eGovernment Strategies The Case of the United Arab Emirates (UAE)

This article provides an overview of eGovernment and its role in revolutionising existing governmental systems. It argues that in order for eGovernment initiatives to truly succeed, we need to develop public trust and confidence to promote diffusion and participation. The article relates this to the recently announced UAE eGovernment Strategic Framework 2011-2013. The framework attempts to promote the electronic transformation of all government services within a period of three years. An important component of the strategic framework in question is the use of the existing national identity management infrastructure and the development of a government-owned federated identity management system to support Government-to-Citizen (G2C) eGovernment transactions and promote trust and confidence on the Internet.

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“ Government-owned identity management systems that provide secure, unique and tamper-proof digital identities should become a primary component of national eGovernment strategies. Such federated identity systems can gain higher levels of trust, confidence and encourage public participation and has the potential to enable new levels of collaboration between different government agencies. ”

1. Introduction

Information and Communications Technologies (ICT) have affected the ways in which people, governments and businesses interact with each other. The rapid diffusion of the Internet, mobile telephony and broadband networks demonstrate how pervasive this technology has become. Today, ICT is considered as one of the fundamental building blocks of modern societies and digital economies (Castells, 2009; Varian et al., 2005).

Yet, the revolutionary pace in countries worldwide is dependent on the preparedness of several factors of both social and political environments (Gauld & Goldfinch, 2006; Loader, 2009; OECD, 2009). New technologies have revealed their potential to threaten existing power settings and economic relationships (Beer, 2011; Nixon & Koutrakou, 2007). The numerous applications of ICT over the past few decades have shown its transformative potential and its usage as an important tool for organising political dissent in countries worldwide (Hirschfeld, 2012; Reddick, 2010; Serageldin, 2011).

From a government standpoint, eGovernment adoption is becoming an unquestionable task. EGovernment deals with facilitating the operation of government and the distribution of governmental information and services. The ultimate goal of eGovernment is to be able to offer an increased portfolio of public services to citizens in an efficient and cost effective manner. Anticipated benefits of eGovernment include efficiency, improved services, better accessibility of public services, and more transparency and accountability (Atkinson & Castro, 2008), see also Figure 1.
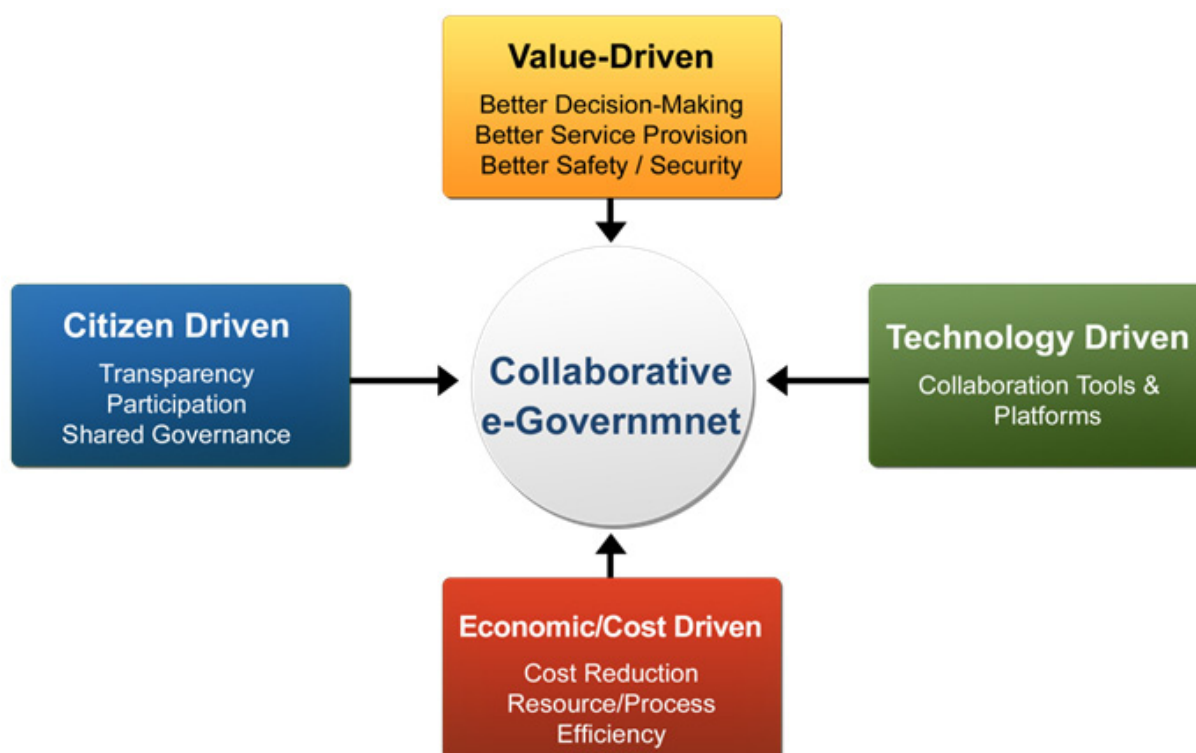

Figure 1: Primary drivers of eGovernment.

The objective of this article is to examine some of the difficulties pertaining to the successful development and implementation of eGovernment programmes. The aim is to be pragmatic and focus on the problematic area from a practitioner's point of view, thus relating the identified concerns and mapping them to a case study drawn from the UAE eGovernment experience.

The article is structured as follows: The first section provides a snapshot overview of the literature around the objectives and outcomes associated to eGovernment. It then briefly discusses the issue of trust and security in virtual networks and how it may encourage or inhibit public trust and confidence. The following section gives an overview of eGovernment in the Gulf Cooperation Council (GCC[1]) countries and some recent statistics about eGovernment diffusion. It then presents the case of the UAE eGovernment Strategic Framework 2012-2014 and explains its primary objectives and components. Finally, it sheds some light on the UAE government's strategic initiative, the national identity management infrastructure and its federated identity management system explaining its potential role in supporting the eGovernment transformation and successful implementation of the government's strategy.

2. eGovernment: The power of technology

eGovernment in its simplest form is about the use of ICT to provide access to governmental information and deliver public services to citizens and business partners. However, practitioners have still not figured out how to exploit its full benefits. There is an equilibrium problem with eGovernment applications and limitations arising from the difficulty to tangibly justify the gigantic investments in ICT systems for the past decade and a half.

The average public expectations concerning governments' efforts are shaped according to the ability of the government to successfully improve citizens' quality of life. Governments need to ensure that their policies, regulations and systems, enable citizen participation and address the needs of improving the delivery of services. The service delivery lifecycle needs to be reengineered and redesigned so as to meet citizen's expectations of enhanced social security and quality of life. Figure 2 depicts the role of government policy making in building a more citizen-centric and competitive government.

Government policies should enable governments to undertake radical organisational changes, that: (1) foster growth in services, (2) reduce unnecessary costs and regulatory burdens on firms, (3) strengthen education and training systems, (4) encourage good management practices, (5) foster innovation and new applications, (6) foster market conditions and create a business environment that promotes productive economy, and the list goes on.

