit 1-1 pictorially represents the purpose and approach taken in this research study. For deeper analysis, six levels of impact are defined. The levels of impact (influence) are specified in Exhibit 1-2.

It important to note that the **dimensions** and **levers** of connected government and **impact levels** of government EA together form the foundation for countries reaching the connected government stage in their respective e-government journeys. However, connected government is too coarse as an assessment index or metric, as used by the UN surveys. There is a need to establish a fine-grained mechanism for understanding connected government as a desirable capability. Hence four granular evolutionary stages of connected government are presented and discussed in Section 2.

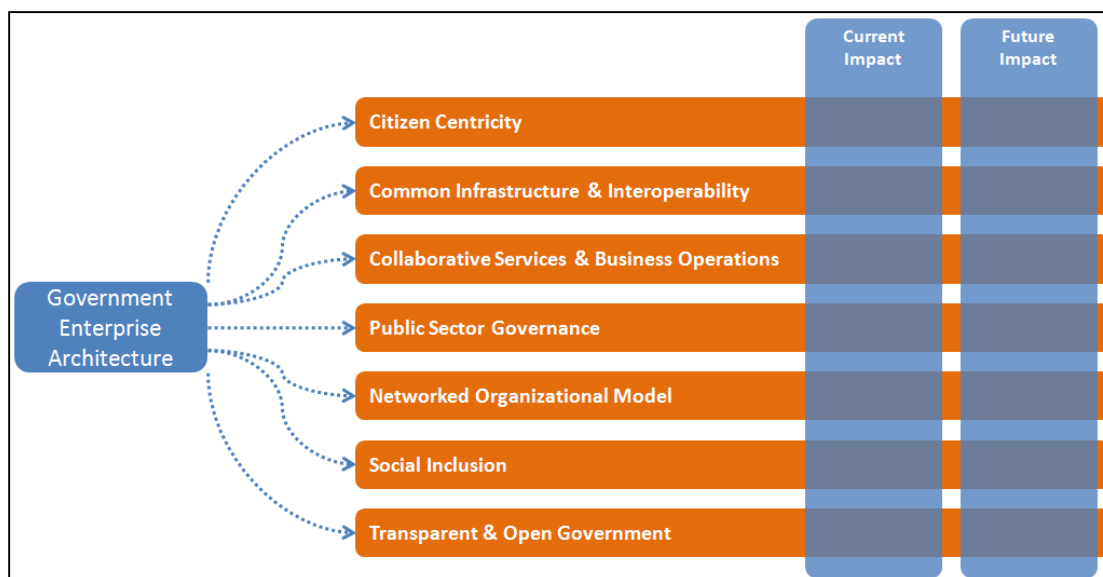


Exhibit 1-1: Modeling EA as Platform for Connected Government

Levels of Impact of EA on Connected Government	
Levels of Impact	
Level 0 → None	This indicates that EA has no influence on connected government. There may be elements of this connected government dimension existing in the e-government programs, but they are isolated and independent of EA.
Level 1 → Marginal	This indicates, if at all, EA has minimal influence on connected government. It is characterized by ad-hoc, spotty and inconsistent influence. The elements of EA that have the potential to influence are being put in place.
Level 2 → Localized	This is indicative of partial influence on connected government. The elements of EA with clarity of purpose are specified, and the influence is ad-hoc and localized to a few lines of business, ministries and agencies.
Level 3 → Defined	This is indicative of continuous and consistent influence on connected government. The elements of EA are clearly defined, their roles in e-government programs specified and outcomes established. However the EA itself may be positioned a recommended good practice, but not mandatory.
Level 4 → Institutionalized	This is indicative of continuous and consistent influence on connected government. The elements of EA are clearly defined, their roles in e-government programs specified, outcomes established and continuously tracked. Government EA efforts are internalized and embraced widely across the whole-of-government. However there could be a tendency that linkages between the various dimensions of connected government are ambiguous.
Level 5 → Optimized	This exhibits all the characteristics applicable to Level 4. In addition, the linkages between the different dimensions of connected government are made explicit and the EA activities and programs are optimized around these inter-connected / correlated dimensions to derive the highest levels of benefits.

Exhibit 1-2: Levels of Impact of EA on Connected Government

1.1 UNITED ARAB EMIRATES

United Arab Emirates (UAE)'s approach to e-government is unique in the sense that some the larger, prominent and affluent emirates (Abu Dhabi and Dubai) have a very modern and comprehensive collection of government services that are efficient and largely IT-enabled. On the other hand a federal level e-government strategy seems to be absent. UAE's federal e-government portal (<http://www.government.ae/gov/en/index.jsp>) is currently under construction. In contrast Abu Dhabi's e-government portal (<http://www.abudhabi.ae/>) and Dubai's e-government portal (<http://www.dubai.ae/en.portal>) portray a citizen friendly and modern image. Some of smaller emirates like Sharjah, Ras Al Khaimah and Fujairah have e-government activities on a smaller scale and most likely subsumed within the larger emirates. Exhibits 1-3 and 1-4 show UAE's ranking in the UN Global E-Government Survey 2010.

UN Department of Economics and Social Affairs (UNDESA)					
UN Global E-Government Survey 2010					
UN E-government Development Index 2010					
Rank	Country	Index value	Of which		
			Online service component	Telecommunication infrastructure component	Human capital component
44	Bulgaria	0.5590	0.1392	0.3086	0.1112
45	Poland	0.5582	0.1317	0.3152	0.1113
46	Kazakhstan	0.5578	0.1792	0.3194	0.0593
47	Romania	0.5479	0.1414	0.3045	0.1021
48	Argentina	0.5467	0.1403	0.3136	0.0928
49	United Arab Emirates	0.5349	0.0853	0.2703	0.1793
50	Kuwait	0.5290	0.1565	0.2892	0.0833
51	Jordan	0.5278	0.1813	0.2869	0.0596
52	TFYR Macedonia	0.5261	0.1090	0.2916	0.1255
53	Mongolia	0.5243	0.1889	0.3012	0.0342
54	Ukraine	0.5181	0.1177	0.3184	0.0821
55	Antigua and Barbuda	0.5154	0.0410	0.3014	0.1730

Exhibit 1-3: UAE in the UN Global E-Government Development Index 2010

UN Department of Economics and Social Affairs (UNDESA)			
UN Global E-Government Survey 2010			
E-Participation Index			
Rank	Country	Index value	
86	Russian Federation	0.1286	
86	Trinidad and Tobago	0.1286	
86	United Arab Emirates	0.1286	
97	Cambodia	0.1143	
97	Cuba	0.1143	

Exhibit 1-4: UAE in the UN Global E-Participation Index 2010

Even though UAE does not appear within the top 50 in the overall rankings, the following observations can be made:

- A. Given the overall affluence of the country, UAE has invested substantially in the physical telecommunication and IT infrastructure. This is evidenced by the relatively high ranking that UAE gets in the Telecommunication Infrastructure Component in Exhibit 1-5. Undoubtedly, a good telecommunication and IT infrastructure provides

UN Department of Economics and Social Affairs (UNDESA)							
UN Global E-Government Survey 2010							
Telecommunication Infrastructure Index and its Components							
Rank	Country	Index value	Estimated Internet users per 100 inhabitants	Main fixed telephone lines per 100 inhabitants	Mobile subscribers per 100 inhabitants	Personal computers per 100 inhabitants	Total fixed broadband per 100 inhabitants
22	Belgium	0.5698	66.53	42.08	111.63	42.02	27.97
23	New Zealand	0.5648	69.76	41.37	109.22	52.97	21.63
24	Barbados	0.5513	73.86	58.93	132.00	15.79	21.77
25	United Arab Emirates	0.5434	65.15	33.63	208.65	33.08	11.79
26	Liechtenstein	0.5412	65.08	55.40	90.58	39.61
27	San Marino	0.5330	51.37	68.30	56.76	79.00	12.83
28	Japan	0.5242	69.16	40.21	86.73	40.87	23.65
29	Antigua and Barbuda	0.5241	75.03	43.86	157.67	20.68	14.52

Exhibit 1-5: UAE in the Telecommunication Infrastructure Component Index 2010

- B. Analyzing the Online Service Component depicted in Exhibit 1-6 shows that UAE barely gets any points for offering IT enabled government services that require integration and collaboration between the various ministries and agencies.

UN Department of Economics and Social Affairs (UNDESA)						
UN Global E-Government Survey 2010						
Online Service Index and its Components						
Rank	Country	Index value	Points for emerging information services	Points for enhanced information services	Points for transaction services	Points for connected approach
95	Lesotho	0.2635	52	29	1	1
95	Paraguay	0.2635	39	18	16	10
97	Sri Lanka	0.2603	33	30	6	13
98	Nicaragua	0.2540	34	25	16	5
99	United Arab Emirates	0.2508	46	26	2	5
100	Georgia	0.2476	45	17	5	11
100	Pakistan	0.2476	33	36	5	4
102	Indonesia	0.2444	41	25	4	7

Exhibit 1-6: UAE in the Online Service Component Index 2010

Overall, UAE displays the political will to transform its e-government program and move up the capability and maturity stages. It has laid the foundation through substantial investments in the base telecommunication and IT infrastructure but yet to utilize the same to its full potential.

Recently, there have been some efforts on the government EA front. These efforts are led by the larger emirates and a few leading ministries and agencies. Based on publicly available information, Abu Dhabi is taking the lead through its government services transformation program (<http://adsic.abudhabi.ae/Sites/ADSIC/Navigation/EN/root.html?>). As part of its e-government strategy, it has adopted the Environment-Readiness-Usage (E-R-U) framework. Across these three dimensions the strategy is being implemented via 105+ initiatives, which are logically grouped into 70+ project charters, all of which being cross-ministry / cross-agency in nature. The e-government strategy and implementation plan are supported by enabling activities that include IT architecture and standards, government shared infrastructure, interoperability, information security and IT planning and management support. The **Abu Dhabi IT Architecture and Standards (IT A & S) Version 2.0** was released in 2009. The Abu Dhabi IT A & S consists of eight domains; **Business, Access and Presentation, Application, Data, Integration, Infrastructure, Security and Operations**. These domains are supported by the **IT A & S Governance Framework**. Other than Abu Dhabi,

Dubai Customs is also a leading agency in embracing EA, which is targeted to achieve its goal of **Enterprise Connected View (ECV)**.

