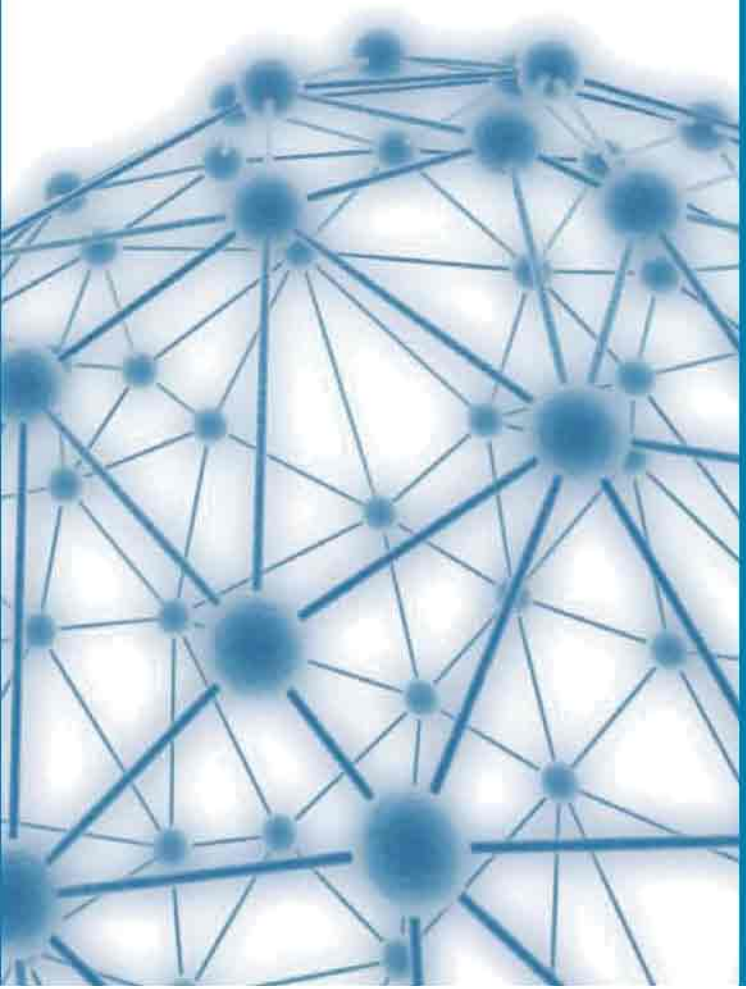
ICT for Local Governments

Standards, principles and best practices



NALAS

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This document presents a guidance study based on best practices for establishment of Local e-Government services. It is aimed primarily for the South East Europe region, but can be used for all developing or transitional countries. It also contains an extensive list of references and resources that would mitigate the transition from basic ICT usage towards connected local e-Governments.

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ICT for Local Government

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1. Background

1. 1 E-Government

The term "e-Government" can be broadly defined as the application of information and communication technologies (ICTs) aimed to enhance the performance of traditional government functions and services. More definitions of this term can be found in the literature. For example, according to [1], e-government is "the use of digital technologies to transform government operations in order to improve effectiveness, efficiency and service delivery".

It should be pointed out that e-government is not a single event in a short period of time but a long-term evolutionary process of transforming government to focus on citizen services. Thus, it is necessary to establish a high-level e-government roadmap (top-down design) with a bottom-up detailed implementation plan.

The purpose of e-government is more effective delivery of government services to citizens. Generally, the more services are available online and the more widespread the use of these services, the greater the impact of e-government. Thus, e-government requires a critical mass of e-citizens and e-businesses to generate external sustainable impact beyond the government. However, achieving this critical mass is not easy. For example, a World Bank study [29] about the importance of making more online services accessible to e-citizens and e-businesses found that:

"Many countries who pioneered e-government programs 5-10 years ago soon realized that the level of public participation in and usage of e-government services remained quite low despite substantial public investment on the supply side, which succeeded in making government services available online."

E-Government will only be successful if there is strong demand and support for it from the majority of the population. Some of this demand will come from better awareness of the opportunities offered by better and faster government service delivery. Citizens and businesses also need to be motivated to use e-government services through the provision of compelling, relevant and accessible digital content. In particular, the following must be implemented to increase demand and support for e-government services:

- Develop a multi-channel, single-window common service delivery infrastructure, including 'physical' citizen service centers and other public access points such as telecentres, callcentres, Web portals and mobile portals;

- Implement measures that will enhance public trust in ICT-enabled transactions and all other interactions in the digital environment;
- Encourage the development of relevant, compelling, user-friendly online and mobile content, including so-called 'killer applications'; and
- Implement programmes aimed at improved accessibility and affordability of online and mobile content and ICT.

The following four objectives can be achieved when e-government projects are implemented successfully:

1. Online government service
2. A paperless government
3. A knowledge-based government
4. A transparent government

To achieve these four objectives, e-government at central and local level must be built. There are three major tasks at each of these levels of government:

a) innovating citizen services (G2C);
b) innovating business services (G2B);
c) innovating the way government works (G2G).

In addition to the e-Government levels, different e-Government models should be used in order to provide different types of services to the interested stakeholders. The basic e-Government models coupled with the description of the interaction with corresponding stakeholders is given in Table 1.