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1   GCC is the acronym for Gulf Cooperation Council, also referred to as the Cooperation Council for the Arab States of the Gulf (CCASG). It includes six countries namely, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

- Significant competition between government departments implementing E-Government.
- Application integrating fewer departments & delivering specific service to a limited constituency have enjoyed greater success.
- Application for revenue collection are quickly embraced
- Publishing has an important impact on transparency

Trends

Outcomes — **Policy Making**

Citizen Quality of Life

- Improved public sector performance: changing way of doing business in government.
- Increased participation of citizens in government decisions and actions.
- Improved accountability of politicians and civil servants.
- Assured competitive environment for private businesses

Regulation

Social Security

Impact on Organizations

- Focusing on core competencies, outsourcing.
- Extended organizations : Partnerships.
- New forms of organization Flat, agile, lean, networked, client-focused. Flexible with scale.
- Organizing for innovation, learning at all levels.
- Focusing on organization's II, knowledge & service competencies. Investing in intangibles.
- Increasing transparency of government transactions.
- Improving Government image as modern and responsive.
- Catalyst for reform: Improve skills and motivation of civil servants.
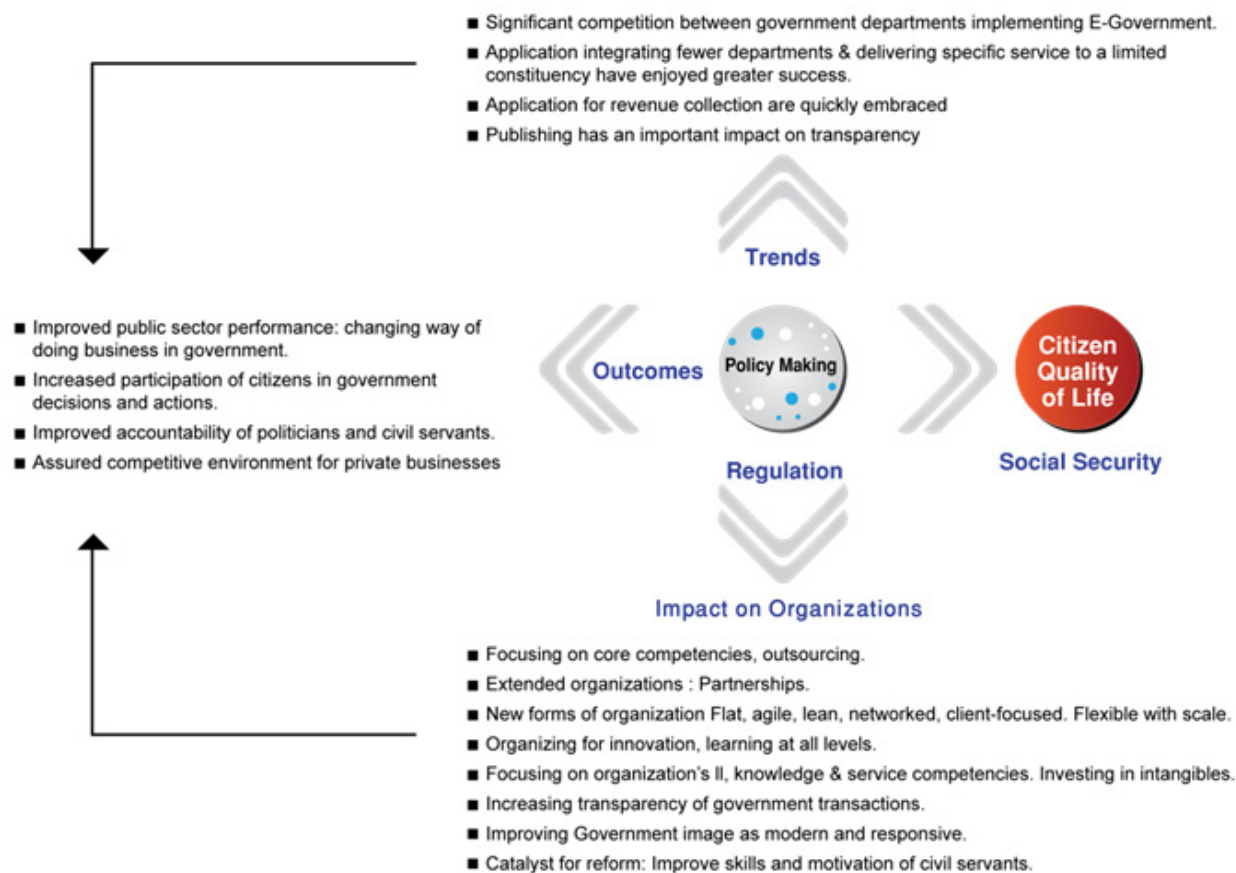
Figure 2: Development of a new revolution in Governments

Advocates of eGovernment point out the opportunities for citizens to play a greater role in public policy (Ambali, 2010; Bonina & Cordella, 2008; Navarra & Cornford, 2007; Torres et al., 2005). They also stress its potential to connect them, quickly and directly, to what their government has to offer – no queues, no waiting, service 24/7.

Cost-cutting is a major factor driving decisions to go online. Advanced eGovernment in our opinion has the potential to cut overheads by as high as 90 %, through streamlined communications and integrated systems that offer higher levels of efficiency, effectiveness and convenience. This is to say, eGovernment initiatives can reduce administrative burdens, process time cycles and improve responsiveness. Besides, compared with the traditional over-the-counter services, online services can reduce substantial tangible costs as they, for example, do not need buildings, people, electricity, service desks etc.

Indeed, ICT offers the potential for development and competition in the public sector specifically in areas of customer service and overall organisational excellence[2] programmes. Such competition not only helps lower the costs of government services through automation and computerisation but also strengthens pressures on firms to improve performance and change conservative attitudes.

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2   Though competition in the public sector was not relevant in the past, governments today use excellence models to recognise achievements and support the implementation of best in class tools and practices. Excellence programmes are perceived by governments as a tool to achieve sustainable growth and enhanced performance, create a breakthrough in public sector productivity, and boost engagement to improve bottom line results. The EFQM Excellence model, for instance, is one of the most common frameworks that is widely used in public and private sector organisations (http://www.efqm.org).

Private sector has always challenged the public sector and acted as a catalyst for better quality and for more effective budget utilisation (Suomi & Tähkäpää, 2002). Increased computerisation in the public sector is promoting new levels of balance between the two sectors (Das et al., 2010). Government agencies and public sector agencies in particular are paying greater attention to core capabilities and outsource other support functions to be delivered by the private sector (Suomi & Tähkäpää, 2002). ICT in this regard has played a central role in helping governments to achieve remarkable productivity gains (EIU, 2004).

On the other hand, and despite high spending and the widespread adoption of sophisticated ICT infrastructure, many other countries continue to lag behind on key measures of economic growth and productivity (ibid). Government investment in ICT to date has been very narrowly focused on administrative rationalisation, cost-cutting, and service reform without giving attention to create public oriented systems that promote and encourage citizen participation (Longford, 2002).

The major deficiency in such efforts is that they have been thought of and executed from a 'government mindset' rather than being based on public needs and expectations. Such a narrow view of eGovernment calls for reported ICT achievements to be regarded with a sceptical eye (Longford, 2002). Unless measures are taken to address other aspects of society and governance, eGovernment alone may produce little if any net gain in leveraging ICT to rationalise and restructure administrative systems and service delivery systems (ibid).

Other researchers recommend that governments adopt a new approach that embeds a transformation in the logic underpinning the design and evaluation of public sector organisations (Lane, 2000). This is envisaged to have considerable implications for enhancing the services delivered by public administration and serious consequences for the public value associated with the services delivered (Bonina & Cordella, 2008).

In Arab countries, eGovernment is now viewed as the path to develop a more sustainable new economy. It is also considered as playing a vital role in managing and directing the process of change and reform that will boost public confidence. However, building trust in eGovernment is not a simple issue. Relevant literature shows that there are overwhelming concerns about the potential of digital networks to negatively affect public privacy and security (Conklin & Whiet, 2006; McLeod and Pippin, 2009; Nikkhahan et al., 2009; Palanisamy & Mukerji, 2012; Yee et al., 2005). The next section discusses this in more detail.

3. Trust and Confidence

Trust is probably one of the most important aspects in the implementation of eGovernment strategies. In order for eGovernment to achieve its ambitious objectives to develop and deliver high quality and integrated public services, citizens need to trust the virtual environment. Without trust, citizens will not participate in the eGovernment process.

A review of the literature and empirical studies on eGovernment identifies the criteria for the adoption of eGovernment from both a citizen's and government's perspective, which highlights trust and security as major factors (Al-Khouri, 2012a; Tassabehji & Elliman, 2006). Empirical evidence shows that the level of trust is simply not a gradual process that happens over time (Berg et al., 1995; Kramer, 1999), rather a cumulative process. There are several overlapping and consistent factors that have the potential to impact the building of trust. These are classified in two major clusters; pre-interactional and interactional factors, as depicted in Table 1 (Colesca, 2009).

Table 1: Factors that impact the building of trust.