At the federal level, the General Information Authority (GIA) is currently involved in drawing up a plan for UAE to build its national EA. This is evidenced through the efforts underway via leading emirates and agencies. Qualitative analysis of the UAE's approach is summarized in Exhibit 1-7.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
1. Citizen Centricity	<p>In general, the government services available via various portals are citizen and business friendly. Procedures to solicit feedback from the citizens have been in put place. Citizens are able to connect to the government through various channels. However the whole-of-government approach is currently lacking. Layer 1 (Business) and Layer 2 (Access & Presentation), which seems to be the most likely place in the IT A & S where citizen centricity can be embraced currently does not show evidence of single enterprise approach.</p> <p>[ASSESSED CURRENT IMPACT → MARGINAL]</p>
2. Common Infrastructure & Interoperability	<p>The Abu Dhabi IT A & S provides the means to positively influence this dimension. All aspects of common infrastructure and interoperability are covered via the eight layered framework. Despite good overall effort in Abu Dhabi, there is no current evidence of government-wide mindset. However the strength is that the IT A & S can easily be extended at the whole-of-government level with some adaptation.</p> <p>[ASSESSED CURRENT IMPACT → LOCALIZED]</p>
3. Collaborative Services & Business Operations	<p>Evidence of cross-agency collaboration at a business level is seen in the various government services provided through the portals. Clearly some of the services require back office integration and sharing of relevant information. However such efforts are concentrated in some areas and there is no evidence that such efforts and activities are a result of EA.</p> <p>[ASSESSED CURRENT IMPACT → MARGINAL]</p>
4. Public Sector Governance	<p>In general, it seems UAE as a whole till date has taken a fairly decentralized approach to governance. This allows individual emirates and agencies within them to work towards their own standards of excellence. For instance even Abu Dhabi Systems & Information Center (ADSIC) views the IT A & S as a best practice set of recommendations, but not mandatory for the agencies. However the IT A & S Governance Framework is a step in the right direction.</p> <p>[ASSESSED CURRENT IMPACT → MARGINAL]</p>
5. Networked Organizational Model	<p>UAE's current architecture activities are foundational and unlikely to impact this dimension at this point. The political and administrative structure however is conducive to the concept of NVO, where in the seven emirates could form the hubs of the network, supported by federal agencies in a coordinated manner.</p> <p>[ASSESSED CURRENT IMPACT → NONE]</p>
6. Social Inclusion	<p>There is evidence that individual emirates make an effort to involve the citizens by collecting feedbacks to various operations of the government. There could be inconsistencies across the emirates and currently there is nothing in the government EA that looks to address this dimension.</p> <p>[ASSESSED CURRENT IMPACT → NONE]</p>
7. Transparent & Open Government	<p>Some government information is shared and made available publicly. For instance the complete e-government strategy, implementation and IT A & S are available via the ADSIC website. It is not clear how much of government operations and information is open to public scrutiny.</p> <p>[ASSESSED CURRENT IMPACT → NONE]</p>

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
<p>SUMMARY</p> <p>The UAE has taken initial efforts in defining its architecture standards. Overall the impact of its government EA to connected government varies between Level 0 (NONE) and Level 2 (LOCALIZED) for the following reasons:</p> <ul style="list-style-type: none"> A. The architecture activities are generally fragmented and the whole-of-government approach is lacking. B. The architecture activities are led by a few ministries and agencies. C. The architecture activities are foundational in nature. D. There is no information available of the future planned activities pertaining to the government EA. E. The assessment is supported by UAE's overall e-government ranking. 	

Exhibit 1-7: UAE's Current Impact of EA on Connected Government

1.2 AUSTRALIA

Driven by sustained efforts and a well planned and executed strategy, Australia is a forerunner in embracing e-government. Even though it has a large geographical area, Australia is a relatively small country in terms of population. This makes it relatively simpler for it to plan and execute its e-government program. The Department of Finance and Deregulation, through the Australian Government Information Management Office (AGIMO) (<http://www.finance.gov.au/e-government/index.html>), works across the government to maintain Australia's position as a leader in the productive application of information and communications technologies to government administration, information and services. This is clearly reflected in its ranking in the UN Global E-Government Survey 2010 in Exhibits 1-8 and 1-9.

UN Department of Economics and Social Affairs (UNDESA)					
UN Global E-Government Survey 2010					
UN E-Government Development Index 2010					
Rank	Country	Index value	Of which		
			Online service component	Telecommunication infrastructure component	Human capital component
5	Netherlands	0.8097	0.2310	0.3257	0.2530
6	Norway	0.8020	0.2504	0.3262	0.2254
7	Denmark	0.7872	0.2288	0.3278	0.2306
8	Australia	0.7863	0.2601	0.3278	0.1983
9	Spain	0.7516	0.2601	0.3231	0.1683
10	France	0.7510	0.2321	0.3225	0.1965

Exhibit 1-8: Australia in the UN Global E-Government Development Index 2010

UN Department of Economics and Social Affairs (UNDESA)		
UN Global E-Government Survey 2010		
E-Participation Index		
Rank	Country	Index value
1	Republic of Korea	1.0000
2	Australia	0.9143
3	Spain	0.8286
4	New Zealand	0.7714

Exhibit 1-9: Australia in the UN Global E-Participation Index 2010

Overall, Australia's e-government is a result of several years of sustained effort. It is both broad and deep. According to the **Australian's use and satisfaction with e-government services** survey 2009, e-government in Australia has stabilized and demonstrates citizens' satisfaction with the way they interact with the government. AGIMO has developed and published several best practices, frameworks, standards and policy documents in areas of IT management that have direct influence to Australia's e-government programs. In addition to the efforts at the federal level, efforts by the various states also demonstrate high degree of maturity. However it is not very clear how the efforts at the federal and state levels are coordinated and aligned.

Efforts in the area of Government EA in Australia led to the release of the first versions of the **Cross-Agency Services Architecture Principles** and the **Australia Government Architecture (AGA) Reference Models** in 2007. The second version of the **AGA Reference Models** was released in the end of 2009, indicating that there is ongoing effort in this area. The AGA enables cohesive and consistent delivery of government services in a more cost-effective manner, by providing a framework that: encourages the use of a common vocabulary for agencies involved in the delivery of cross-agency services; provides mechanism to identify duplicate, re-usable and shared services; presents a standard approach to review investments in IT-enabled government services and enables cost-effective and timely delivery of ICT services through a repository of standards, principles and templates that assist in the design and delivery of ICT capability and, in turn, business services to citizens. AGA, adopted from the United States Federal Enterprise Architecture Framework (FEAF), represents Australia's foray into EA at the federal level. There are evidences of similar efforts at the state level. The following observations can be made with regard to Australia's journey:

- A. There is no clarity as to how the architecture frameworks, standards, principles and policies between the federal level and states are coordinated. Based on available information, the associations and the inter-dependencies are unclear at this stage.
- B. The AGA currently consists of only the principles and the four reference models. For AGA to be implementable and its goals realizable, it needs to be augmented with several other key components.
- C. AGIMO over the years has developed and published several best practices, frameworks, standards and policy documents in areas of IT management. Linkages to and from IT management practices to AGA are still not available.

Despite some of the visible gaps presented above, Australia is well-respected for its mature and capable e-government. With the AGA, its intentions are clear. Qualitative analysis of Australia's approach is summarized in Exhibit 1-10.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
1. Citizen Centricity	With a respected e-government program, Australia has been able to build in citizen requirements and factor in their expectations. Despite the efforts at the state level towards EA, its foray into utilizing national level EA for enhancing citizen centricity is in its initial stages. [ASSESSED CURRENT IMPACT → LOCALIZED]
2. Common Infrastructure & Interoperability	Reviewing the AGA (and other state level EA standards), the Data, Application and Technology Reference Models are a perfect fit to address this dimension. Hence it is clear that the relevant pieces are in place along with the necessary enforcement mechanism at the federal level.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
	[ASSESSED CURRENT IMPACT → DEFINED]
3. Collaborative Services & Business Operations	<p>Reviewing the AGA (and other state level EA standards), the Business Reference Model is a good fit to address this dimension. Hence it is clear that the relevant pieces are in place. However it is important to factor in the challenges faced in enforcing business level collaboration as compared to technical collaboration.</p> <p>[ASSESSED CURRENT IMPACT → DEFINED]</p>
4. Public Sector Governance	<p>Australia has put in place the structures, policies, frameworks and standards to improve its governance. However, per the Gershon Report of August 2008, it is characterized by weak enforcement, especially at the federal level. Within the AGA, the cross-agency services architecture principles partially address governance.</p> <p>[ASSESSED CURRENT IMPACT → LOCALIZED]</p>
5. Networked Organizational Model	<p>Referring back to the Gershon Report of August 2008, there seems to be indications where in Australia is considering the use of shared services. States like Queensland and Victoria demonstrate higher maturity in using shared services than the federal government. However, the role of EA (especially the business reference model) in identifying such services is unclear.</p> <p>[ASSESSED CURRENT IMPACT → LOCALIZED]</p>
6. Social Inclusion	<p>Citizen engagement and social inclusion are the two themes of the recently released Government 2.0 Task Force Report. The report makes 13 recommendations, a large number of which can be influenced by architecture. It is unclear how the recommendations are to be implemented.</p> <p>[ASSESSED CURRENT IMPACT → MARGINAL]</p>
7. Transparent & Open Government	<p>The central recommendation in the Government 2.0 Task Force Report pertains to open government. This clearly demonstrates the intended purpose. Australia ranks high on freedom of information. The current version of AGA does not provide any insights into to how this is to be addressed.</p> <p>[ASSESSED CURRENT IMPACT → MARGINAL]</p>
<p>SUMMARY</p> <p>Australia has taken steps in the right direction by establishing its AGA and Cross-Agency Services Architecture Principles. Overall the impact of its government EA to connected government varies between Level 1 (MARGINAL) and Level 3 (DEFINED) for the following reasons:</p> <ul style="list-style-type: none"> A. It already has a mature and capable e-government program as reflected by its ranking in the UN Global E-Government Survey 2010. B. The current AGA is a good effort but is not complete as a framework. It needs to be augmented with additional elements. C. Some states demonstrate better capabilities in dimensions of connected government, but that does not translate to capabilities at the federal level. D. The whole-of-government mindset is partly demonstrable. 	

Exhibit 1-10: Australia's Current Impact of EA on Connected Government

1.3 JORDAN

Jordan's e-government activities are well described in its e-government strategy which was published in 2006 and effective up to 2009. Its official government portal (http://www.jordan.gov.jo/wps/portal/General/?New_WCM_Context=/wps/wcm/connect/gov/eGov/Home/&lang=en) that contains information on e-government aims to provide a

one-stop-shop for all government services. The portal currently describes procedures for one thousand and eight hundred (1800) government services. These services span **government-to-citizen**, **government-to-business** and **government-to-government** categories. Availability of service descriptions in a step-by-step manner provides clarity to service consumers. Detailed service descriptions provide the foundation for e-service delivery. Jordan's rank in the UN Global E-Government Survey 2010 is shown in Exhibits 1-11 and 1-12.