Table 1: e-Government models

e-Government Models	Interaction between Stakeholders
Government-to-Citizen (G2C)	One-way delivery of public services and information by the government to citizens.
Citizen-to-Government (C2G)	Allows for exchange of information and communication between citizens and government.
Government-to-Business (G2B)	Consists of electronic transactions where government provides businesses with the kinds of information they need to transact with government. An example is an e-procurement system.
Business-to-Government (B2G)	Refers to marketing of products and services to government to help government become more efficient through improved business processes and electronic records management for example. An e-procurement system is an application that facilitates both G2B and B2G interactions.
Government-to-Employee (G2E)	Consists of initiatives that will facilitate the management of the civil service and internal communication with government employees. An example is an online human resource management system.
Government-to-Government (G2G)	Allows for online communication and information sharing among government departments or agencies through integrated databases.
Government-to-Non-profit (G2N)	Government provides information to non-profit organizations, political parties and social organizations.
Non-profit-to-Government (N2G)	Allows for an exchange of information and communication between government and non-profit organizations, political parties and social organizations.

The relation between the e-Government levels and e-Government models is given on Figure 1. The local government cannot be treated like other levels of government. Up to 80 percent of interactions occur at the local government level. Thus, service delivery is the major issue for the local government. On the other hand, the local government sector differs within itself depending on the region, the level of development, and the population it covers.

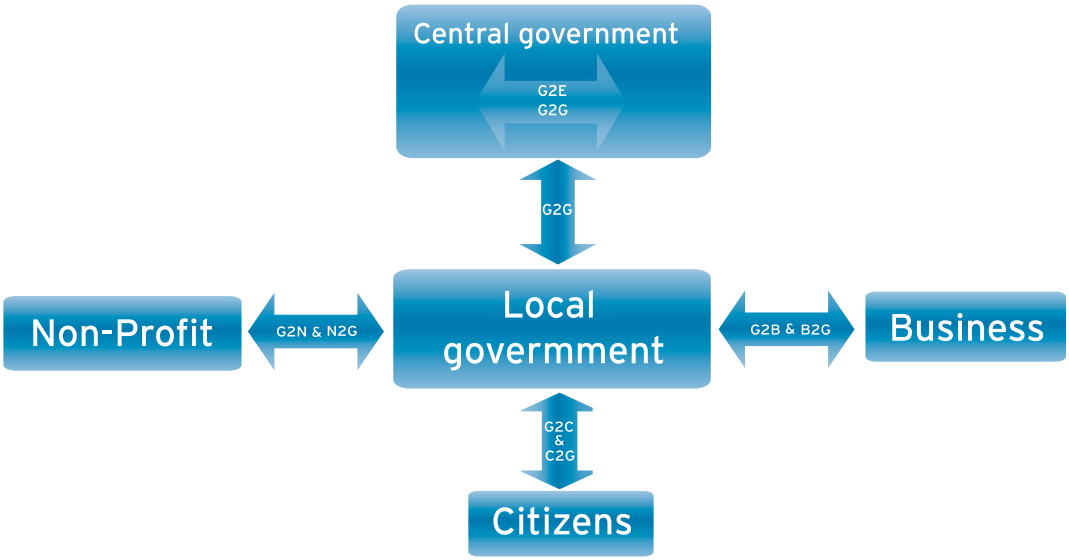

Figure 1: e-Government partnership system [2]

1.2 Local e-Government

Local governments, compared with central government, are closer to the citizens. Therefore, Information Society development should be an issue for local governments to a large extent.

Local e-government is the application of e-Government that focuses on following goals:

Transforming services – making them more accessible, more convenient, more responsive and more cost-effective. For example, it can make services more accessible to people with disabilities. It can also make services to be easier to join (within councils, between councils, and between councils and other public, voluntary and private agencies). It can help improve the customer's experience of dealing with local public services.

Renewing local democracy – making councils more open, accountable, inclusive and able to lead their communities. Governments should help their citizens: the opportunities to debate with each other, engageme with their local services and councils, access their political representatives. It can also support councilors in their executive, scrutiny and representative roles.

Promoting local economic vitality – a modern communication infrastructure, a skilled workforce and the active promotion of e-business can help local councils and regions promote employment in their areas and improve the employability of their citizens. Local government can use e-government services to achieve these benefits, if there are services that can ease promotion of local economy.

Unfortunately, these local e-Government goals are not easy to achieve. There is no unique approach to achieve these goals because models of e-Government development don't fit all levels of government.

Figure 2 describes the common services that might be considered for implementation at the local government level together with example applications. They include not only interaction with the citizens (via e-services), but also financial management, human resource management, support of decision-making (at both operational and political level).

Figure 2: e-Government for Local Authorities [3]

In addition to this diversity in needs, cost is probably the most important metric for successful deployment of e-Government services. The local government sector will resist intervention if it is not financially supported. Even if a certain service is deployed in one municipality, it cannot be assumed that it will easily be deployed regionally only with intervention from higher levels of government.

A co-ordinated approach to innovation brings this whole sector forward, because it can establish ICT as the enabler of strategic change with a limited budget. Figure 3 states some of the contributions that ICT can bring to governance both internally and externally.