Pre-interactional factors	
Individual citizen/consumer behavioural attributes	Subjective norms, individual demographics, culture, past experiences, propensity to trust, benevolence, credibility, competency, fairness, honesty, integrity, openness, general intention to trust and use of eServices.
Institutional attributes	Organisational reputation, accreditation, innovativeness, general perceived trustworthiness of the organisation.
Technology	Hardware and software that deliver security and effectiveness such as interface design, public key encryption, integrity.
Interactional factors	
Product/service attributes	Reliability, availability, quality, and usability.
Transactional delivery and fulfilment of services	Usability, security, accuracy, privacy, interactivity, quality.
Information content attributes	Completeness, accuracy, currency, quality.

For the successful adoption of eGovernment services, citizens must have the intention to 'engage in eGovernment' which encompasses the intentions to receive and provide information through online channels (Warkentin et al., 2002). With the increasing reach of digital communication tools and connectivity, governments' interactions with their citizens over virtual networks are becoming more popular. Citizens have come to expect and demand governmental services matching private-sector services in every aspect of quality, quantity, and availability.

In fact, such expectations put higher pressures on governments to develop quality services and delivery systems that are efficient and effective. However, the complexity arises from the fact that a citizen plays multiple roles while interacting with the government. Single role-based identities are decreasingly relevant in existing government transactions. This makes it imperative for governments to acquire citizen-centric qualities that provide services and resources tailored to the actual service and resource needs of the users, including citizens, residents, government employees, business partners, etc.

The next section provides a snapshot of eGovernment in GCC countries who have been recognised globally for their efforts in eTransformation and eReadiness.

4. eGovernment in GCC Countries

The latest United Nations Development Programme (UNDP) report on eGovernment shows a high level of preparedness in Middle Eastern countries, well above the world average, in terms of eGovernment adoption and readiness to interact proactively with citizens. The Internet usage in the Middle East is reported to be 35.6 % compared to 32.6 % worldwide (UNDP, 2012). See also Table 2.

Table 2: Internet Users in the Middle East and the World[3]

Middle East Region	Population (2011 Est.)	Pop. % of World	Internet Users 31 Dec 2011	% Population (Penetration)	Users % World	Facebook 31-03-2012
Total Middle East	216,258,843	3.1 %	77,020,995	35.6 %	3.4 %	20,247,900
Rest of the World	6,713,796,311	96.9 %	2,190,212,747	32.6 %	96.6 %	815,277,380
World Total	6,930,055,154	100.0 %	2,267,233,742	32.7 %	100.0 %	835,525,280

Source: http://www.internetworldstats.com

Representing a total of 77 million internet users, Middle Eastern citizens are classified as heavy users of electronic social networks with high dependence on digital communications. The United Arab Emirates have the highest Internet penetration with nearly 70 % of the population followed closely by Qatar, Bahrain, Oman, Kuwait, Palestine and KSA. See also Figure 3.
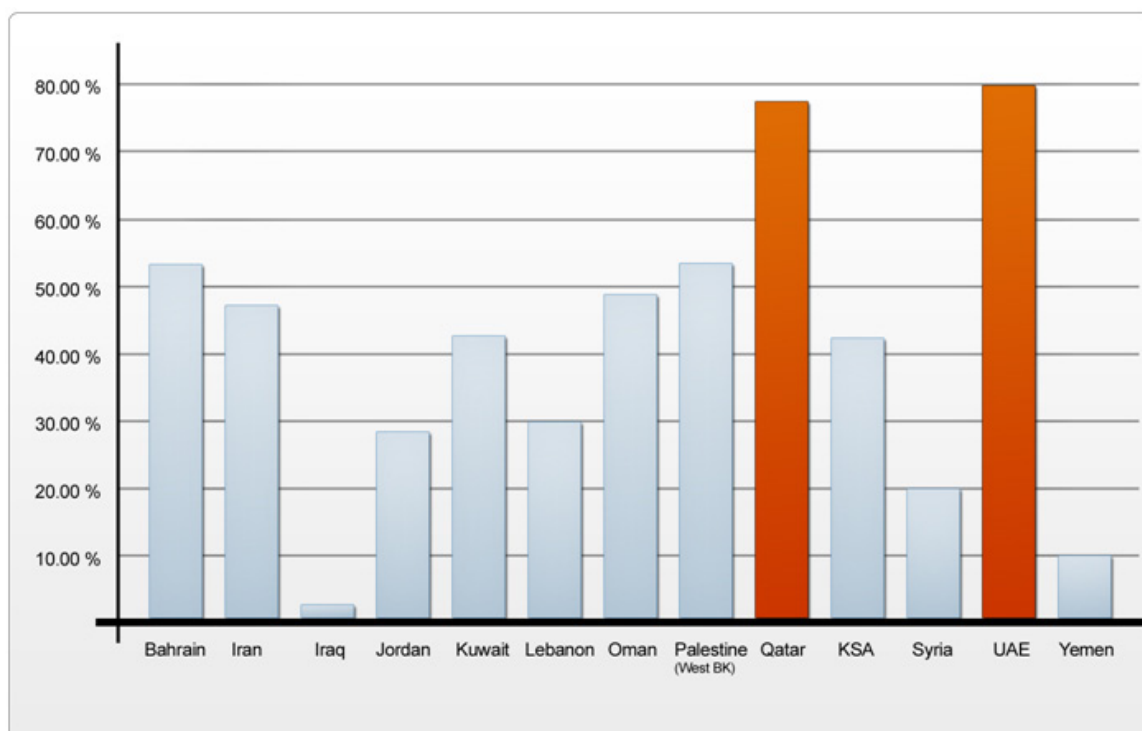

Figure 3: Middle East Country Wise Internet % Population (Penetration)
Source: http://www.internetworldstats.com

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3   NOTES: (1) Internet Usage and Population Statistics for the Middle East were updated as of 31 December 2011, and Facebook subscribers were updated as of 31 March 2012; (2) population numbers are based on data contained in the US Census Bureau; (3) the most recent Internet stats come mainly from data published by Nielsen Online , ITU , Facebook and other trustworthy sources; (4) data on this site may be cited, giving due credit and establishing an active link back to InternetWorldStats.com. Source: http://www.internetworldstats.com.

Overall, GCC countries have maintained leadership in eGovernment readiness among Arab peers. They have taken serious steps to support the diffusion of eGovernment in their societies (Al-Khouri & Bachlaghem, 2011; Al-Khouri & Bal, 2007). Several UNDP reports confirmed that the growing efforts of GCC governments to promote digital transformation and literacy have helped further enhance the region's collective ranking in the UN eGovernment Readiness Surveys (UNDP, 2010; UNDP 2012). These reports indicated that GCC countries played various roles for eGovernment in addressing the global financial crisis.

Governments of the GCC countries are considered to be in intense competition with each other to develop a new knowledge-based economy, away from the current dependence on oil, and to make their products and services competitive on a global scale (Awan, 2003). GCC countries are proceeding at a rapid space to use more service oriented and citizen-centric operating models. This rapid reform is bringing a paradigm shift in the way citizens in the GCC are interacting with their governments. There are serious efforts in these countries to develop electronic operating environments, with advanced capabilities to build the right conditions for the eCitizens concept to evolve.

The next section provides an overview of the eGovernment strategy of one of the GCC countries, namely the UAE government's strategic framework that aims to electronically transform all public services through a two-year action plan.