UN Department of Economics and Social Affairs (UNDESA)					
UN Global E-Government Survey 2010					
UN E-Government Development Index 2010					
Rank	Country	Index value	Of which		
			Online service component	Telecommunication infrastructure component	Human capital component
49	United Arab Emirates	0.5349	0.0853	0.2703	0.1793
50	Kuwait	0.5290	0.1565	0.2892	0.0833
51	Jordan	0.5278	0.1813	0.2869	0.0596
52	TFYR Macedonia	0.5261	0.1090	0.2916	0.1255
53	Mongolia	0.5243	0.1889	0.3012	0.0342

Exhibit 1-11: Jordan in the UN Global E-Government Development Index 2010

UN Department of Economics and Social Affairs (UNDESA)			
UN Global E-Government Survey 2010			
E-Participation Index			
Rank	Country	Index value	
42	Brazil	0.2857	
42	Egypt	0.2857	
42	Jordan	0.2857	
45	Latvia	0.2714	
45	Lebanon	0.2714	

Exhibit 1-12: Jordan in the UN Global E-Participation Index 2010

From information available on Jordan's government portal, there seems to be evidence of planned and focused efforts aimed at improving its overall e-government capability. Developed by the Ministry of Information and Communication Technology (MOICT) Jordan's e-government strategy 2006 – 2009 identifies four pillars for its success: **institutional framework**; **legal framework**; **ICT infrastructure** and **business operations management**. Jordan has organized its e-government services into:

- ▶ E-services consisting of vertical, cross-organizational, shared and composite services;
- ▶ Managed services consisting of hosting services; and
- ▶ Support services consisting of e-government program support services and public sector department support services.

Overall, Jordan's e-government agenda has the foundations to enhance its capabilities. The role of government EA is formalized under its e-government architecture framework (e-GAF). The architecture aims to facilitate the development of e-services by the various government ministries in a federated approach. This means that the e-government program of Jordan defines the architecture standards and infrastructure that is needed for launch of

e-services in a consistent way across the government. The whole-of-government approach is visible. Jordan's e-GAF consists of: **EA for the e-government central platform; reference architecture framework for the ministries; interoperability framework (GEFI); governance framework; and a set of supporting standards and guidelines.** Jordan has adopted the Open Group Enterprise Architecture Framework (TOGAF) as the framework to establish the enterprise architecture for the e-government. In general, the following observations can be made:

- A. Jordan's e-government agenda is relatively clear and reflects a structured and sustained approach. This provides Jordan an excellent foundation to enhance its e-government capabilities. Jordan ranks a respectable twenty-two (22) on the online service component of the UN Global E-Government Survey 2010, reflecting its promising endeavor. From a planning perspective, Jordan takes a whole-of-government approach.
- B. Its government EA efforts, formalized as e-GAF, are an integral part of Jordan's e-government agenda. The e-GAF and its five components are part of one of the four primary pillars of e-government, thus demonstrating its primacy.

Jordan's e-GAF presents a complete and coherent perspective of its EA. Its overall e-government agenda and intentions and the role of e-GAF are clear and shows potential. Qualitative analysis of Jordan's approach is summarized in Exhibit 1-13.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
1. Citizen Centricity	The whole-of-government approach is visible. Different categories of service consumers (citizens, businesses and other government agencies) connect to the government via the portal. Adaptability in government services is high through the use of composite services. The e-GAF architecture vision identifies the need to be citizen-centric. [ASSESSED CURRENT IMPACT → DEFINED]
2. Common Infrastructure & Interoperability	The e-GAF framework for interoperability (GEFI) and the supporting standards and guidelines contribute fully to this dimension of connected government. The payment gateway, public key infrastructure and government national backbone are aimed at providing the infrastructural foundations. [ASSESSED CURRENT IMPACT → DEFINED]
3. Collaborative Services & Business Operations	Jordan's e-government services are well organized and form a consistent service catalog. Services requiring collaboration between different agencies, including private partners have been explicitly identified along with their priorities as part of the e-government strategy. Architecture building blocks required to enable such collaborative e-government services are part of the e-GAF thereby demonstrating strong linkages. [ASSESSED CURRENT IMPACT → DEFINED]
4. Public Sector Governance	The e-government strategy explicitly identifies the various stakeholders and their responsibilities with regard to the listed e-government services. Through this Jordan has been able to impart clarity in terms of the accountability and authority framework that is needed to achieve its e-government vision of reaching the highest level of maturity. The e-GAF architecture governance is an integral part of this overall governance. [ASSESSED CURRENT IMPACT → DEFINED]
5. Networked Organizational Model	Elements of networked virtual organization are covered within the cross-organizational e-services, shared services and composite services. These categories of services are characterized by multi-stakeholder collaborations, operational autonomy and grouping based on shared

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
	objectives and outcomes enabled by the e-GAF. [ASSESSED CURRENT IMPACT → DEFINED]
6. Social Inclusion	Jordan's government portal does not provide any information about the specific steps taken to address this dimension. The e-GAF target architecture does state enhancement of government responsiveness as one of its goals. [ASSESSED CURRENT IMPACT → MARGINAL]
7. Transparent & Open Government	Government openness and transparency is a stated goal in Jordan's target architecture. The e-government performance indicators facilitate management of the e-government. In addition, one of the four pillars of the e-government vision is the supporting legal framework. [ASSESSED CURRENT IMPACT → MARGINAL]
SUMMARY Jordan has put in place all the right ingredients wherein its government EA (called e-GAF) directly influences its e-government activities. The overall impact of its government EA to connected government ranges between Level 1 (MARGINAL) and Level 3 (DEFINED) for the following reasons: <ul style="list-style-type: none"> A. The national e-government agenda is defined and it takes a whole-of-government approach. B. Government EA is an integral part of the e-government agenda and the role of EA is explicitly mentioned. C. The targeted level of e-government maturity to be enabled by the architecture is clearly stated. D. The government takes a service oriented approach to e-government. 	

Exhibit 1-13: Jordan's Current Impact of EA on Connected Government

1.4 NEW ZEALAND

New Zealand (NZ) has been consistently recognized as a leader in e-government. E-government has contributed to embracing change and utilizing technology for enabling transformation. NZ's e-government strategy (<http://plone.e.govt.nz/about-egovt>) provides excellent insights into its strategic context, milestones, required actions, key stakeholders, implementation roadmap and activities, role of government EA and linkages to other relevant strategies. NZ's e-government journey and achievements are a result of its continuous efforts directed through the e-government strategy, which is now in its fourth edition, and is reflected aptly in its overall ranking shown in Exhibits 1-14 and 1-15.

UN Department of Economics and Social Affairs (UNDESA)					
UN Global E-Government Survey 2010					
UN E-Government Development Index 2010					
Rank	Country	Index value	Of which		
			Online service component	Telecommunication infrastructure component	Human capital component
12	Sweden	0.7474	0.1792	0.3200	0.2482
13	Bahrain	0.7363	0.2483	0.2948	0.1932
14	New Zealand	0.7311	0.2170	0.3278	0.1864
15	Germany	0.7309	0.1867	0.3146	0.2295
16	Belgium	0.7225	0.2126	0.3218	0.1880

Exhibit 1-14: NZ in the UN Global E-Government Development Index 2010

UN Department of Economics and Social Affairs (UNDESA)		
UN Global E-Government Survey 2010		
E-Participation Index		
Rank	Country	Index value
2	Australia	0.9143
3	Spain	0.8286
4	New Zealand	0.7714
4	United Kingdom	0.7714
6	Japan	0.7571

Exhibit 1-15: NZ in the UN Global E-Participation Index 2010

NZ's progressive e-government milestones are:

- By 2010, the operation of government will be transformed, as government agencies and their partners use technology to provide user-centered information and services and achieve joint outcomes; and
- By 2020, people's engagement with the government will have been transformed, as increasing and innovative use is made of the opportunities offered by network technologies.

These clearly exhibit clarity in approach and long term consistent focus. The NZ Federated EA (NZ FEA) was made an integral part of the e-government strategy in 2006 (<http://plone.e.govt.nz/standards/fea>). The NZ FEA aimed as a design approach, attempts to capture the benefits of both centralization and decentralization. By taking a whole-of-government approach the NZ FEA facilitates the achievement of the e-government milestones listed above. The NZ FEA currently consists of the Reference Models (RM) and adapts the United States' FEAF. Supported by the NZ FEA, NZ's e-government success characteristics according to the State Services Commission (<http://plone.e.govt.nz/>) are:

- **Convenience and satisfaction:** People have a choice of channels to government information and services that are convenient, consistent, easy to use, and deliver what they want in a way that suits their needs;
- **Integration and efficiency:** Information and services are integrated, packaged, and presented to minimize cost to government and users, and improve results for people, businesses, and communities; and
- **Trust and participation:** Government information is authoritative, reliable, and secure, and people and government are willing to share it across organizational and sectoral boundaries; people are better informed and better able to partner with government in delivering outcomes.

NZ is well on its way to achieving connected government. It has successfully established the foundational elements. Overall, the following observations can be made:

- A. Its e-government agenda with milestones up to 2020 is clear and exhibits sustained directed efforts. Taking a whole-of-government viewpoint, its e-government strategy is linked to **NZ Digital Content Strategy, Public Broadcasting Program, Geospatial and Justice Sector Information Strategy, Health Information Strategy and ICT Strategic Framework for Education**, thereby reflecting a coherent approach.

- B. The NZ FEA, though an integral part of the e-government, is currently a set of reference models. For it to be complete framework, several critical components need to be added in.
- C. The NZ FEA is currently an isolated and independent set of reference models. It is unclear how the five reference models (for now) and other critical components of the government EA (in future) are likely to be linked and designed as a single unified framework.

Qualitative analysis of New Zealand's efforts and outputs are summarized in Exhibit 1-16.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
1. Citizen Centricity	Citizen participation and user-centered services are the primary themes of NZ's e-government strategy. This is reflected both in long term milestones and its areas for success assessment. Key messages noticeable from the e-government agenda include: e-government is ubiquitous; builds trust, engages people and puts people first, enabled by the NZ FEA. [ASSESSED CURRENT IMPACT → DEFINED]
2. Common Infrastructure & Interoperability	Efforts in this dimension are characterized by programs pertaining to interoperability framework (e-GIF), web standards, meta-data, shared workspace, authentication standards and secure computing among others. Within the NZ FEA, the Service Reference Model (SRM), Data Reference Model (DRM) and Technical Reference Model (TRM) holistically connect all these individual streams of activities. [ASSESSED CURRENT IMPACT → INSTITUTIONALIZED]
3. Collaborative Services & Business Operations	Enhancing collaboration between and within government agencies and external stakeholders is a strategic thrust in the e-government agenda. The NZ FEA and e-GIF along with other standards are intended to provide the necessary foundational infrastructure to achieve collaboration. Specifically the Business Reference Model (BRM) promotes collaboration. [ASSESSED CURRENT IMPACT → INSTITUTIONALIZED]
4. Public Sector Governance	NZ's success of e-government depends on collaboration, horizontal and vertical integration and active involvement of all stakeholders. Within this context, a significant role is played by the public sector governance in the areas of cross-boundary decision making, wider state sector participation in e-government and optimizing the allocation of decision rights. However, the role of NZ FEA as a mechanism to achieve governance is at best implicit. [ASSESSED CURRENT IMPACT → LOCALIZED]
5. Networked Organizational Model	One of the six developmental goals for the state services is explicitly 'networked state services'. The correlation between this and other developmental goals is visible. The NZ FEA definitively aims to enable the networked model. [ASSESSED CURRENT IMPACT → INSTITUTIONALIZED]
6. Social Inclusion	Citizen engagement is the cornerstone of NZ's e-government strategy. The NZ FEA along with e-GIF and other standards are designed to encourage an inclusive and responsive government. The networked model plays a pivotal role in realizing social inclusion. [ASSESSED CURRENT IMPACT → DEFINED]
7. Transparent & Open Government	NZ has a comprehensive and ongoing open government initiative (http://open.org.nz/). It is already underway to establishing policy and legal frameworks to support the open government initiative. The NZ Government Open Access and Licensing Framework (NZGOAL) is one such example among few others. An important component of open government is open data, which is linked to the DRM in the NZ FEA. This is still work-in-

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
	progress. [ASSESSED CURRENT IMPACT → LOCALIZED]
SUMMARY New Zealand definitely represents a country that is diligently working towards achieving connected government. The overall impact of its government EA to connected government ranges between Level 2 (LOCALIZED) and Level 4 (INSTITUTIONALIZED) for the following reasons: <ul style="list-style-type: none"> A. The e-government strategy in its fourth edition represents a conscientious, directed and enduring national agenda that is targeted towards public sector transformation. B. The work program for government transformation and the e-government strategy roadmap incorporates the NZ FEA as an indispensable component. C. The e-government strategy acts a unifying framework for several initiatives and programs that are currently ongoing in the NZ government. D. The overall success of e-government is measured using a comprehensive set of criteria and metrics. 	