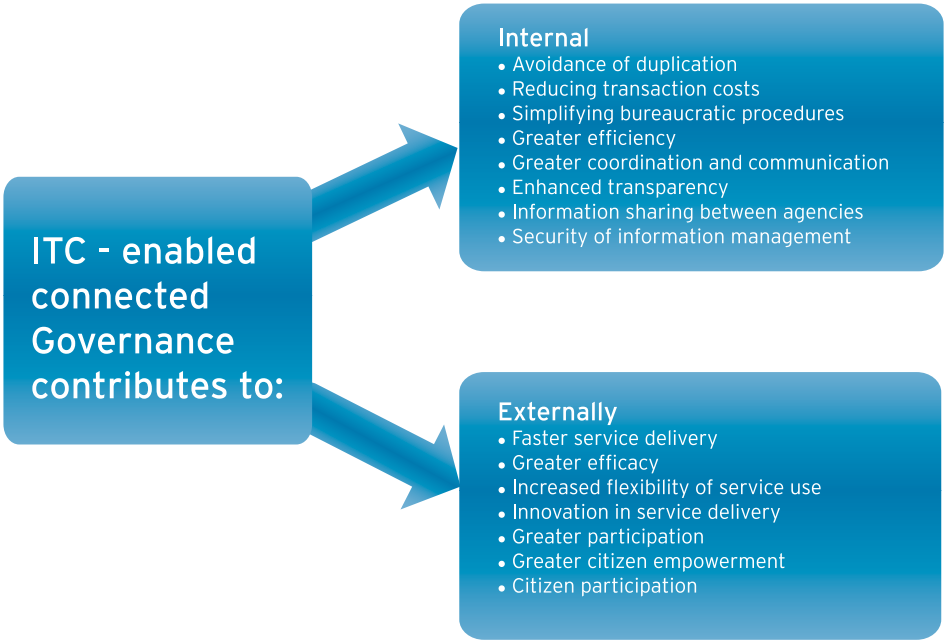

Figure 3: ICT - enabled Connected Governance [4]

1.3 Vision

To explain the vision of local e-Government, the Bilbao Declaration[23] will be used. The Bilbao declaration signed by mayors and local and regional authorities' representatives assumes the principles and values ("10 Principles of Bilbao") that must guide local action with regard to the development of the Information Society:

I. "Freedom of communication and universal access to information and knowledge are fundamental rights of each and every citizen":

II. "The information era must lead to the strengthening of all human rights and the development of democracy in accordance with the principles contained in the Universal Declaration of Human Rights";

III. "The potential of information and communication technologies must contribute, above all to the achievement of the Millennium Development Goals";

IV. "The development of the Information Society must benefit all citizens, without exception, and bridge the digital divide, with special attention being paid to the most disadvantaged groups, to persons with disabilities and to the inhabitants of the most isolated areas, particularly rural communities";

V. "To promote effective democratic decentralization with relevant powers and sufficient financial resources";

VI. "Respect for cultural and linguistic diversity, dialogue between civilizations, and the diversity of the media";

VII. "To promote transparency in the management of local and regional affairs and encourage people participation";

VIII. "To combat gender inequality and discrimination through the use of information technologies";

IX. "To promote cooperation between local and regional authorities around the world through exchanging information and knowledge, and developing joint projects that enable the Information Society to progress";

X. "To develop North-South and South-South solidarity as a means of combating social and economic inequality, contributing in the process to the creation of a fairer and more equitable Information Society";

1.4 Benefits

The key benefits provided by the implementation of e-government are:

E-government helps improve efficiency in government. ICTs are a necessary enabler of reforms to the ways in which public administrations work. Improving internal operating systems – financial systems, purchasing and payment arrangements, internal communications and sharing of information, programme processing and delivery arrangements can generate operating efficiencies and improve performance.

Enhanced quality of service has been a major component of public administration reform over the past two decades, and the use of ICTs to generate improvements in services has been a primary driver for e-government activity. In particular, the use of the Internet has given a major boost to customer focused, seamless services, which aim to transcend the structure of public administrations. Online services are increasingly seen as part of a broader services strategy, with important customer and efficiency benefits. As users of public services are often obliged to interact with government, user dissatisfaction with the quality of government services can quickly become a major political issue.

ICTs can support **more effective outcomes** in key policy areas such as health, welfare services, security and education. Ultimately, governments and public administrations exist to deliver policy outcomes, and ICTs are a major enabler across all major policy areas. The use of internet to deliver value in these areas is a major preoccupation in member countries.

Better governance arrangements in themselves will **promote economic policy objectives**. More specific effects may range from impacts on ICT production, e-commerce diffusion and business productivity to indirect effects such as reduced fiscal requirements owing to more effective programmes and efficiencies flowing through to the broader economy.

E-government can help **forward the reform agenda**. When aligned with modernization goals, implementing e-government can help administrations focus on the additional changes needed to meet service delivery and good governance concerns. At the same time, it provides some valuable reform tools and builds support from high-level leaders and government employees for achieving those objectives.

Through citizen engagement, government can improve the overall trust relationship between government and public administrations. E-government, by improving information flows and encouraging active participation by citizens is increasingly seen as a valuable tool for building trust between governments and citizens. The citizen engagement can be trated as a form of eParticipation. This kind of engagement is active bottom-up participation driven by citizens and communities, rather than only one-way information and top-down consultation provided by local government information web sites. eParticipation is broadening in scope and concept to embrace wider empowerment and engagement in governance using ICT, as well as greater pro-active involvement in eService design. It is clear that, although most citizens are not much interested in the mechanics of (e)participation, many remain very interested in public issues and policies which affect them or their communities directly.

These objectives may involve trade-offs between efficiency and effectiveness, efficiency and openness, accountability and customer focus. When this is the case, priorities will need to be set, but it should not be assumed that such trade-offs are inevitable. For example, several Nordic countries have put in place specific offices (ombudsmen) to handle citizen complaints with regard to privacy and citizen trust; this supports both privacy protection and efficient use of data.