5. UAE eGovernment Strategic Framework 2012-2014

Although local initiatives in the UAE started earlier, the federal eGovernment programme started in 2001. One of the early eServices offered at a federal level was the electronic card known as the eDirham in 2001, which was issued to collect government services fees (Figure 4). Today, the UAE is considered to have one of the most advanced and world-class information and communication technology infrastructures.
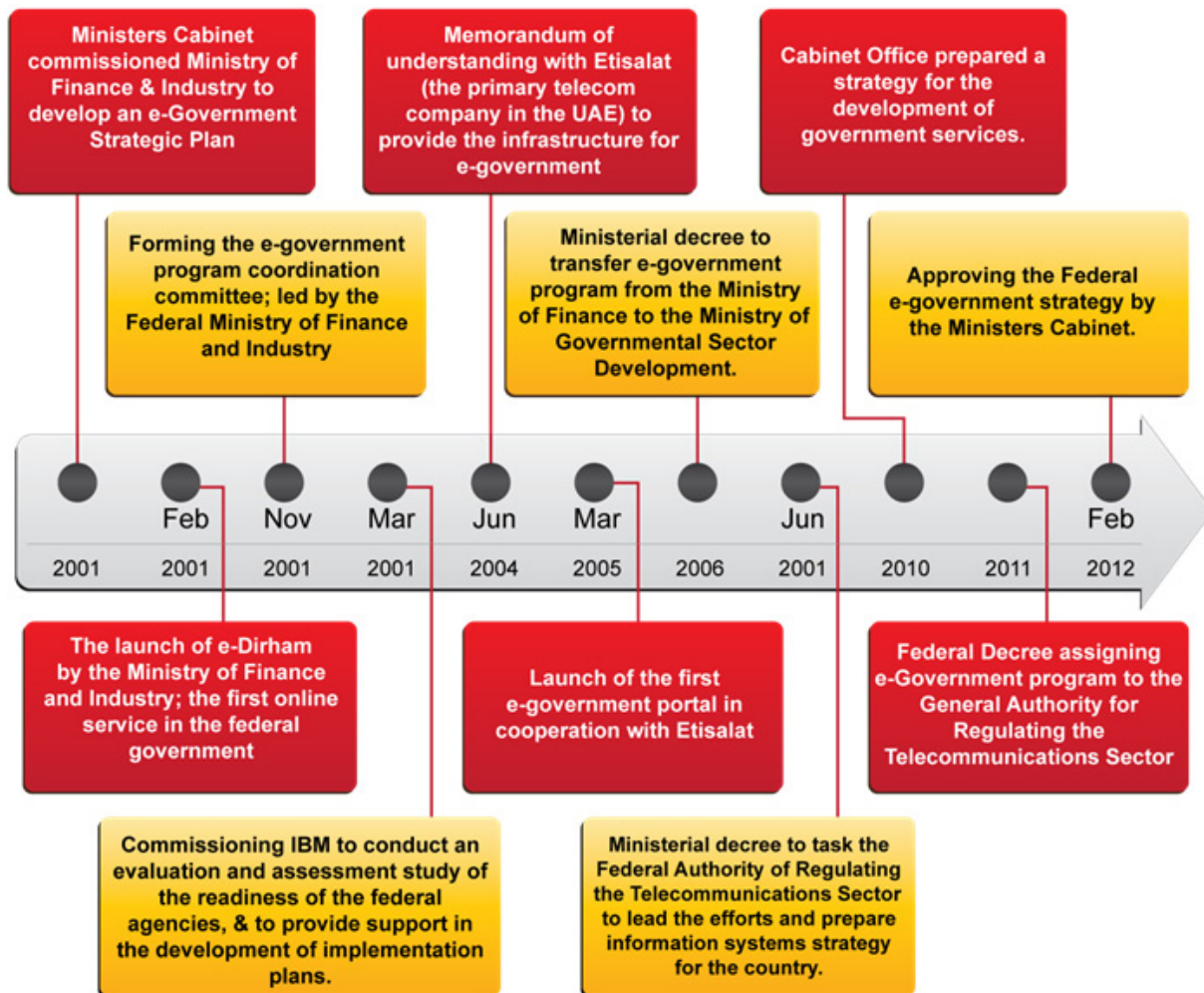
Figure 4: UAE Federal eGovernment Evolution

The UAE is considered among the highest investing governments in adopting and implementing progressive ICT in its government and private sectors. The UAE has made a remarkable worldwide achievement in the field of eGovernment according to the UN eGovernment Survey 2012, which focuses on the role of eGovernment in sustainable development. The UAE achieved the 28th rank overall according to the survey against the 49th rank in the 2010 Survey. It scored 7th on online service index against 99th in the 2010 survey and 6th in the eParticipation index against 86th in the 2010 survey (Figure 5).

Figure 5: UAE in UN EGovernment Survey 2012
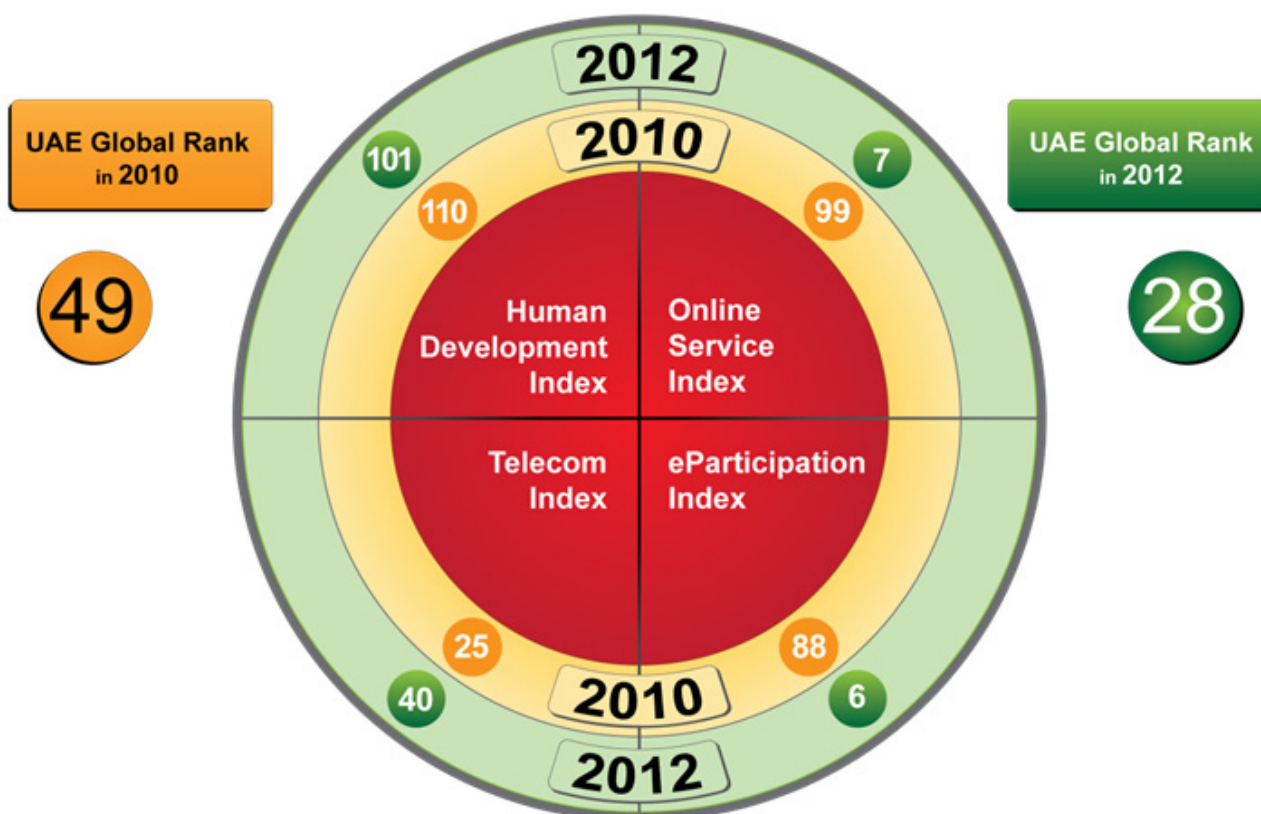
The UAE has recently announced a revised eGovernment Transformation Strategic Framework. This framework comprises numerous strategic initiatives at a federal level to transform all government services and make them available electronically through various channels. The following section will provide an overview of this strategy.

5.1 UAE Federal eGovernment Strategic Framework

The United Arab Emirates has developed a federal eGovernment Strategic Framework for 2012-2014 that charts out the initiatives and courses of action the government intends to take over a period of three years. The framework is aimed to contribute to:

1. UAE Vision 2021: which drives the UAE to be one of the best countries in the world, see also Table 3; and

2. UAE Government Strategy 2011-2013: that aims at putting citizens first and developing an accountable and innovative government.