Exhibit 1-16: NZ's Current Impact of EA on Connected Government

1.5 SAUDI ARABIA

The Kingdom of Saudi Arabia (KSA) embarked on an ambitious e-government program derived out of its National Communications and IT Plan of 2005. The e-government program called the YESSER initiative (<http://www.yesser.gov.sa/english/default.asp>) is owned and managed by the Ministry of Communications and Information Technology (MCIT) and supported by the Ministry of Finance (MOF) and the Communication and Information Technology Commission (CITC). The YESSER initiative represents a comprehensive and unified e-government program for KSA with the following objectives: (1) To enhance public sector's productivity and efficiency; (2) To provide better and more easy-to-use services for individual and business customers; (3) To increase return on investment (ROI); and (4) To provide the required information in a timely and highly accurate fashion. The current YESSER program goes up to 2010 and its rather limited success is reflected in KSA's ranking in the UN Global E-Government Survey 2010 in Exhibits 1-17 and 1-18. A similar assessment by Gartner in 2007 places KSA between **Level II (Interaction)** and **Level III (Transaction)** on the E-Government Maturity Framework.

UN Department of Economics and Social Affairs (UNDESA)					
UN Global E-Government Survey 2010					
UN E-Government Development Index 2010					
Rank	Country	Index value	Of which		
			Online service component	Telecommunication infrastructure component	Human capital component
56	Mexico	0.5150	0.1500	0.2936	0.0713
57	Andorra	0.5148	0.0788	0.2903	0.1457
58	Saudi Arabia	0.5142	0.1058	0.2754	0.1330
59	Russian Federation	0.5136	0.1123	0.3101	0.0913
60	Montenegro	0.5101	0.1069	0.2940	0.1093

Exhibit 1-17: KSA in the UN Global E-Government Development Index 2010

UN Department of Economics and Social Affairs (UNDESA)		
UN Global E-Government Survey 2010		
E-Participation Index		
Rank	Country	Index value
102	Botswana	0.1000
102	Niger	0.1000
102	Saudi Arabia	0.1000
102	Sudan	0.1000
102	Togo	0.1000

Exhibit 1-18: KSA in the UN Global E-Participation Index 2010

Despite limited success, some of the notable components of the YESSER program include:

- ▶ National e-government strategy and action plan;
- ▶ Transformation measurement and funding mechanism;
- ▶ Regulatory and legal framework;
- ▶ YESSER building blocks (interoperability framework, government secure network, government service bus, data center, national contact center, national center for digital certification and the e-services framework);
- ▶ Centralized government services portal (<http://www.saudi.gov.sa>); and
- ▶ Other supporting specifications, standards and policies.

Overall YESSER presents a picture of an ambitious e-government agenda. It has the necessary components to propel KSA as the most mature e-government within the Gulf Cooperation Council (GCC) area. In its assessment in 2007, Gartner identified lack of whole-of-government approach as one of the key impediments to achieving YESSER's program objectives. This is further exacerbated by the fact that KSA's government EA is subsumed under its e-services enablement framework (http://www.yesser.gov.sa/english/eServices_Introduction.asp?menu=SupportingWork&id=eS01). Even though the e-services enablement framework mentions adapting best practices from EA frameworks (like Zachman and TOGAF), in itself it is more of a business process reengineering and automation approach, rather than an EA framework. Overall, the following observations can be made:

- A. The basic components of KSA's e-government program are in place. However, there seems to be a gap between planning and execution. It is possible that the impediments identified by Gartner may not have been eliminated.
- B. Some aspects of government EA are covered by the YESSER Framework for Interoperability (YEFI), e-services enablement framework, government service bus, e-government transactions methodologies and handbook and other best practices. However, a holistic framework for government EA taking the whole-of-government approach seems to be lacking at the moment.
- C. KSA's e-government takes a service-provider view. The current emphasis of the YESSER program is to ensure that the government services are delivered in the most efficient and secure way, i.e. takes an 'inside-out' view of the government.

Qualitative analysis of Saudi Arabia's efforts and outputs are summarized in Exhibit 1-19.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
1. Citizen Centricity	KSA's current e-government agenda emphasizes the need to deliver government services in the most efficient manner. Most services appear to be agency-centric. Soliciting citizen feedback in the e-services enablement framework is not explicit and evident. [ASSESSED CURRENT IMPACT → NONE]
2. Common Infrastructure & Interoperability	The e-services enablement framework, YEFI and other supporting specifications standards and policies within the e-government agenda evidence the intended role and impact. There are technical standards, initial data standards, national application projects and IT management in place. [ASSESSED CURRENT IMPACT → LOCALIZED]
3. Collaborative Services & Business Operations	The national e-government strategy and action plan clearly identifies and describes about 150 e-services to be IT enabled. These have been categorized and prioritized based on 'readiness' and 'impact' criteria. All services have an identified host agency and will most likely need collaboration between multiple agencies. The current architecture does not have the provision to identify common services. [ASSESSED CURRENT IMPACT → MARGINAL]
4. Public Sector Governance	KSA's public sector governance is not explicit in the e-government strategy and action plan. Consolidating all e-government activities as the YESSER program is definitely a positive development. Nonetheless, the e-services enablement framework in its current form is relatively primitive to impact this dimension. [ASSESSED CURRENT IMPACT → NONE]
5. Networked Organizational Model	KSA's national e-government strategy and plan targets the 'integrator' model. To achieve this, coordination and collaboration between various stakeholders is essential. There is some indication that KSA is embracing cluster based approach through the concept of communities of interest (COI). [ASSESSED CURRENT IMPACT → LOCALIZED]
6. Social Inclusion	There are indications that KSA is making efforts to solicit citizen engagement in some aspects of e-service lifecycle. The YESSER program does implicitly target government responsiveness as a secondary objective. The e-services enablement framework and YEFI provide limited directions. [ASSESSED CURRENT IMPACT → MARGINAL]
7. Transparent & Open Government	There is no direct indication as to how much of the government operations and information is open to public scrutiny. The e-services enablement framework in its current form is relatively primitive to impact this dimension. [ASSESSED CURRENT IMPACT → NONE]
SUMMARY <p>The YESSER program is a promising development for KSA. However, as identified by Gartner, there are impediments to its implementation and derivation of full benefits. The impact of KSA's government EA to connected government varies between Level 0 (NONE) and Level 2 (LOCALIZED) for the following reasons:</p> <ul style="list-style-type: none"> A. The architecture activities are generally primitive and subsumed within the e-services enablement framework. B. KSA's ranking in the current UN Global E-Government Survey 2010 indicates that a majority of the impediments identified by Gartner are yet to be addressed. C. Some components of collaborative government are in place, but there is a gap between planning and execution. There is no information available on the citizen feedback on the e-government activities. 	

Exhibit 1-19: KSA's Current Impact of EA on Connected Government

1.6 SOUTH KOREA

South Korea has had an impressive e-government journey in the past decade. It has jumped from 13th to 1st position between 2002 and 2010 in the UN Global E-Government surveys. Exhibit 1-20 summarizes South Korea's e-government journey from 1987 to 2012, while Exhibit 1-21 depicts its ranking in the past three UN Global E-Government Surveys.

E-Government Infrastructure Development (1987-2002)	Full-Fledged Implementation of E-Government (2003-2007)	Further Advancement of e-Government (2008-2012)
Goal Digitalization of government business processes, establishment of IT infrastructure	Goal Expansion of e-Government services through digitalization of overall government business processes	Goal Integration of e-Government systems for seamless delivery of public
Key Actions <ul style="list-style-type: none"> Digitization of government business processes (patent, customs, tax, etc.). Establishment of e-Government infrastructure. 	Key Actions <ul style="list-style-type: none"> Expansion and improvement of services for citizens and businesses Enhanced administrative efficiency and transparency through reform of government work method Linkage and connection among information systems 	Key Actions <ul style="list-style-type: none"> Customer-centric citizen services and enhanced public participation Intelligent administrative services through digital government network Real-time public safety information network Strengthened e-government infrastructure through enhanced privacy and security

Exhibit 1-20: South Korea's E-Government Journey from 1987 to 2012

Category	2005	2008	2010
E-Government Development Index	5 th	6 th	1 st
Web Measure	0.97 (4 th)	0.82 (6 th)	1.00 (1 st)
Telecommunication Infrastructure	0.67 (9 th)	0.69 (10 th)	0.64 (13 th)
Human Capital	0.97 (14 th)	0.98 (10 th)	0.99 (7 th)
E-Participation Index	0.87 (5 th)	0.98 (2 nd)	1.00 (1 st)

Exhibit 1-21: South Korea's E-Government Rankings in 2005, 2008 and 2010

Managed by the Ministry of Public Administration and Security (MOPAS), the e-government program (http://www.korea.go.kr/new_eng/service/aboutKoreaGovernment.do) identifies **strong government leadership, governance of IT, customer oriented e-government services, performance based program management and technology support** as its critical success factors.

It is clear from the above that South Korea takes its e-government seriously and its current position is a result of years of sustained efforts of planning and execution. South Korea is an exceptional example of the use of ICT for government innovation. It would not be an exaggeration to state that at present it does not have a proven model to follow. As a leader, it must continually innovate and create its own model.

Interestingly, its formal foray into government EA started with legislation on the **Effective Introduction and Operation of Information Systems** in 2006. The act specified the need to construct the EA to enhance the effectiveness of informatization investments and improve the performance of organizations. This was followed by the release of the Government-Wide EA Framework by the National Information Society Agency (NIA) in 2007. The MOPAS currently manages the government EA program. South Korea's government EA framework consists of **EA vision, principles, a set of reference models, a meta-model, maturity model and the management infrastructure**.