1.5 Objectives

Main objectives of local e-Government are:

More 'joined up' services – These services can be provided by linking services across organizations in the region, through improved communication, shared information systems, access points and delivery methods. This includes **delivering services jointly** with central and local government agencies and departments, the health service and the voluntary sector in particular;

More accessible services – Services have to be reachable from home, libraries, offices, community centers - indeed anywhere for the convenience of the public rather than from council offices at the end of a queue. Equal access for all and social inclusiveness are key factors for a successful deployment of this objective. Services should be available at times and in ways that suit the public – not constrained by normal office hours or specific technology to access the service (access channels);

Services should be delivered or supported digitally – Digital services are creating more responsive, better value and faster services and information access. For example, through joint contact centers and web sites, and simplifying access to services such as changing school, setting up a business, or moving home. Seamless delivery and the removal of unnecessary bureaucracy are key aims of this objective;

Open and accountable services – Services should provide more information about plans, priorities and performance, encouraging public consultation and supporting councilors in keeping in touch with the people they represent;

Services used by 'e-citizens' – Citizens will adapt to electronic services where appropriate, especially where this reduces transaction costs and allows focus on those who need it most. Though it is hard to know what the public will expect from electronic public services in the future, and it is obvious that not everyone will want or be able to access services electronically; careful design and continuing consultation will help avoid costly investment mistakes.

1.6 Common fallacies

There are some common misunderstandings among political and administrative leaders of municipalities that reflect in the information society development of the region.

- The role of the ICT component is overrated. In fact, the technological component is the easiest part of the development and implementation of the ICT systems,
- There is understanding that it is possible simply to transfer ICT systems from one country or even from one municipality to another. This is in most cases impossible because of the complexity of procedural and organizational matters,
- There are often arguments that ICT systems are very expensive and that, because of a lack of budget, the ICT development is not possible. The systematic approach in ICT budget planning is often even more important than the amount of money. It helps save money and even with the use of limited resources to guarantee the sustainability of development and implementation,
- Some fear that ICT companies are trying to sell expensive and not suitable products. The authorities should invest in personnel able to translate the difficult technology-related language to an understandable language for top-managers.
- There is understanding that top-managers have no role in this development process: Everything is legally determined and the main problem is to find a company that will make the programs according to the existing legislation. The ICT development process is widely change management process where strong leadership is most important. Therefore, some basic knowledge of ICT and organizational support of the managers of the municipality is needed.

1.7 Current situation in South East Europe

The majority of municipalities in South East Europe work with digital data. Number of evidences about inhabitants, economy subjects etc. are done electronically. Nevertheless, the problem is that gathering information is not coordinated. As a result, many institutions have separate evidence on the same data. It means that regional local governments have **significant information potential** which is still not utilized in the most optimal way [26].

There are significant efforts in usage of modern ICT in municipalities in SEE. In some municipalities, **big efforts** have been made towards development and constitution of information systems and tools in order to improve public service. For example, municipality Indjija (probably technologically the most advanced municipality in Serbia) is offering comprehensive e-government services accessible through its website, ranging

from issuing basic registry documents to providing licenses and permits. This municipality also has a well functioning Citizen Assistant Center that has been successfully replicated in dozens of municipality across the country.

Generally, the existing municipality profile features no strategy for the improvement of ICT usage. Nearly all municipal decision-makers have heard about ICT but there are no concrete action plans for their implementation. ICT development depends on **mayor's priorities**. At the same time, there is a growing understanding among mayors that the use of ICT will be unavoidable in the future. If local leading government structure consists of people who understand and accept the importance of ICTs in a modern government, then activities in this field will be included in the srategic plans of municipalities and will be supported. Bigger development projects are mainly dependant on foreign aid and executed with the assistance of foreign ICT companies. Computerization of governmental and municipal offices is not systematic: it is quite common that computers are not networked and not connected to internet, even if internet connection in the office exists.

There are no mechanisms/fixed procedures for ICT budget planning. The percentage of budget spent on ICT and its development of municipalities is low. The low budget is spent on phone communications and in very rare cases on the ICT. Very few databases and information systems exist in the municipalities. Information is not integrated with the databases of the branches of the ministries.

After the implementation of the decentralization process, it is very important to pay great attention to the establishment and integration of the databases and improvement/development of ICT software infrastructure. Electronic document management and workflow should be developed to improve the efficiency of the municipalities.

There is a lack of offer of online services (with exception of few cases of one way download of certain forms from the web sites). Some of the municipal websites provide an opportunity for citizens to ask questions, but there is a lack of internal procedures and general regulations on what kind of data should be accessible for the public.

The telecom liberalization process has given first good results (prices are going down, availability of internet in urban areas is growing) and first projects of rural broadband will connect better rural remote municipalities. Central government, municipalities, business and citizens use more computers and there is rising demand for e-services.

The following recommendations are encouraged [32]:

1- **All-Stakeholders Consultation:** The governmental authorities should launch a national consultation to engage the citizens, the business community, local governments and other stakeholders in formulating objectives and building support for the implementation of an e-government for development program.

2- **Implementing Strategy:** Based on the results of the all-stakeholders consultation, a strategy, or masterplan, for implementing e-government at central and local levels should be generated.

3- **E-government Coordination:** An interministerial committee under the leadership of the Prime Minister should assist the work of the committee and be responsible for directing the implementation of the national strategy for e-government. The Prime Minister may wish to create an e-Government Coordinator and/or Coordinating Office to oversee the implementation of the national e-government strategy and coordinate an annual report to the Parliament.

4- **Policy/Legal/Regulatory Reform:** Among the early actions by the e-government interministerial committee would be to conduct surveys to determine how the legal, policy and regulatory environment should be modified in order to support e-government for development. It is critical for e-government and e-commerce that policy/legal/ regulatory barriers be removed.

5- **Cross-Ministerial Fund:** Consideration should be given to establishing an interministerial fund to support cross-ministerial activities and provide incentives for ministries to use their own funds to support e-government.

6- **EU Good Practices:** In formulating the national e-government strategy, the interministerial committee should refer to good practices identified by the EU and neighbouring countries.

7- **E-Government Training:** Ministries should be encouraged to sponsor training in government, especially professional courses and study tours for middle and senior managers.