The framework also makes reference to some of the existing federal strategies to ensure alignment with government strategic intents and plans. See also Table 3.

Table 3: The seven primary references in the UAE eGovernment strategy

Description	References
Is the highest reference strategy and provides the strategic vision of the country, for which the eGovernment strategy needs to be aligned with, and contribute to its realisation. The UAE vision 2021 envisages development of a knowledge-based economy that will be diverse and flexible led by skilled professional Emiratis. The vision contains four important components with detailed objectives related to national identity, economy, education and health. It seeks to make the UAE a land of ambitious and confident people who hold on to their heritage; a strong federation; a competitive economy led by creative and knowledgeable Emiratis; and finally a high quality of life in a generous and sustainable environment. http://www.vision2021.ae/	UAE Vision 2021
Provides a phased plan for the Federal Government to progress towards the UAE Vision 2021. http://uaecabinet.ae/English/Documents/PMO%20 StrategyDocEngFinV2.pdf	UAE Strategy 2011-2013
Government strategy to regulate the telecommunications sector. It represents the basis on which the eGovernment strategy was developed, as it defines and details the three dimensions of service, environment and readiness.	UAE Government ICT Strategy
Provides an analysis of the current state of federal government services, as well as detailed guidelines on how to develop them. It also includes many of the strategic initiatives that fall under the eGovernment programme.	Services Development Strategy
Alignment of eGovernment budget with the federal budget. http://www.mof.gov.ae/En/Budget/Pages/ ZEROBudgeting.aspx	Federal government budget
Covers three dimensions (environment, readiness and services), and contributes to the identification of gaps and opportunities that can be addressed through the objectives and specific initiatives in the eGovernment strategy. http://www.emiratesegov.ae	Current Situation Analysis
Comparisons of best practices in the field of eGovernment to support the development of the new strategy and define its primary objectives and initiatives.	Benchmarking

There is a considerable leadership confidence that successful implementation of the federal eGovernment strategy 2012-2014 will help to improve the UAE's global competitiveness and enhancing the UAE's eTransformation. This is described clearly in the vision and mission statements developed as part of the strategy and as depicted in Figure 6 below.

Figure 6: UAE eGovernment development methodology
Source: http://www.emiratesegov.ae

As shown in the above diagram, the government adopted a seven-stage strategy development process. It included benchmarks with some international eGovernment practices and implementations, such as Canada, USA, Southern Europe, Singapore, the European Union and GCC countries. The outcome of this exercise was the definition and prioritising of the initiatives and the primary focus areas. The development approach took into account three primary dimensions of eServices, eReadiness, and ICT environment (Figure 7).
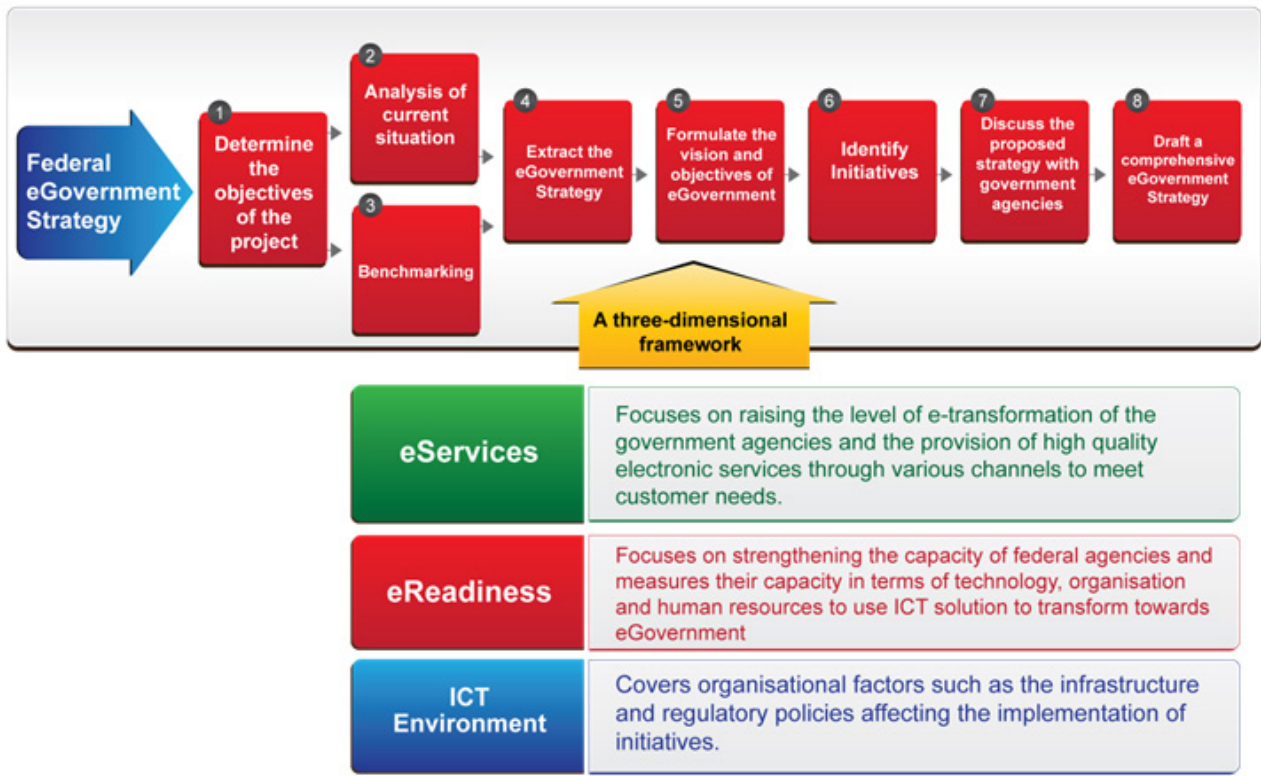
Figure 7: Strategy Development Plan
Source: http://www.emiratesegov.ae