Moving forward, South Korea has identified **integrated business processing platform, e-government architecture and extensive interfaces across relevant organizations** as the three most critical elements for its next generation of e-government. In general, government EA is a critical element in South Korea's overall e-government program. There are strong indications that government EA will continue to be an important element in the future of its e-government. Overall, the qualitative analysis of South's Korea approach is summarized in Exhibit 1-22.

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
1. Citizen Centricity	South Korea deservedly ranks very high on this dimension as a result of its three main initiatives. These are the online citizen participation portal (http://www.epeople.go.kr), e-voting system and single window for online citizen services (http://www.egov.go.kr). The whole-of-government approach is explicitly visible. As part of its next generation of e-government, South Korea intends to utilize e-government architecture to identify and deliver shared, ubiquitous and socially integrated services. [ASSESSED CURRENT IMPACT → INSTITUTIONALIZED]
2. Common Infrastructure & Interoperability	To support the collaboration while also avoiding duplication among agencies, the national EA, managed by the MOPAS, has created an underlying IT architecture that ensures common standards government-wide. Some of these include government information sharing platform, integrated security system, integrated authentication system among several others. [ASSESSED CURRENT IMPACT → INSTITUTIONALIZED]
3. Collaborative Services & Business Operations	Government services requiring involvement and coordination of multiple agencies are already widespread. Some of the current examples include electronic procurement service, electronic customs clearance service, comprehensive tax services, internet civil services, patent service, online petition and discussion portal, single window for business support services, on-nara business process system and shared use of administrative information among others. MOPAS, as part of South Korea national EA, ensures avoidance of duplication among the agencies through the Sharing Project of the EA infrastructure of Korea in 2009 . [ASSESSED CURRENT IMPACT → INSTITUTIONALIZED]
4. Public Sector Governance	MOPAS uses the EA as a means to establish and manage ownership of government services with multiple stakeholders. It also ensures that the EA at the national level is linked tightly to the national informatization project. Furthermore, MOPAS rationalizes the agency informatization plans to avoid overlaps and duplication. Government EA in South Korea supports the three key e-government directions: administrative procedure reforms, civil services reforms and information resource management reforms. [ASSESSED CURRENT IMPACT → INSTITUTIONALIZED]
5. Networked Organizational Model	Collaborative services delivered by the government include identification, assessment and selection of partners in the private sector. Seoul transportation and help-line for healthcare are examples of services that

Enterprise Architecture Assessment Framework for Connected Government	
Dimensions of Connected Government	Impact of Government EA
	include multiple stakeholders both from government and private sectors that also take a sector or cluster based approach. [ASSESSED CURRENT IMPACT → DEFINED]
6. Social Inclusion	South Korea has its local e-government information network, information network village (http://www.invil.org) and the online citizen participation portal (http://www.epeople.go.kr) to enable citizen engagement and improve government responsiveness. Moving forward, it intends to enhance these areas even further. [ASSESSED CURRENT IMPACT → LOCALIZED]
7. Transparent & Open Government	As part of its open government initiative, South Korea has its administrative information disclosure system (http://www.open.go.kr). However, based on the information available publicly the whole approach is designed in a way that expects citizens and businesses to request for information disclosure. Government information by default is not publicly available. The current government EA does not provide directions with regard to this dimension. [ASSESSED CURRENT IMPACT → LOCALIZED]
SUMMARY South Korea has matured its e-government through years of effort. Government EA has played a key role in this journey. The overall impact of its government EA to connected government ranges between Level 2 (LOCALIZED) and Level 4 (INSTITUTIONALIZED) for the following reasons: <ul style="list-style-type: none"> A. Elements of EA have been used to drive reforms in the government sector, namely, administrative procedure reforms, civil services reforms and information resource management reforms. B. The adoption of government EA has been triggered by the relevant legislation making it mandatory for agencies to build their informatization plans in concurrence with the national plans. C. The role of EA is set to extend with the enhancement of its government-wide EA program supporting its next generation of e-government. 	

Exhibit 1-22: South Korea's Current Impact of EA on Connected Government

1.7 OTHERS

Sections 1.1 through to 1.6 presented and discussed the role of government EA and its impact on connected government in six countries. The countries assessed include the ones that have:

- ▶ Advanced e-governments; and / or
- ▶ Reasonably mature government EA programs; and /or
- ▶ Plans to enhance their government EA programs within the context of their e-government initiative; and
- ▶ Made available substantial amounts of information about their respective e-government initiatives and government EA publicly.

The criteria above are important in selecting a particular country for detailed assessment given the nature of study in this phase. There are few other countries that fulfill some, but not all the criteria above. Exhibit 1-23 briefly summarizes the government EA and e-government initiatives in Bahrain, Egypt and Oman.

Government EA in Other Countries	
Country	Summary of Government EA in the E-Government Program
1. Bahrain	<p>Launched in 2007, Bahrain's e-government program is managed by its e-government authority (http://www.ega.gov.bh/en/). Its current e-government strategy can be summed up as delivering customer value through collaborative government. Despite the short period of time that Bahrain has embarked on its e-government journey, it has done well and is ranked 9 in the e-government development index and ranked 11 in the e-participation index of the UN Global E-Government Survey 2010. It is the highest ranked country in the GCC area and its achievements are line with its goal of being a leader in e-government.</p> <p>Integrated within its e-government strategy, Bahrain launched its project to develop a National EA Framework (NEAF). The current NEAF project phase involved assessing the ICT platforms in all government ministries and designing the target architecture under one unified framework for all policies and applications.</p>
2. Egypt	<p>Initiated by the Ministry of Communication and Information Technology (MCIT) in 1999, Egypt's e-government journey started with the establishment of overall ICT infrastructure nationwide. In 2004, the Ministry of State for Administrative Development (MSAD) took charge of the e-government program. Egypt's e-government portal (http://www.egypt.gov.eg) is called the 'Bawaba'. Egypt's e-government has three main goals: (1) citizen centric service delivery; (2) community participation; and (3) efficient allocation of government resources.</p> <p>Egypt released the Egyptian Government EA Framework (EGEAF) (http://www.misr.gov.eg/english/documents/default.aspx) in 2006 following its interoperability standards released in 2005. The EGEAF is basic and does not demonstrate its connection to the country's e-government agenda.</p>
3. Oman	<p>Oman started its e-government journey via the Digital Oman Strategy (http://www.ita.gov.om/ITAPortal/eServices/eoman_strategy.aspx) in 2003. Oman's Information Technology Authority (ITA) has been entrusted the responsibility of its implementation. Within the strategy, there is an Oman e-governance framework which consists of three pillars: (1) Oman E-Government Architecture Framework (OeGAF); (2) Process Management; and (3) Standards Development and Maintenance.</p> <p>The intention of OeGAF being an integral part of Oman's e-government agenda is clear. Inspired by the Singapore Government EA (SGEA), OeGAF is currently under development. It aims to impact some of the connected government dimensions. According to ITA, OeGAF is built on well defined design principles and the concept of connected government and it is reflected in the architecture principles directly and indirectly. From a technical perspective the emphasis has been on integration and interoperability of heterogeneous systems within ministries and across various ministries and agencies to deliver effective and efficient citizen and resident services. OeGAF contains design principles at three levels:</p> <ol style="list-style-type: none"> 1. OeGAF (overall) Development Guiding Principles 2. OeGAF is made of "Reference Models" namely - Business Reference Model, Solution Reference Model, Information Reference Model and Technical Reference Model. Each reference model has its own set of guiding principles. 3. The reference models are further made up of domains. The domains have their respective domain design principles.

Exhibit 1-23: Summary of Government EA in Other Countries in the Asia-Pacific

2 ANALYSIS AND FINDINGS

Exhibit 2-1 shows the current impact of EA on connected government in selected countries.

Current Impact of Enterprise Architecture on Connected Government						
DIMENSIONS	UAE	AUSTRALIA	JORDAN	NEW ZEALAND	SAUDI ARABIA	SOUTH KOREA
Citizen Centricity	Marginal	Localized	Defined	Defined	None	Institutionalized
Common Infrastructure & Interoperability	Localized	Defined	Defined	Institutionalized	Localized	Institutionalized
Collaborative Services & Business Operations	Marginal	Defined	Defined	Institutionalized	Marginal	Institutionalized
Public Sector Governance	Marginal	Localized	Defined	Localized	None	Institutionalized
Networked Organizational Model	None	Localized	Defined	Institutionalized	Localized	Defined
Social Inclusion	None	Marginal	Marginal	Defined	Marginal	Localized
Transparent & Open Government	None	Marginal	Marginal	Localized	None	Localized

Exhibit 2-1: Current Impact of EA on Connected Government in Selected Countries

The survey of the six countries plus the high level review of another three countries clearly reveals that connected government is a desirable long term goal for national e-government programs. This is further substantiated by the UN Global E-Government Survey of 2010 wherein the four stages of online service development include **emerging**, **enhanced**, **transactional** and **connected**. The e-participation is considered separately. This creates a few issues:

1. Online service development and e-participation come out as fairly independent dimensions of e-government measurement.
2. The connected online service development stage is not granular enough for countries to take full advantage of the measurement scheme.

The above considers connected government (i.e. the connectedness) from the point of view of government being a service provider, and its goal of doing this in the most efficient way. The service consumer point of view is partly captured via the e-participation dimension. It is obvious that there is a need to unify both the service provider and service consumer points of view and extend the definition of connected government.

The countries surveyed were deliberately selected for their wide range of characteristics that include e-government capabilities, government EA practices, national plans and formally directed efforts. From the country assessments the following levels of connectedness are identifiable and proposed. The levels represent the **evolutionary stages** of connected government.

- **Intragovernmental:** Connectedness among and between government ministries and agencies that usually leads to the whole-of-government perspective and being viewed as a single virtual and networked enterprise. This also includes interactions and coherency at multiple layers of government (national, state, provincial, district, city).

- ▶ **Intergovernmental:** This is connectedness between sovereign nations driven by common and shared goals and objectives on issues that have multi country or global repercussions (examples include law enforcement, customs, counter-terrorism, health, intellectual property, free trade agreements etc.).
- ▶ **Extragovernmental:** This refers to the connectedness between government and associated business organizations and partners outside of the government. This type of connectedness allows the creation of services that may be planned and delivered in collaboration with non-governmental entities, seamlessly integrated and usually leading to service ecosystems.
- ▶ **Ubiquitous:** This refers to connectedness that facilitates multi-dimensional multi-channel all pervasive communication between all stakeholders (but focusing more on citizens) by way of participation, engagement, openness, government transparency and accountability. In some literature these are the goals of Government 2.0. This is the stage wherein government itself acts as a platform and coherency is imperative as connectedness is fully diffused, comprehensive and encompasses the emotional aspects as well.

Exhibit 2-2 shows the four evolutionary stages of connected government derived by expanding the connected stage in the approach used by the UN. Exhibit 2-3 depicts their key characteristics, and the relationship between government connectedness and performance. Together, they set the context for the rest of the analysis which are discussed in the subsequent paragraphs.