8- **Donor Coordination:** The World Bank, UNDP, and other international development organizations as well as bilateral donor countries should be encouraged to assist in the formulation of the strategy and to support specific e-government projects.

9- **E-Procurement:** The government should establish a transparent and efficient national web-based clearing house for buyers and sellers that could be used by businesses at central and local government levels, as well as a legal and regulatory environment necessary to streamline procedures and reduce distortions in the bidding process.

10- Security and Standards:

- Establish a standards body to publish standards and best practices for IT networking and e-government in coordination with the private sector.
- Review laws on privacy and personal data protection to ensure EU compliance.
- Ensure that the digital signature law is implemented to use the best practices in e-authentication.
- Harmonize the legal framework to prevent cybercrime, including implementation of the Council of Europe Cybercrime Convention.

11- Telecommunications Connectivity and access:

- Deregulation needs to be managed and implemented to promote the rapid availability of high quality and affordable telecommunications capacity.

12- Information Services: make government information more readily available by:

- Establishing information centers at local level for business data, market research, employment data, and government information.
- Establishing sharing mechanisms, a central portal, within the government for databases (data warehouse) for one-stop shopping by business and citizens.
- Make the online content of the Official Gazette cost-free and open.

13- Citizen Participation

- Consider establishing Internet kiosks to facilitate citizen participation in e-government, at a cost.
- Alternatively allow private sector owned Internet cafes to bid on providing e-government services to citizens (forms, digital signatures, etc.).
- Consider using computer/Internet centers at schools and libraries to provide government information and services.
- Consider using Web 2.0 social sites, such as Facebook, Twitter and YouTube, to increase greater social participation in the fields of: information dissemination on official government channels, education and tourism. Local governments should develop an overall strategic plan for all agency levels to participate in social networks, and develop a coordinated effort to develop and implement the tools.
- Aim new e-government services at the mobile phone market.

2. ICT standards

2.1 The need for open standards

Many governments all over the world have begun to realize the importance of open technologies and technical specifications, and the ability to participate in the development of these technologies and specifications [5]. In parallel to this, they have taken notice of FOSS (Free and Open Source Software) and the benefits that it can bring to a nation. As a result, in many countries, the government has come out with policies and/or initiatives which advocate and favor open standards in order to bring about increased independence from specific vendors and technologies and at the same time to accommodate both FOSS and proprietary software. This is true for most e-government projects and initiatives all over the world.

Embracing open standards can also assist FOSS to flourish in a country. In the Introduction, it was mentioned that open standards helped to popularize FOSS to a large extent. FOSS can interoperate well with established proprietary software and technologies with the aid of open standards, thereby making its implementation more feasible. As such, countries that are looking to FOSS should also look at specifying open standards too.

2.1.1 The European Union

The European Union (EU) comprises many nation states with many diverse cultures and languages at varying states of technology/technical development. For it to be able to function effectively, especially in the area of information exchange, the concerned governments have to establish a proper interoperability framework and standards on data interchange. The development of the European Interoperability Framework (EIF) [6], a framework for the e-government services of the member states to facilitate the interoperability of these services at pan-European level, is taking place under the European Commission's Interoperable Delivery of European e-Government services to public Administrations, Business and Citizens (IDABC) Programme. The EIF version 1.0 recommends the use of open standards for maximum interoperability among e-government services. It defines the minimal characteristics for open standards as the following:

1. The standard is adopted and maintained by a non-profit organization;
2. The development of the standard occurs using an open decision-making process and does not exclude any party from it;
3. The standard is published and is available either free of charge or for a nominal fee;

4. The published standard must be available for all to copy and distribute, either free of charge or for a nominal fee; and
5. Any patents present in the standard are to be irrevocably available on a royalty-free basis.

The above definition has attracted controversy even though the area of validity is confined to pan European projects carried out in the context of the IDABC Programme[21] [22]. FOSS groups and advocates have welcomed it but other groups, including ANSI (American National Standards Institute), BSA (Business Software Alliance) and EICTA (European Information & Communications Technology Industry Association), have criticized it, particularly with respect to the last two criteria. These parties point out that they are inconsistent with the approach taken by other standards development organizations that acknowledge the right of patent holders to charge reasonable royalties and to place reasonable restrictions on the licensing of their essential technology covering an open standard.

The European Commission's IDA expert group on open document formats has recommended that the European Union's public sector use open formats in their electronic documents[7]. For revisable documents, XML-based formats like the Open Document format from OASIS and Microsoft's new XML based MS Office formats are recommended.

2.1.2 United Kingdom

The United Kingdom's e-government initiative places a lot of emphasis on open technical standards to achieve seamless information flow across the public sector and to provide citizens and business with better access to government services [8]. Its e-Government Interoperability Framework (e-GIF) defines the technical policies and specifications governing information flows across government and the public sector. Complying with e-GIF at the highest level includes the use of open standards like XML as the primary means for data integration and the implementation of Internet and WWW standards [9].

2.1.3 Denmark

The Danish e-Government Interoperability Framework includes recommendations and status assessments for more than 450 selected standards, specifications and technologies used in its e-government solutions [10]. In general, the Framework recommends the use of open standards and centrally agreed XML schemas (which may be provided free of charge throughout the public sector) for data interchange.

As part of the Interoperability Framework, the policy on data and document exchange specifies that documents should be published in generally available formats for which free readers exist and the use of proprietary word processing formats such as MS Word or formats that do not have widely available readers should be avoided for publicly available documents [11].

2.1.4 The Netherlands

The Netherlands has created the OSOSS - the programme for Open Standards and Open Source Software in government [12]. This programme encourages the use of open standards and provides information on open-source software. The Dutch ICTU, the organization for ICT and government programme, runs OSOSS. While the programme targets the public sector, its results will be available for the private sector and individuals too. The programme provides information and advice to the public sector on open standards. It has set up a catalogue of recommended open standards [13] for use in the public sector.