The eService dimension is concerned with the acceleration of the pace of eTransformation within government organisations and the provision of high quality electronic services through innovative delivery channels; e.g., Internet, fixed and mobile phones and kiosks, besides the traditional service centres. eReadiness focuses on strengthening the capacities of federal agencies in terms of ICT, organisation structures, HR capabilities and competencies, and their readiness for eTransformation. The ICT environment dimension covers organisational factors such as policies and legislations needed to support the implementation of eGovernment initiatives. This has resulted in the development of five strategic goals as depicted in Figure 8.
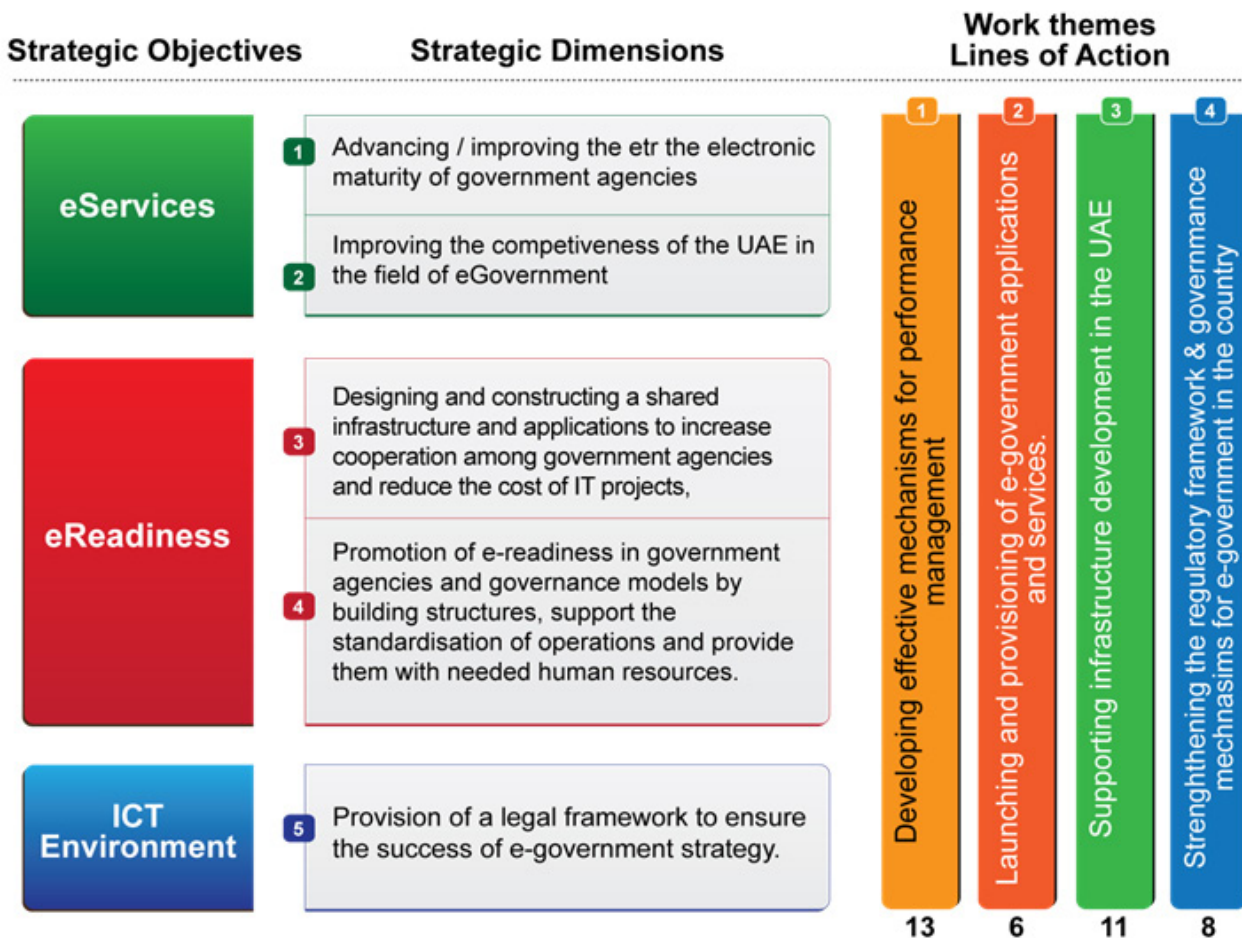
Figure 8: Strategic intents, goals, and work themes
Source: http://www.emiratesegov.ae

In order to achieve these goals, the government has identified 38 initiatives to be implemented as part of the eGovernment strategy. Figure 9 depicts the initiatives for each of the four work streams. These 38 initiatives cover four vital eGovernment areas:

1. **Strengthening the regulatory framework and governance mechanisms for eGovernment in the country.** This is related to the legal and regulatory environment governing acquisition and use of information systems in government agencies, eGovernment services, and a high level plan for the overall development of the public sector in the country. Regulations and laws are considered primary enablers to support eGovernment and ensure security, reliability and data privacy. As such, this area also includes the development of strong governance structure to facilitate communication between the different stakeholders and attempts to capture their needs and turn them into electronic service systems.

2. **Infrastructure support of information systems in the United Arab Emirates.** This theme deals with creating a solid infrastructure for information systems to enable the delivery of world-class eGovernment services. It also focuses on aspects such as facilitation of exchange and sharing of data between government agencies.

3. **Launching and providing eGovernment applications and services.** This theme focuses on a set of applications and services to be provided to government agencies to support them in providing eGovernment services effectively and efficiently.

4. **Development of effective mechanisms for performance management.** This theme focuses on improving overall effectiveness and actual levels of performance of departments of information technology within government agencies. It also deals with developing automated tools and reports to monitor performance indicators and overall performance management.

Strategic Goals
* advancing/raising the e-transformation levels in government services
* improving the competitiveness of UAE in the field of e-Government.
* Establishing advanced infrastructure and promote cooperation between government agencies.
* promotion of e-readiness in government agencies and governance models
* Provision of legislative and legal to ensure the success of e-government strategy.

Work Themes

First axis
Strengthening the regulatory framework and governance mechanisms for e-government in the country.

1- Development of a legal framework for e-government
2- Development of e-government security policies
3- Development of e-government policies
4- Development of a management system to measure & monitor e-transformation levels of government agencies.
5- Development of e-transformation strategy for government services.
6- Development of quality standards for e-services.
7- The launch of an electronic platform to support the development of e-Content in government agencies.
8- Design of the institutional structure of the UAE government (AE).
9- Development of Cloud computing strategy
10- Development of the electronic maturity model.
11- Development of ICT skills and competencies strategy for federal government agencies.
12- Development of ICT Structure for federal government agencies.
13- Development of e-government environment-friendly, green ICT strategy and policies.

Second axis
Infrastructure support of information systems in the UAE

1. Build and operate the FedNet information network for the UAE Government.
2. Development of data sharing model between government agencies
3. Building and managing the data center and disaster recovery
4. Launch and operation of customer relationship management centre
5. Development of an integration (interoperability) model for federal government systems.
6. Provide e-mail services to the staff of the federal government agencies.

Third axis
Launching and availing e-government applications and services

1. Development and management of the official portal of the Government of the UAE.
2. Update standards for federal government agencies websites and conduct annual evaluation.
3. Launch and management of electronic encyclopedia of the UAE.
4. Launch and operation of e-government service via mobile phones and devices.
5. The launch of open-to-all e-government program
6. The launch of UAE e-Government Award.
7. Specialized electronic portals - Phase I.
8. Construction of Cloud computing for UAE government.
9. Launch and operation of knowledge management system.
10. Development of e-Service Service Level Standards.
11. Build a model to calculate the return on investments for e-government projects.

Forth axis
Development of effective mechanisms for performance management

1. Measuring customer satisfaction on e-services
2. Measuring the quality of e-Government services
3. Media Campaign to enhance the level of awareness & use of public access e-services & the different channels.
4. Develop and implement an action plan to improve the UAE ratings on the United Nations e-Government index.
5. Systematic documentation and marketing of e-government success stories.
6. The development of a dissemination framework of successfulpractices in e-government.
7. The development of business continuity governmental policies.
8. Measuring the e-maturity of government agencies.

Figure 9: UAE eGovernment 2011-2014 initiatives
Source: http://www.emiratesegov.ae