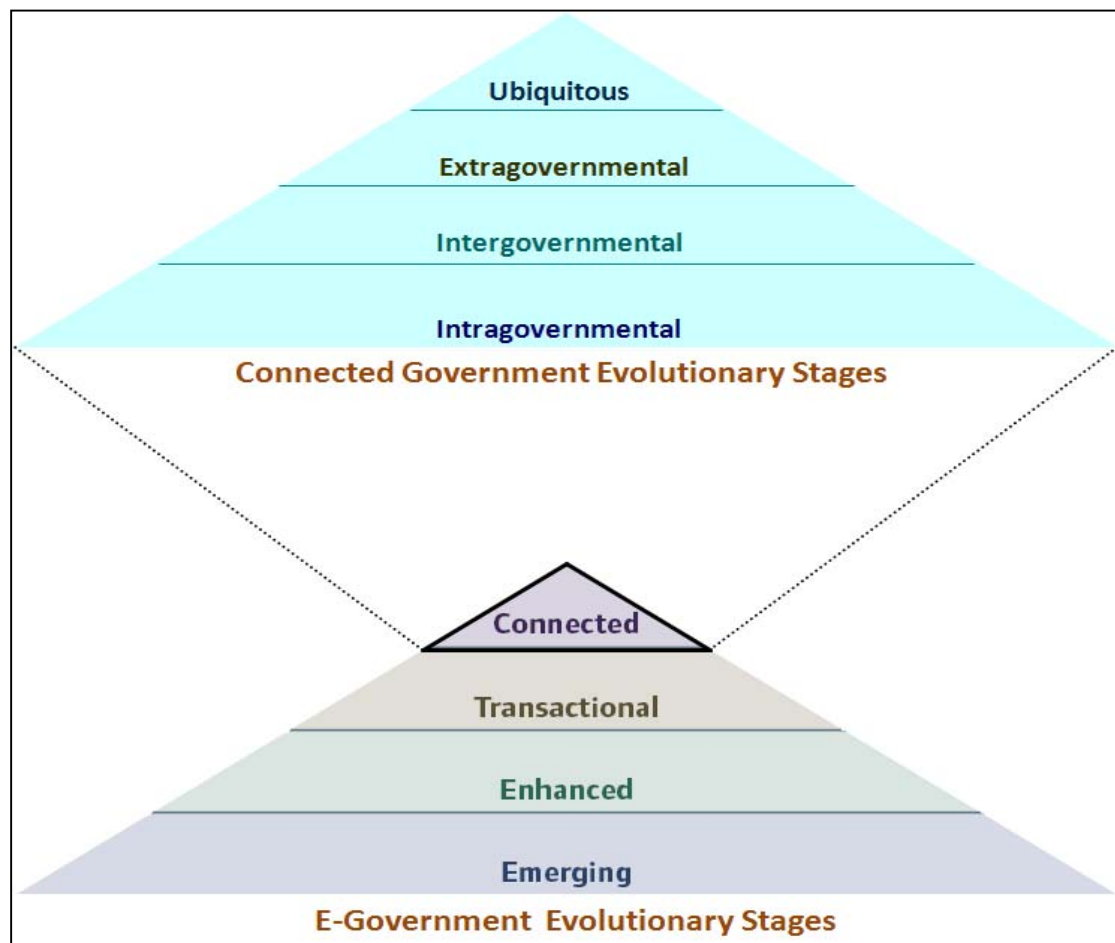


Exhibit 2-2: The Four Evolutionary Stages of Connected Government

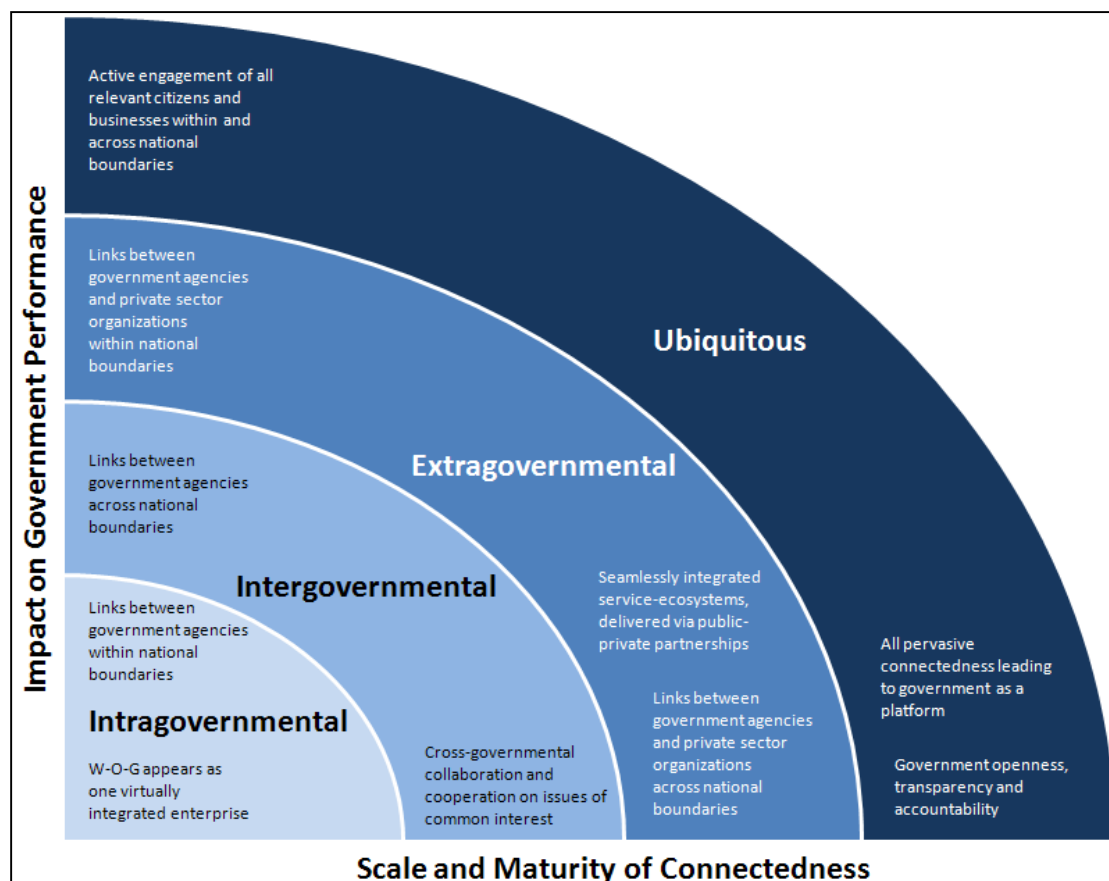


Exhibit 2-3: Connected Government Maturity and Government Performance

The varying degrees and approaches that countries use EA as a means to achieve connected government is noticeable from the assessments carried out. The following are the key findings and issues for discussion that can be extracted.

Government EA programs have traditionally been used to establish common underlying infrastructure and interoperability. The technology, application, data and security architectures directly contribute to this. This is not difficult to explain as EA has generally been viewed as a structured and disciplined approach for IT management and planning, in most cases, led by the IT department (CIO office) in the government. Common infrastructure and interoperability also requires least amount of involvement from the service consumers and users, thereby making it (politically) easier to progress. Emergence of cloud computing is making the move to common infrastructure even more justifiable.

Collaborative services and business operations incorporate interoperability at the business layer. Even though government EA efforts have tried to address this dimension in their bid to achieve connectedness, real progress is often hampered by weak governance. In scenarios wherein traditionally government ministries and agencies operate with a good degree of autonomy (and hence in their own stovepipes), getting them to collaborate is not necessarily easy. Government entities can often consider this as an intrusion into their autonomy. At the intergovernmental level this could be equated to intrusion into national sovereignty. Furthermore, identifying collaborative services and business functions is only part of the issue. The bigger factor for all types of connectedness is to get common agreement on ownership and management of such collaborative services.

With government EA efforts pushing the whole-of-government viewpoint, it is not entirely uncommon to this being realized. Successful national EA programs created the notion of governments operating as large integrated enterprises, allowing citizens to interact with the government through multi channel engagement mechanisms. Advanced implementations, as in South Korea, even allow the possibility of citizens being provided individually customized intelligent services. This is realized through building service modularity capability during service analysis and design. The prospect of having customized services encourages citizens to interact more with the government, thus contributing to ubiquitous connectedness.

Advanced and successful e-governments have effective authority and accountability structures at the core. The underlying technology can only do so much. Without good governance e-government programs can have severely limited benefits. Overall, public sector governance is a critical success factor as it eliminates ambiguity in terms of stakeholders, their roles and responsibilities, enforcement mechanisms and practices, expected outcomes and mission effectiveness. Most government EA frameworks are limited to governance of the architecture during and after the development. There are not many instances of utilizing EA as a means to enhance the broader public sector governance. The role of public sector governance gains importance as countries try to extend the degree and intensity of their connectedness from intragovernmental to ubiquitous. Viewed in conjunction with collaborative services and business operations the centrality of effective governance cannot be overstated.

For governments to provide citizen centric seamless services that are adequately modularized for necessary flexibility, there is a need to understand complete value networks, their constituents and stakeholders and levels of required coordination and cooperation. This becomes non-trivial if the value network includes a mix of providers from the government and the private sectors as these two groups typically have divergent set of goals, objectives and operating models. Government EA has not been fully utilized to address this dimension of connected government. Key areas where EA could be used include: (1) articulation of the shared business purpose; (2) delineation of targets and goals; (3) continuous tracking of performance; (4) collaboration factors and needs; and (5) legal and governance issues. **Service Canada** (<http://www.servicecanada.gc.ca/eng/home.shtml>) is a good example of citizen centric services being provided by a multitude of service providers both from the public and private sectors. As it should be, the service consumers (citizens) are completely transparent to the complex networks of providers that work together to provide consumable services.

Social inclusion and open government are relatively new dimensions in the context of connected government. This brings in the 'softer' aspects into the picture. Trust, openness and accountability play a critical role. Traditional EA programs have viewed and designed government services largely from a service provider perspective, wherein the emphasis is on getting the various government entities to be 'connected' to one another. EA frameworks that addressed the issue of citizens being 'connected' to the government via active engagement and participation are weak or altogether missing.

3 PERSPECTIVES

Sections 1 and 2 surveyed and analyzed six countries in detail and another three countries with regards to their e-government programs fulfilling the requirements of connected government using government EA. To understand the current state of practice first hand and as validation of findings in the previous sections, this section presents viewpoints on the role of government EA towards connected government from across the world representing a cross-section of institutions for greater generality.

3.1 GOVERNMENT OF COLOMBIA

María Isabel Mejía Jaramillo

Gerente General

Programa Agenda de Conectividad

Estrategia de Gobierno en línea

Ministerio de Tecnologías de la Información y las Comunicaciones

“When speaking about connected government, it is necessary to integrate processes and institutions for the provisioning of services to citizens with the technology and adequate organizational structure. Thus, effective services provide the quality expected, integrating all stakeholders (including public agencies, private sector, communities and citizens) and proper management of knowledge. EA is a methodological approach that allows establishing the role of the actors involved, their responsibilities, identifying business processes and integration schemes and generating value to the customers as well as a management scheme that allows adapting to the changes that may occur. EA has been used as a reference for issues such as the interoperability framework for **Government Online** in Colombia, to formulate diagnostics, to build action plans of **Government Online** in the public agencies, for analyses of processes (clusters of procedures) between public agencies and to identify actions at the organizational, legal, procedural and technical levels.