2.1.5 Norway

The Norwegian Government has declared that proprietary formats will no longer be acceptable in communication between citizens and government [14]. As part of its "eNorge 2009 - the digital leap" masterplan for IT - all public sector bodies in Norway are to have in place a plan for the use of open source software and open standards by the end of 2006.

2.1.6 Massachusetts, USA

The Commonwealth of Massachusetts, USA, has announced an IT Policy that emphasizes the importance of open standards compliance for IT investments in Massachusetts [15]. The Policy states that all prospective IT investments will have to comply with open standards referenced in the current version of the Enterprise Technology Reference Model (ETRM) of the Commonwealth. It further says that existing IT systems will be reviewed for open standards compatibility and will be enhanced to achieve open standards compatibility where appropriate. In addition, open standards solutions will be selected when existing systems are retired off or need major enhancements.

2.1.7 New Zealand

As part of its e-government vision, New Zealand has created "a supporting Information Systems (IS) Policies and Standards" document. The guiding principles state that the IS Policies and Standards are to be based on open standards, wherever possible [16]. New Zealand also has an e-Government Interoperability Framework (NZ e-GIF)[17] that lists the mandatory use of many open standards for compliance.

2.1.8 Malaysia

The Malaysian Government Interoperability Framework (MyGIF)[18] defines the minimum set of IT standards and technical specifications for use in government ministries, agencies and departments. These cover the areas of interconnection, data integration, information access, security and meta-data. Instead of creating new standards or specifications, MyGIF adopts internationally recognized open and de facto IT standards and specifications for all the interoperability areas mentioned.

2.1.9 Chile

In 2004, the Government of Chile issued Decree 81[19] whereby all public agencies and services are required to format documents in XML. A three-phase roll-out deployment plan is being implemented with the final stage scheduled for completion by 2009.

2.1.10 India

The Government of India has started its eBizinitiative [20] - a project to build a framework for Government to Business (G2B) services where services from the federal, state and local government agencies will be made available through a single portal. The eBiz architecture is to be built on the principles of interoperability and open standards.

2.1.11 Austria

Austria is considered to be a showcase for electronic offerings and e-government in Europe. Its e-Government system, supported with the Austrian e-Government Act since 2004 and the Federal Platform Digital Austria since 2005, has made Austria a champion in e-Government in Europe. In an online sophistication study in 2007 [35], Austria was at the first place with impressive 99% level of online sophistication of base services and 100% of online capacity.

The Austrian Electronic File system was introduced in order to replace paper based filing and archiving in all Austrian ministries. The project was started in September 2001 and completed in January 2005. Since then ELAK has been used by some 8 500 users. An electronic file is created for every written request requiring an answer as well as for every internal work task responding to the request. In this way, every procedure can be easily audited anytime by viewing the file. Several provincial administrations also introduced similar electronic file systems with about 40,000 users all over Austria.

In 2008, the developed e-Government software was completely published on an open source platform [36]. The best practices of cooperation between all levels of government administration were put on a wiki-type platform at www.verwaltungskooperation.at [37].

Austrian municipalities are the link between the federal government and the citizens. Typical services of the federal government, like registration of residents, passport enquires, voting papers requests etc. are all provided at the municipal front offices.

2.2 Standards development organizations

There are a number of standards development organizations (SDOs) referred to in this document. The following table provides a brief reference - SDOs marked with an asterisk (*) indicate that standards are freely downloadable:

Table 2: Standards Development Organizations

SDO	Description	URL
ISO	International Organization for Standardization	http://www.iso.org/
IETF*	Internet Engineering Task Force	http://www.ietf.org/
OASIS *	Organization for the Advancement of Structured Information Standards	http://www.oasis-open.org/
W3C*	World Wide Web Consortium	http://www.w3c.org/
ITU	International Telecommunication Union	http://www.itu.int/
IEC	International Electrotechnical Commission	http://www.iec.ch/

ECMA	Ecma International - European association for standardizing information and communication systems	http://www.ecma-international.org/
SABS	South African Bureau of Standards	http://www.sabs.co.za/
IEEE	Institute of Electrical and Electronics Engineers	http://www.ieee.org/
ANSI	American National Standards Institute	http://www.ansi.org/
OGC*	Open Geospatial Consortium	http://www.opengeospatial.org/
FIPS	Federal Information Processing Standards	http://www.itl.nist.gov/fipsp ubs/
ITU-T	International Telecommunication Union Standardization Sector	http://www.itu.int/
ETSI	European telecommunications Standard Institute	http://www.etsi.org/

2.3 Minimal set of ICT standards

In the following chapters, some general and specific principles referring to the ICT in the Government will be defined. A principle is a general rule or guideline for designing a system or architecture. By its nature a principle is a restriction of design freedom. Principles are the means to guide the design and evolution of systems.

2.3.1 General principles

The following general principle statements serve as points of departure for setting technical principles statements and standards:

- The funding of government IS/ICT projects and the purchasing of IS/ICT products and solutions should depend on compliance with defined and agreed standards;
- When interconnectivity, data interoperability or information access is required, the cost of non-complying with the standards should rest with the non- complying entity, system or organization.
- Government organizations' IS/ICT plans should be based on the agreed set of standards as well as acts and other relevant Government policy documents;
- The institution- and functional-based approach should be replaced by a service-centered approach;

- Government organizations that co-operate in order to ensure the provision of information and services for citizens or own officials need not know everything about the subordinating system or the division of roles therein;
- The development of information systems should be based on an internet-centered approach;
- Access to public services should preferably be ensured via a web browser by different channels and devices;
- XML-based technologies should be used for the integration of information systems and the presentation of data;
- Information systems should provide and use services via a data exchange layer based on multilateral agreements; and
- In developing open information systems, open-source based solutions are to be considered before proprietary ones;

2.3.2 Specific principles

2.3.2.1 Principles for Networking

Local government organizations should interconnect using IPv4. Adoption of the next generation of protocols should be considered in due time, in cooperation with central state governments.