The government identified 20 strategic performance indicators across all five strategic objectives to measure the implementation success of the strategy. Figure 10 shows 8 of these key performance indicators (KPIs).
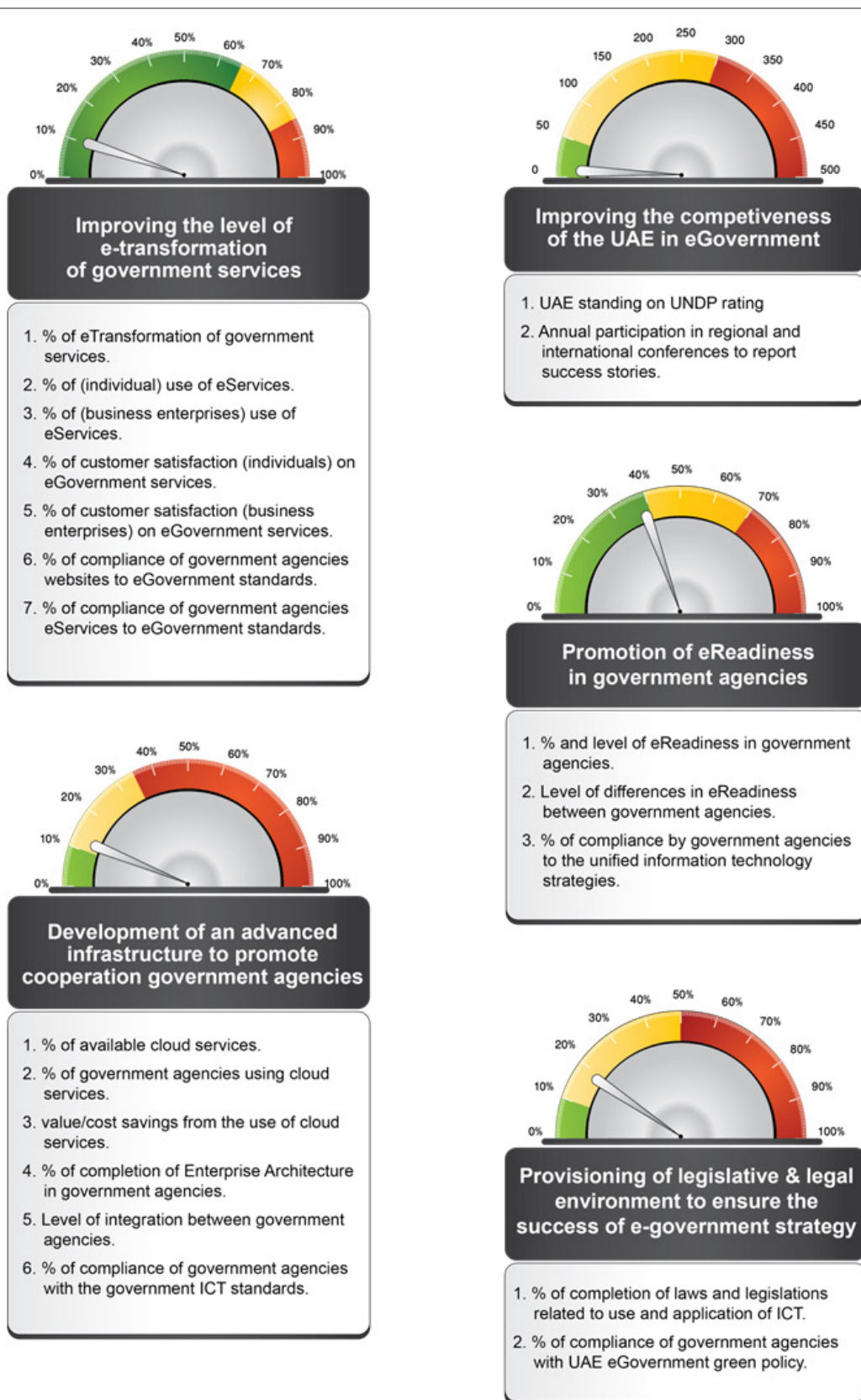
Improving the level of e-transformation of government services

1. % of eTransformation of government services.
2. % of (individual) use of eServices.
3. % of (business enterprises) use of eServices.
4. % of customer satisfaction (individuals) on eGovernment services.
5. % of customer satisfaction (business enterprises) on eGovernment services.
6. % of compliance of government agencies websites to eGovernment standards.
7. % of compliance of government agencies eServices to eGovernment standards.

Improving the competiveness of the UAE in eGovernment

1. UAE standing on UNDP rating
2. Annual participation in regional and international conferences to report success stories.

Promotion of eReadiness in government agencies

1. % and level of eReadiness in government agencies.
2. Level of differences in eReadiness between government agencies.
3. % of compliance by government agencies to the unified information technology strategies.

Development of an advanced infrastructure to promote cooperation government agencies

1. % of available cloud services.
2. % of government agencies using cloud services.
3. value/cost savings from the use of cloud services.
4. % of completion of Enterprise Architecture in government agencies.
5. Level of integration between government agencies.
6. % of compliance of government agencies with the government ICT standards.

Provisioning of legislative & legal environment to ensure the success of e-government strategy

1. % of completion of laws and legislations related to use and application of ICT.
2. % of compliance of government agencies with UAE eGovernment green policy.

Figure 10: Some of the UAE eGovernment 2011-2014 KPIs

Source: http://www.emiratesegov.ae

The government also developed an operating model that will be used to measure progress based on two variables: (1) citizen centricity and (2) efficiency and effectiveness factors associated with initiatives and projects. The model consists of six elements, as depicted in Figure 11. Each of these elements is managed through a separate and dedicated set of project portfolios. The most important element in the model is the construction of necessary security measures to develop trust and confidence levels between the service providers and the beneficiary.

Figure 11: UAE eGovernment strategy operating model
Source: http://www.emiratesegov.ae

One of the key programmes launched by the UAE to build trust and security in its eGovernment plan is the national identity management infrastructure programme. There is a high level of interdependence between these two initiatives. As part of the programme, the UAE issues a smart card with digital identities for all of its population which is estimated at around 9 million people. The next section will elaborate further on the objective of this programme.

6. UAE National Identity Management Infrastructure

The UAE national identity management infrastructure is a strategic initiative to enhance homeland security and develop a federated identity management system enabling secure eGovernment transactions (Al-Khouri, 2012b). A federated identity is the means of linking a person's electronic identity and attributes, stored across multiple distinct identity management systems (Madsen, 2005). Such systems would allow individuals to use the same user name, password or other personal identification to sign in to the networks of more than one enterprise in order to conduct transactions (Bertino & Takahashi, 2011; Roebuck, 2011; Windley, 2005).

As part of the programme, the UAE issues smart identity cards for all of its population. The UAE national identity card is one of the world's most advanced and secure smart cards. The card is provided with identification parameters stored securely in the smart chip. It thus enables establishing a person's identity on-site (physically) and remotely (virtually), enabling secure and trusted transactions. The multi factor authentication which provides both match-on-card4 and match-off-card5 features, facilitates validation, verification and authentication of any given identity. The cardholder can then access all identity based services as shown in Figure 12.

Figure 12: National ID Card: Key Enabler for UAE eGovernment.

The UAE ID card capabilities of on-site identification, remote identification and authentication are available to be used across the different applications enabling various forms of electronic transactions e.g., G2C, B2C, etc. These are facilitated by PIN verification, biometric authentication (match on card and match off card features) and digital signatures (Figure 13).

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4   Match-On-Card (MOC): The process of matching a biometric sample against a previously stored template on the same smartcard. MOC is the best known approach to underwrite cardholder's privacy protection.
5   Match-Off-Card: The process of matching a biometric sample against a previously stored template outside of card or any portable personal object.
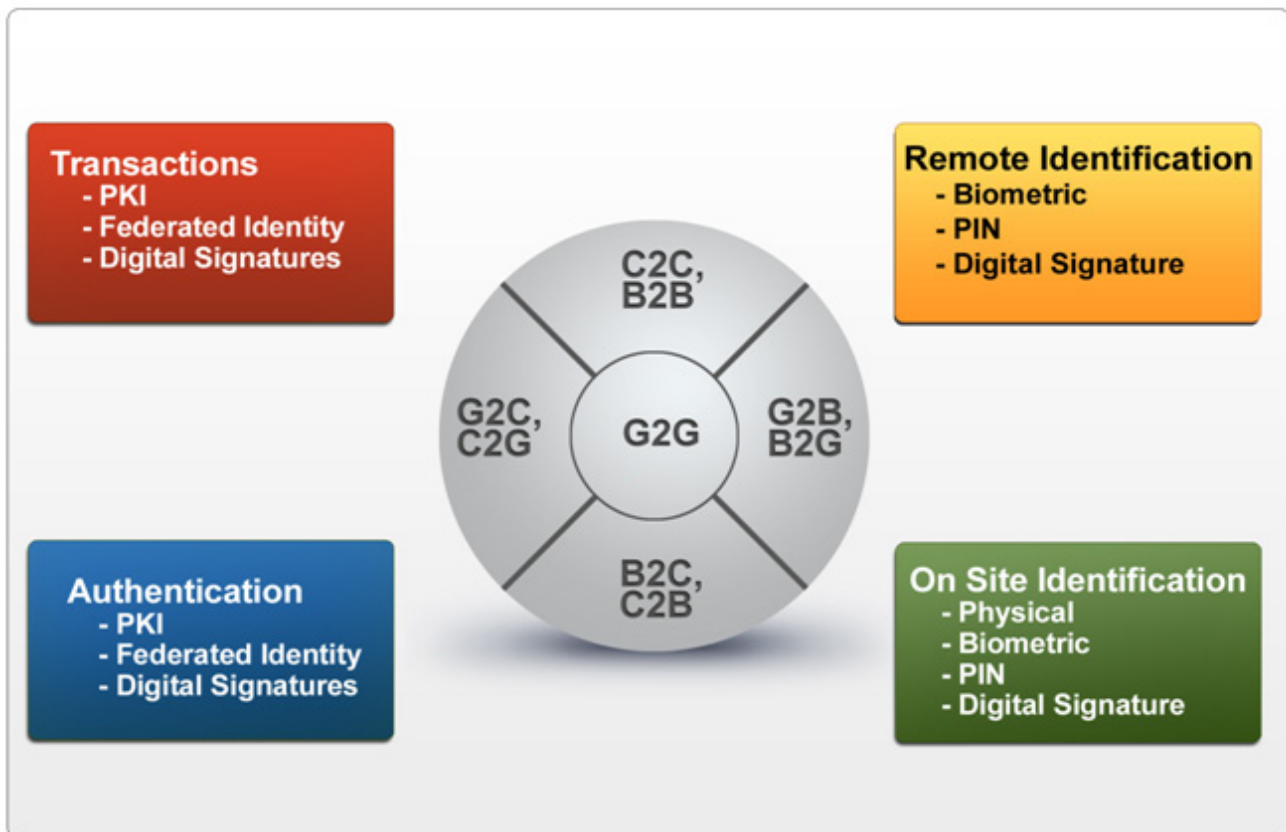
Figure 13: Enabling secure eGovernment transactions through smart identity cards