The methodological approach of EA is immersed in the e-Government strategies of countries like India, Netherlands and Singapore. But an approach that is gaining strength internationally is the Open Government (OG), where the governments put in order their house and data and expose them so the society transforms them for dynamic provisioning of public services catering to the users' needs. Government EA needs to be enhanced with respect to organizational matters, which are critical to generate the changes that lead to transformation. Additionally, it should consider how EA and OG can be integrated because in the near future it will no longer be ‘citizen centric’ government but an ‘all working together’ government and I am sure that EA will serve.”

3.2 GOVERNMENT OF VIETNAM

Ho Sy Loi, Ph.D.

Department of Information and International Cooperation

Directorate for IT Applications Promotion

Ministry of Information and Communications

“We understand that connected government, or a government-as-a-whole as denoted in the UN E-Government Survey of 2008, basically focuses on how to support collaboration more effectively across agencies to address complex intra-government and shared problems within and among the agencies. Government EA encompasses all of business operations,

information, services, technology and infrastructure of government agencies, crossing multiple systems and multiple functional groups within government. Therefore, we agree that government EA can influence connected government by offering holistic structure, interconnection, integration, and interoperability.

Despite its benefits towards and importance for e-government development, the prerequisite for adopting government EA is still higher than what Vietnam can afford. In our earlier research, it appears that almost all countries that are seriously considering the role of government EA not only have high level of standardization with regard to their nationwide business processes but also display great deal of readiness for utilizing government EA in terms of infrastructure and human resources. In Vietnam, we however have found ourselves a bit inadequate in all of these. It leads to the switching our attention to find appropriate solutions for interoperability of information systems operated within state agencies as the first activities for e-government development. Our view is that the outcomes of having interoperability of information systems within state agencies would definitely contribute towards strong e-government maturity in Vietnam by laying out a solid foundation for further activities for developing government EA, which in addition includes business, application, and information.”

3.3 GOVERNMENT OF OMAN

Omar AlShanfari

Chief, Governance and Advisory Division

Information Technology Authority

Ministry of National Economy

“While the phrase ‘connected government’ can be viewed from different perspectives – for the purpose of this document, we have taken the ‘technology perspective’ – essentially from technology integration and interoperability perspective. As in any EA development process, we started the EA initiative with a set of ‘guiding principles’ and strengthened the same with design principles for the ‘reference models’ and their respective domains. Enough care has also been taken to reflect these principles in the development of standards and best practices.

Oman also has an operational ‘MPLS based government network’ for government ministries and agencies to integrate and interact. Standards and requirements to connect to the network have been incorporated in the EA. The EA also discusses the proposed ‘Enterprise Service Bus’ and provides related information.”

3.4 UNITED NATIONS

Haiyan Qian

Director, Division of Public Administration and Development Management

Department of Economic and Social Affairs

“National Enterprise Architecture (NEA) or a Government Interoperability Framework (GIF) in general results in the establishment of interoperability frameworks for e-government services at the national and local levels. EA influences the development, design and the capacity of a government’s offerings of public services. By definition, connected governance is the current trend on the provision of electronic and mobile public services, in which public institutions share common objectives across organizational boundaries, as opposed to independently supporting autonomous portals by the different government ministries.

Connected governance poses new requirements to governments, such as cross-organizational connectivity as well as back-office to front-office integration - issues which are addressed by effective EA. Therefore, the presence of EA is a precondition for successful implementation of connected government. Simply taking an IT perspective in implementing e-government would be a serious mistake. As an ICT management and planning tool, government EA represents a business-driven approach to ICT management that emphasizes interoperability for achieving connected government and governance. EA with cross-national interoperability is indispensable in moving towards connected government/governance.

While government EA adds agility to the public service delivery including back-end operation and integration, cyber-security and virtual terrorism have emerged as a threat to all countries. There is a need for EA to address these emerging challenges. A country with a strong e-government maturity but lacking an effective EA program can perhaps embark on a strategic mid-to-long term approach to implement EA as an effective enabler to achieve its development goals including the effective delivery of more efficient, transparent and accountable public services. The following cases utilize government EA to achieve connected government:

- ▶ **United Kingdom:** The Cabinet Office plays a central role in providing guidance and setting standards for the use of ICT across the public sector and for the delivery of government services. The UK e-Government Interoperability Framework sets out the government's technical policies and standards for achieving interoperability and information systems integration across the public sector;
- ▶ **United States of America:** The Office of Management and Budget (OMB) of the Government of the USA released the **Enterprise Architecture Assessment Framework (EAAF)** for government institutions to achieve connected governance;
- ▶ **Canada:** The Government of Canada has developed a Service Oriented Architecture Strategy;
- ▶ **Republic of Korea:** The Government of the Republic of Korea has instituted a government-wide EA. A milestone towards the development of excellence in e-government in Korea is the implementation of government EA framework by its Ministry of Home Affairs and Government Administration (MOHAGA);
- ▶ **Singapore:** The SGEA is a set of blueprints comprising the Business Architecture (BA), Information Architecture (IA), Solution Architecture (SA) and Technical Architecture (TA) of the Government of Singapore. It provides a holistic view of business functions, common data standards, and shared information communications technology systems and infrastructure; and
- ▶ **New Zealand E-Government Interoperability Framework:** The Government's policy on how public sector organizations should achieve interoperability is set out in the Cabinet paper endorsing the New Zealand Interoperability Framework.

All these countries demonstrate a cross-national enterprise architecture interoperability framework.”

Saleem Zoughbi, Ph.D.

*Regional Adviser, Information and Communication Technology
Economic and Social Commission for Western Asia*

“By nature, EA tries to view the government’s strategy, processes and information content in a globally integrated way. This builds directly on the application of ICT in every form that may fit and be of help. As such connectivity of governments is based not only on the actual ICT connectivity, but also on the continuity of its architectural units such that governments would perform most efficiently. For that reason, EA contributes directly to connected government, and in particular to facilitate the connectivity and optimize it. Proper EA application would optimize the connectivity of the government. A value-added contribution is to ensure that the business of the government and information technology is compatible and aligned.

I have not come across countries which have been able to utilize government EA to achieve connected government, but I have seen the ones that have tried to embark on such an effort. This is basically in some developing countries, and the drawback is that not much freedom and flexibility in the effort and use of EA was allowed to the experts who worked on this. Naturally, the result is minimal and in some cases counterproductive. Again, considering developing countries, many of them do not view EA as an end by itself. In such situations EA is considered as perhaps the best way of coming up with better business platforms to move towards “better” or “modern” governments wherein there is less focus on knowledge and information resource planning and more on infrastructure. The drawback is hence connectivity wherein knowledge and information is sacrificed for connectivity of infrastructure and human resource planning.

E-government maturity can be exhibited easily in countries that do not have strong EA programmes, since the aggregation of processes and services can exist in middle tier of public services, which is characterized by “few-stop shops’ rather than one-stop shop!”

4 GOVERNMENT EA FRAMEWORK CAPABILITY DIMENSIONS

The previous sections surveyed government EA programs, assessed their impacts on connected government, uncovered and discussed key issues affecting government EA activities. At present countries use currently available government EA frameworks to plan and design their architecture activities. These range from adopting publicly available frameworks (e.g. Zachman, TOGAF, FEAF, DoDAF and IAF) to developing proprietary frameworks specific to the purpose. Nonetheless, government EA efforts are generally piecemeal and often lack the necessary firepower. From the analysis above it is clear that current frameworks have scope for improvement if EA is to be considered a first class citizen of the connected government agenda. To leverage the power of a connected form of enterprise, government leaders must understand that not all involved need to have the same level of architecture capabilities.

The objective of this study is not to develop a full-fledged government EA framework. Rather, it is to look at areas of importance (based on the analysis in Sections 1, 2 and 3) and propose capability dimensions that would be useful. These, the **Government Enterprise Architecture Framework Capability Dimensions** would provide inputs to countries in developing specific capabilities along these dimensions so as to support the transition to connected government. Capability here is defined as **groups of activities that the governments need to be good at and have the ability to positively influence the government performance (in this case achievement of connected government)**.

Exhibit 4-1 shows how government EA capability dimensions support connected government dimensions. Importantly, every connected government dimension (as described in Section 0.2.1) contributes to the evolutionary stages of connected government. The connected government evolutionary stage that a country would be at (or aims to be at) depends on the capability levels (as in Exhibit 1-2) demonstrated along the dimensions.

Government EA Framework Capability Dimensions for Connected Government							
Government Enterprise Architecture Framework Capability Dimension	Connected Government Dimensions						
	Citizen Centricity	Common Infrastructure and Interoperability	Collaborative Services and Business Operations	Public Sector Governance	Networked Organizational Model	Social Inclusion	Transparent and Open Government
1. Designing and implementing governance				√√			√
2. Measuring government performance	√			√			√√
3. Developing strategic architecture	√		√√		√√		√
4. Developing business architecture	√	√	√√		√		
5. Developing technology architecture		√√	√		√		√

Government EA Framework Capability Dimensions for Connected Government							
Government Enterprise Architecture Framework Capability Dimension	Connected Government Dimensions						
	Citizen Centricity	Common Infrastructure and Interoperability	Collaborative Services and Business Operations	Public Sector Governance	Networked Organizational Model	Social Inclusion	Transparent and Open Government
6. Adopting standard architecture development approach		√√	√√				
7. Providing tool support and enablement		√	√		√		√
8. Assessing and reporting architecture effectiveness	√			√√		√√	√
9. Disseminating knowledge and awareness	√			√		√	√
10. Establishing regulatory, policy and legal enablers	√	√	√	√√	√√	√	√√
11. Achieving management practice integration	√		√		√√		√
12. Designing and innovating services	√√						√√
13. Adopting value driven transition planning	√√			√			√√