2.3.2.2 Principles relating to Security

Protectively marked data should be handled and transmitted in accordance with the provisions of the ISO 17799.

Non-protectively marked data should be handled and transmitted in accordance with the Public Service Information Security Framework.

2.3.2.3 Principles relating to e-Mail

E-Mail products should support interfaces that conform to the SMTP/MIME.

Within government, intrinsic security should be used to ensure e-mail confidentiality. Outside secure government networks, S/MIME V3 should be used for secure messaging.

2.3.2.4 Principles relating to Directory

A local government directory schema should be developed to support arrangement of communication services including message handling, telephone and facsimile services as well as interactive access to a range of other applications. The schema should be interoperable with central government directory schemas.

2.3.2.5 Principles relating to Domain Naming

Projects are to follow the national Domain Naming policy. Domain Name Services (DNS) is to be used for internet/intranet domain name to IP address resolution.

2.3.2.6 Principles relating to File Transfer Protocol (FTP)

FTP should be used where file transfer is necessary within governmental intranets. Restart and recovery facilities of FTP are to be used when transferring very large files.

2.3.2.7 Principles relating to Terminal Emulation

Web-based technology is to be used in applications that previously used Terminal Emulation whenever possible.

2.3.2.8 Principles relating to Data Interoperability

XML and XML Schema should be used for Data Interoperability.

RDF, OWL and RSS should be used for Metadata framework. It provides interoperability between applications that exchange machine-understandable information on the Web.

UML and XMI should be used for exchange of all business information and information system design modeling.

XSL should be used for data transformation.

It should be ensured that XML products are written in such way that they comply with the recommendations of the World Wide Web Consortium (W3C). (Where necessary base the work on the draft W3C standards but avoid the use of any product-specific XML extensions that are not being considered for open standardization within the W3C.)

2.3.2.9 Principals relating to Information Access

Governmental information systems should be designed so that as much information as possible can be accessed and manipulated from common commercial browsers through utilization of functionality freely supported and available within the browser community.

Governmental information systems should be designed to be available, as appropriate, on the internet, either directly or via third party services.

Governmental information systems should support the standards and specifications listed in the browser standards and specifications tables below using, where necessary, freely available browser plugins or dedicated viewers.

Governmental information systems should be designed to provide protection against security risks of connection to the internet, including the ability to protect against the vulnerability of downloading executable content code that is not authenticated.

Additional middleware or plugins should be used, when necessary, to enhance browser functionality.

Browser standards adopted for conformance should support those features that a business or citizen may be assumed to have available or can easily download without incurring a licensing fee, notwithstanding the policy requirement that all public sector information systems be accessible through browser-based technology, other interfaces are permitted in addition to browser-based ones.

Government information access systems should be designed to provide the ability to support the citizen in his own time and at his own pace i.e. for asynchronous operation as well as synchronous.

The possibility to provide partial information (mainly for dissimination purposes) on a different popular social networks should be considered if the local population uses such social networks.

2.3.2.10 Principles relating to Content Delivery

The design aim would be for the content to be independent of the delivery mechanism; hence the strategic direction is to use XML and XSL.

The full range of services to be delivered to the citizen will dictate the standards required. Content management techniques and personalisation technologies can be used to support various delivery channels e.g. low function web browsers, public kiosks, Digital TV, WAP phones, etc.

Transcoding services, as an example of personalization technologies, can deliver web content to a variety of destination environments within greatly reduced timescales and at significantly reduced cost. The principle is that transcoding can be used to dynamically filter, convert and reformat web content to match the requirements and display capabilities of the destination device. Transcoding technology is server-side software that modifies webpage content based on data protocols, markup languages, device and network parameters and user preferences.

Personalization technologies may also be used to support groups such as disadvantaged communities or visually impaired or blind people (i.e. by using text translation, larger fonts and graphics, audio, etc. via a transcoder).

Special attention has to be turned to supporting new business models which create innovative partnerships facilitated by ICT between government and local actors (from

both the private and civil sectors) through multiple channels which include intermediaries and direct human contact.

2.3.2.11 Principles relating to Web-Services

This is a crucial area for the interoperability of services in which vendor-neutral standards are emerging.

The implementation of web-services for the Government should adhere to the existing and evolving standards developed by W3C and OASIS.

Where standards are still emerging from industry consortia, such as WS-I, the Government should monitor standards development in this area and, where necessary, participate in national standards development.

2.3.2.12 Principles relating to Enterprise Architecture

In terms of the Public Service Regulations, Government organizations should develop Information Plans, Infrastructure Plans and Operational Plans based on the Government organizations' business strategy.

Government organizations should develop plans based on a consistent enterprise architecture containing business architecture, application architecture, data architecture and technology architecture.

Business architecture contains a full business definition, including business motivation, services, business processes implementing these services, business units and locations and how these relate to each other.

Application, data and information technology architectures are consistent with the technology standards provided in the rest of this document.

2.3.3 Interconnection Standards and Specifications

The recommended standards and specifications for interconnectivity are presented in the following table.