The UAE national identity management system eliminates the need to maintain distinct user credentials in separate systems. In an eGovernment context, this should result in greatly simplified administration and streamlined access to resources.

Government agencies in the UAE's federated identity management (FIM) system will depend on the National Identity Validation Gateway to authenticate their respective users and vouch for their access to services. Agencies will be able to share applications without needing to adopt the same technologies for directory services, security and authentication. This is enabled by the active directory services part of the FIM that allows government agencies to recognise their users through a single identity (Figure 14).
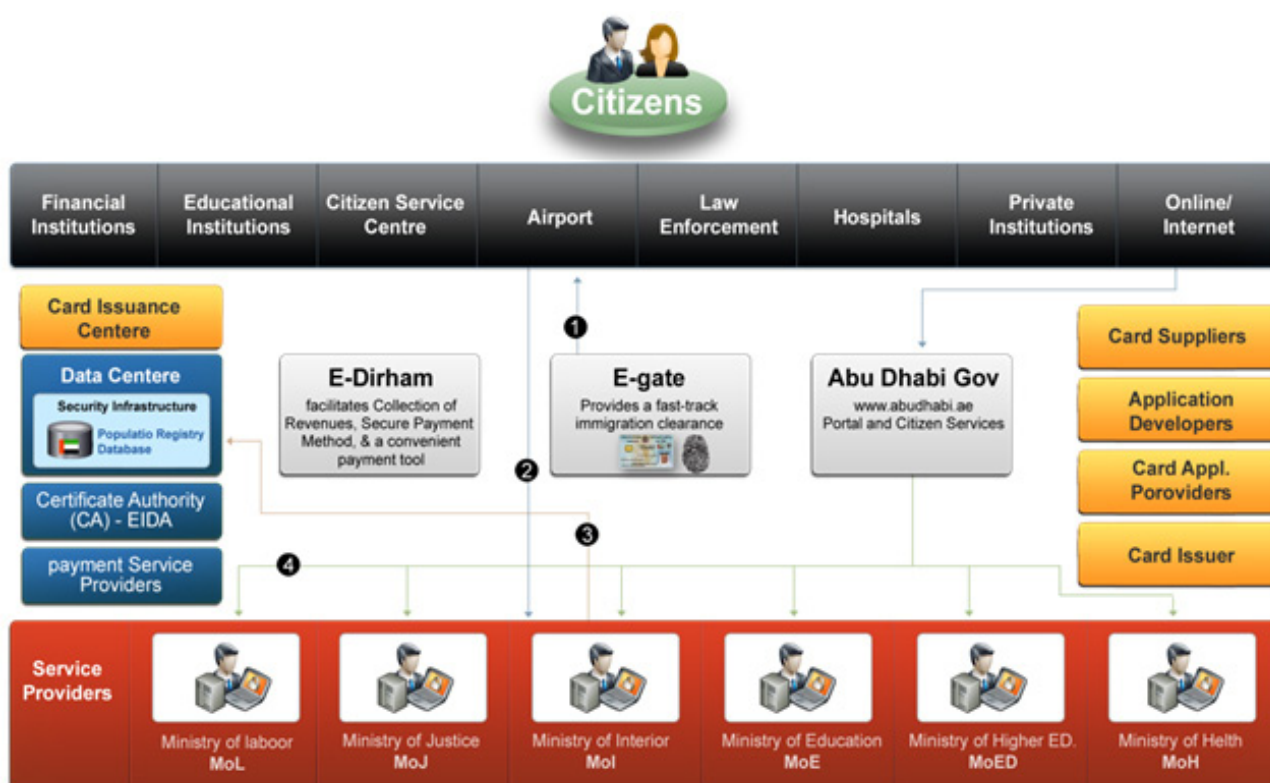
Figure 14: Federated identity management system

UAE is currently taking rapid steps in integrating its identity management infrastructure and its smart card capabilities in various public sector systems and applications. Some of the current deployments for card usage include the eGate service at the airports that allows cardholders to pass through immigration control using biometric authentication.

In addition, citizens in Abu Dhabi[6], for example, have the ability to login to the online local government portal and avail themselves of various eServices and utility payments. Some additional services provided through the Abu Dhabi portal include viewing and modifying details of one's personal traffic profile with Abu Dhabi Police, such as address, licence plate, etc.

There is increasing motivation in the UAE's public sector to rely on the new identity card to provide its services. It is expected that all eGovernment services would eventually require registering for the UAE identity card and PIN to access online government services. Integration of the national identity card is ongoing in all the federal and local authorities.

The design of the UAE federated identity management system ensures reliable and secure access from multiple locations, and hence provides advanced mobility. This supports the vision set in the UAE eGovernment strategic framework to deliver public sector services through different channels; whether it is the internet, kiosk machines, mobile phone applications or any other electronic channel. The UAE national identity card is viewed as the cornerstone for enabling successful deployment of eGovernment and eServices strategy in the country.

6   Abu Dhabi eGovernment: The Abu Dhabi eGovernment Gateway provides a centralised electronic gateway for Emirate-wide information dissemination between the Abu Dhabi Government and its customers. The Gateway provides citizens, residents, visitors and businesses with streamlined access to around 900 services, many of which are available as transactional online services, in addition to more than 250 general information pages, and 95 department pages. http://www.abudhabi.ae.

7. Conclusions

In an era of increasing digital communications and connectivity, governments are paying more attention to the interaction with their citizens within the virtual world (Bwalya, 2012; Reddick, 2010b). While making such attempts, governments are realising that conventional physical trust mechanisms are now insufficient and that there is a clear need to develop new capabilities to identify electronic identities (Andress & Winterfield, 2011; Basin et al., 2011; Howard & Prince, 2011; Sheldon & Vishik, 2011).

The government of the UAE decided, as part of its national development strategy, to own the identification process itself and provide secure, unique and tamper-proof digital identities to its population. This kind of identity management system owned by the national government is envisaged to offer improved security, gain higher levels of trust, confidence and encourage participation.

The federated identity management system, which is a fundamental component of the UAE's identity infrastructure, is foreseen to eliminate the need to replicate databases of users' credentials for separate applications and systems. It also paves the way to use a common framework to share information between trusted partners, where government agencies would not need to establish separate relationships and procedures with one another to conduct transactions.

The UAE eGovernment initiatives will be more successful when citizens will be able to transcend the physical borders to carry out their transactions. A citizen should be able to use his/her national identity card to conduct eGovernment and eCommerce transactions on websites verified and validated by a single identity validation service. This should be the future aspiration.

To the extent that the UAE federated identity allows government agencies to offer controlled access to data or other resources, it has the potential to enable new levels of collaboration between the different agencies. Identity management can support process re-engineering for extending access to valuable resources, using multi-factor authentication mechanisms, while the integration of systems across governmental and private sector spheres further broadens the opportunities for supporting eGovernment and eCommerce applications.

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