Exhibit 4-1: Government EA Capability Dimensions for Connected Government

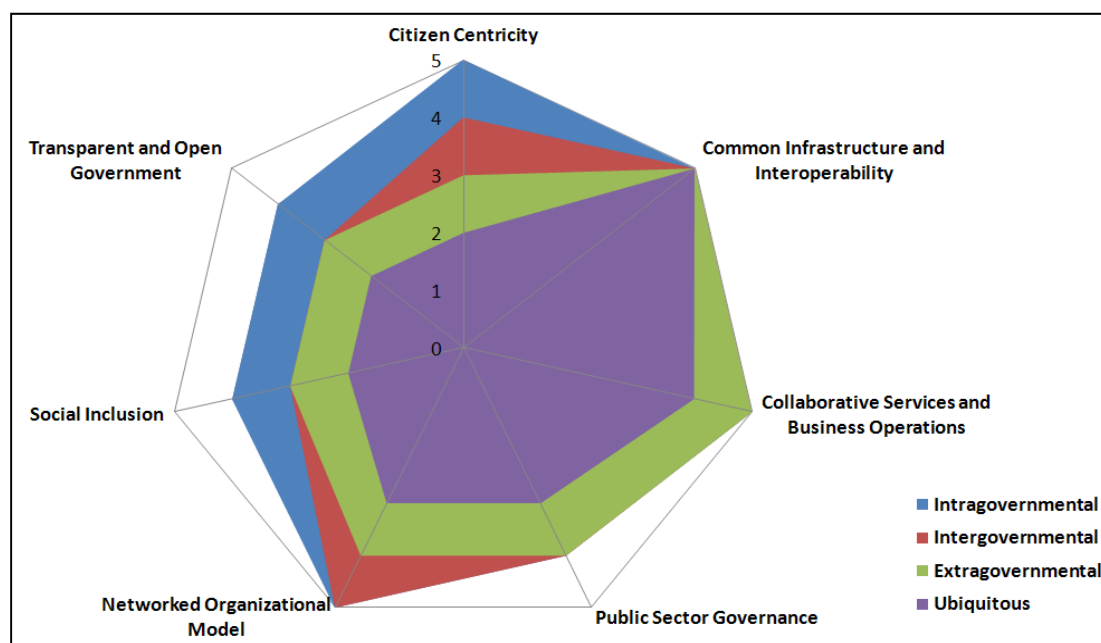


Exhibit 4-2: Minimum Levels of Impact of EA for Connected Government Progression

Exhibit 4-2 shows the minimum levels and the progression of the impact of government EA on connected government required to attain the targeted evolutionary stage. Together, the information in Exhibits 4-1 and 4-2 are intended to allow countries to plan their connected government journey and focus on the EA capability dimensions that would enable the journey.

5 CONCLUSIONS AND WAY FORWARD

Given the benefits that countries gain as a result of effective e-government, there is no dearth of resources being invested in programs and initiatives like Government 2.0, Cloud Computing, Next Generation Broadband, E-Health, Government Data Centers, Shared Services, Payment Gateways, Service Automation, RFID Implementations, Master Data Management, Geographic Information Systems, Enterprise Content Management, Identity Management and Mobile Payments among several others. Apart from technology centric initiatives, governments and their agencies also expend huge amounts of resources for management centric programs like Knowledge Management, Balanced Scorecard, Six Sigma, Strategic Planning, and Business Excellence among several others. Closer scrutiny however reveals that in most cases these programs and initiatives are run as independent activities, each having their own group of enthusiasts. This piecemeal approach leads to futile efforts in redundant and closely related activities. As countries evolve through their e-government journey, the dominant value configuration changes from **value chain** to **value network**.

From the analysis in the earlier sections, it is clear that connected government remains a favored and much desired goal for national governments, the impetus further coming from the periodic e-government surveys conducted by the UN and various other organizations. Furthermore, as part of e-government lexicon government EA: (1) has attained the status of mainstream activity and is gaining further traction; (2) is a precondition for successful implementation of connected government; (3) is challenging and sometimes intimidating to countries who do not yet have adequate prerequisites; (4) provides a structured and disciplined approach to converge several technology and management centric activities; (5) facilitates the move towards value network as the primary value configuration; and (6) requires enhancements in the way it is designed, developed, portrayed, managed, and utilized to provide the necessary impetus for countries to move towards connected government.

The UN, in its global e-government survey 2010 calls for a consistent framework to measure e-government development which could potentially be realized through establishment of e-government principles, adoption of open standards, elaboration of indicators, information sharing and development of interoperable systems. It is imperative that any e-government measurement framework must balance the currently dominant **service-provider centric viewpoint** with the often ignored **service-consumer centric viewpoint**. To design an effective e-government measurement framework, the importance of understanding governments and how they operate cannot be overstated. However, the challenge is to view governments as **complex and dynamic systems** and in order to support the whole-of-government paradigm, embrace **systems-thinking**. It has been argued that many e-government initiatives fall short of their goals as a result of them being conceptualized and implemented in a piecemeal manner, rather than comprehensively and from a whole-of-government perspective. The stove piped approach is ingrained in the financial structures, intervention designs, policies and evaluation methods. Government EA offers the potential to act as the meta-discipline that provides mechanisms to holistically understand the enterprise in question (i.e. governments) and link and optimize disparate activities and approaches into a single unified coherent program.

6 REFERENCES²

- Abu Dhabi Systems and Information Committee (ADSIC). (2009). *Abu Dhabi IT Architecture & Standards Version 2.0*. Abu Dhabi Systems and Information Committee (ADSIC), Government of Abu Dhabi, UAE.
- Al Khouri, A.M. and J. Bal. (2006). "E-Government in GCC Countries". *International Journal of Social Sciences*, Volume 1 Issue 2, pp. 83-98.
- Asia-Pacific Development Information Program (APDIP). (2007). *E-Government Interoperability: A Review of Government Interoperability Frameworks in Selected Countries*. United Nations Development Program Regional Center: Bangkok.
- Asia-Pacific Development Information Program (APDIP). (2007). *E-Government Interoperability Guide*. United Nations Development Program Regional Center: Bangkok.
- Australian Government Information Management Office (AGIMO). (2007). *Cross-Agency Services Architecture Principles*. Department of Finance and Administration, Government of Australia.
- Australian Government Information Management Office (AGIMO). (2009). *Australian Government Architecture Reference Models Version 2.0*. Department of Finance and Deregulation, Government of Australia.
- Australian Government Information Management Office (AGIMO). (2010). *Engage: Getting on with Government 2.0. Report of the Government 2.0 Taskforce*. Department of Finance and Deregulation, Government of Australia.
- Burns, P., Neutens, M., Newman, D. and T. Power. (2009). "Building Value through Enterprise Architecture: A Global Study". *Booz & Company Perspective*.
- Cisco Internet Business Solutions Group (IBSG). (2004). *Connected Government: Essays from Innovators*. Premium Publishing: London.
- Cisco Internet Business Solutions Group (IBSG). (2009). "Cloud Computing in the Public Sector: Public Manager's Guide to Evaluating and Adopting Cloud Computing". *Cisco Systems Incorporated White Paper*.
- Cisco Internet Business Solutions Group (IBSG). (2009). "Realizing the Potential of the Connected Republic: Web 2.0 Opportunities in the Public Sector". *Cisco Systems Incorporated White Paper*.
- Di Maio, A., Claps, M., McClure, D., Vining, J., Bittinger, S., Newman, D., Logan, D., Kreizman, G. and R. Wagner. (2009). "Hype Cycle for Government Transformation 2009". *Gartner Industry Research ID Number: G00169057*.
- Doucet, G., Gotze, J. Saha, P. and S.A. Bernard. (2009). *Coherency Management: Architecting the Enterprise for Alignment, Agility and Assurance*. AuthorHouse: Bloomington, IN.
- Dutta, S. and I. Mia. (2010). *Global Information Technology Report 2009-2010: ICT for Sustainability*. INSEAD and World Economic Forum. World Economic Forum: Geneva.

² **Note:** Several national e-government and enterprise architecture websites have also been referred to. These have been provided as in-text links in the report.

- E-Government Authority. (2007). *Bahrain E-Government Strategy 2007 - 2010*. E-Government Authority, Kingdom of Bahrain.
- E-Government Authority. (2009). *Bahrain E-Government Program: Looking Beyond the Obvious*. E-Government Authority, Government of Kingdom of Bahrain.
- Enterprise Architecture Working Group. (2006). *Egyptian Government Enterprise Architecture Framework Version 4.0*. Ministry of State for Administrative Development, Arab Republic of Egypt.
- Fishenden, J., Johnson, M., Nelson, K., Polin, G., Rijpma, G. and P. Stolz. (2006). "The New World of Government Work: Transforming the Business of Government with the Power of Information Technology". *Microsoft Public Services and eGovernment Strategy Discussion Paper*.
- Gartner Incorporated. (2007). "An Assessment of KSA YESSER Program". Gartner Incorporated.
- Halstead, D., Somerville, N., Straker, B. and C. Ward. (2009). "The Way to Gov 2.0: An Enterprise Approach to Web 2.0 in Government". *Microsoft US Public Sector White Paper*.
- Leechul, B. (2010). Building an Enterprise Architecture for Statistics Korea. *Management of Statistical Information Systems (MSIS 2010)*, Daejeon, Republic of Korea, April 2010.
- Liimatainen, K., Hoffman, M. and J. Heikkilä. (2007). *Overview of Enterprise Architecture work in 15 Countries*. Helsinki: Ministry of Finance, Government of Finland.
- Ministry of Information and Communication Technology (MOICT). (2006). *Jordan E-Government Program: E-Government Strategy 2006 – 2010*. Ministry of Information and Communication Technology, Government of Jordan.
- Ministry of Information and Communication Technology (MOICT). (2007). *Jordan E-Government Architecture*. Ministry of Information and Communication Technology, Government of Jordan.
- Muehlfeit, J. (2006). "The Connected Government Framework for Local and Regional Government". *Microsoft Corporation White Paper*.
- National Information Society Agency (NIA). (2008). *2008 Informatization White Paper*. Ministry of Public Administration and Security, Government of Republic of Korea.
- National Information Society Agency (NIA). (2009). *2009 Yearbook of Information Society Statistics*. Ministry of Public Administration and Security, Government of Republic of Korea.
- Pardo, T.A. and G.B. Burke. (2008). "Improving Government Interoperability: A Capability Framework for Government Managers". *Center for Technology in Government, University at Albany, SUNY Report*.
- Ross, J.W., Weill, P. and D.C. Robertson. (2006). *Enterprise Architecture as Strategy: Creating a Foundation for Business Execution*. Harvard Business School Press: Boston, MA.
- Saha, P. (2007). *Handbook of Enterprise Systems Architecture in Practice*. IGI Global Information Science Reference: Hershey, PA.

- Saha, P. (2008). *Advances in Government Enterprise Architecture*. IGI Global Information Science Reference: Hershey, PA.
- State Services Commission. (2006). *Enabling Transformation: A Strategy for E-Government 2006*. Ministry of State Services, Government of New Zealand.
- State Services Commission. (2008). *New Zealand E-Government Interoperability Framework Version 3.3*. Ministry of State Services, Government of New Zealand.
- State Services Commission. (2009). *New Zealand Federated Enterprise Architecture Framework Version 0.9*. Ministry of State Services, Government of New Zealand.
- United Nations Department of Economic and Social Affairs (UNDESA). (2008). *United Nations E-Government Survey 2008: From E-Government to Connected Governance*. United Nations: New York.
- United Nations Department of Economic and Social Affairs (UNDESA). (2010). *United Nations E-Government Survey 2010: Leveraging E-Government at a time of Financial and Economic Crises*. United Nations: New York.
- YESSER. (2006). *The National E-Government Strategy and Action Plan*. Ministry of Information and Communication Technology, Kingdom of Saudi Arabia.

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