Table 3: Interconnection standards

Component	Standard	Standards Body
Web transport	Hypertext Transfer Protocol HTTP v1 .1 (RFC 261 6)	IETF/W3C
Email transport	Simple Mail Transfer Protocol SMTP (RFC2821,RFC2822)	IETF
Internet message format	Multipurpose Internet Mail Extensions MIME (RFC 2045, RFC 2046, RFC 2047, RFC 2048 and RFC 2077)	IETF
Mailbox access	Internet Message Access Protocol IMAPV4.1 (RFC 3501)	IETF
Email Security	S/MIME V3 shall be used where appropriate for pan government messaging security unless security requirements dictate otherwise. This includes RFC 2630 to RFC 2633.	IETF
Directory	X.500 core schema (ISO/IEC95948). Light-weight Directory Access Protocol LDAP V3 (RFC4510) is to be used for general-purpose directory user access.	ITU/IEC/ISO IETF
Domain Name System	DNS (RFC 1032 to RFC1035 and related up-dates)	IETF
File transfer protocols	FTP (RFC 959, RFC1579, RFC2428) Secure copy over ssh (OpenBSD reference implementation)	IETF
LAN/WAN interworking	Internet Protocol IPv4 (RFC 791)	IETF
IP security	IP-SEC (RFC2402/2404)	IETF
IP encapsulation security	Encapsulating Security Payload ESP (RFC2406)	IETF
Transport	Transport Control Protocol TCP RFC793 with extensions as referred in RFC4614 User Datagram Protocol UDP (RFC768)	IETF IETF
Transport security	TLS1.1 (RFC 4346)	IETF

Encryption algorithms	Stream Ciphers: RC4, Rabbit, Decim, TSC4 (ISO/IEC18033-4) Block Ciphers: AES (FIPS 197), Twofish, RC6, Blowfish, IDEA (ISO/IEC18033-3) Asymmetric: RSA(ISO/IEC18033-2); Elliptic Curve Cryptography (ECC SEC1) (ISO/IEC 15946)	ISO ISO ISO
Hashing	SHA-256, SHA-512 (FIPS Pub 180-2); SHA-384; RIPEMD-160; WHIRLPOOL-512(ISO/IEC10118-3)	FIPS ISO
Digital Signatures	With Appendix: RSA (I SO/I EC 14888) With Message Recovery: RSA (ISO/IEC9796-2/3); DSA (FIPS Pub 186-2), EC-DSA, Rabin, Nyberg-Reuppel (ISO/IEC14888))	
Key Management	Diffie-Hellman (ANSI X9.42 - DH-MQV); ElGamal, Nyberg-Reuppel, RSA (ISO/IEC11770-2/3))	

2.3.4 Data Interoperability standards and specifications

The recommended standards and specifications for Data Interoperability and transformation are given in the table below.

Table 4: Data interoperability standards

Component	Standard	Standard Body
Metadata/MetaLanguage	XML (Extensible Markup Language)	W3C
XML MetaData definition	XML-Schema RelaxNG	W3C OASIS/ISO
XML Data transformation	XSL (Extensible Stylesheet Language)	W3C
XML Data query	Xpath	W3C
XML Signature	XML DSIG	W3C
XML Security mark-up	SAML v2.0 (Security Assertion Markup Language)	OASIS
Public Key Infrastructure	X509v3	ITU-T
Minimum interoperable character set	Transformation Format - 8 bit UTF-8 (RFC3629), individual items in the XML schema may be further restricted in character set on a case by case basis.	IETF

Modeling and Description Language	UML (Unified Modeling Language) RDF (Resource Description Framework)	OMG W3C
Ontology-based information exchange	OWL (Web Ontology Language Semantics and Abstract Syntax)	W3C
Model exchange	XMI(XMLMetadataInterchange), version 2.1	OMG
Form Representation and Data	Xforms	W3C
Geospatial data	GML (Geospatial Markup Language)	Open Geospatial Consortium

2.3.5 Standards for Web Services

The use of web services should be strongly encouraged. The set of standards is given in the table below.

Table 5: Standards for web services

Component	Standard	Standard Body
Web service request delivery	Simple Object Access Protocol SOAP v1.2	W3C
Web service request registry	Universal Description, Discovery and Integration UDDI v3.0	OASIS
Web service description language	WSDL1.1	W3C

2.3.6 Standards and Specifications for Information Access

The Government standards and specifications for information access, browsers and viewers are defined in the tables below. The services to be delivered to the citizen will dictate the expected standards required to be supported by the browser. However, as some browsers may only support the basic standards listed in the former table, this results in only a limited set of e-Government services being able to be offered via such browsers.

As such, the essential minimal level of information required to be accessed and viewed by the citizen should either be conveyed or be capable of being converted using personalization technologies, e.g. transcoders, through the use of the basic standards.

Table 6: Standards for Information Access

Component	Standard	Standard Body
Hypertext interchange formats	Those parts of Hypertext Markup Language HTML v4.0 and XHTML implemented in common by Firefox v2.0 or later, and MS Internet Explorer v6 or later, plus their interoperable extensions	W3C
Working Office Document formats (word-processing, spreadsheet, presentation)	UTF-8/ASCII Formatted Text Open Document Format (ODF) vI.O (ISO26300) and later Oasis versions Comma-Separated Values (CSV) RFC4180	IETF OASIS/ISO IETF
Document formats for presentation view	XHTML markup PDF (version 1.6)	W3C Adobe[1]
Relational Database Access	Structured Query language SQL93	ANSI
Character sets and alphabets	UNICODE ISO/IEC 10646-1:2000	ISO/IEC
Graphical/still image information exchange	Joint Photographic Experts Group /ISO standards 109 18 Portable Network Graphics (ISO/IEC15948:2001) For images that will not tolerate information loss use tag Image File Format (.tif)	ISO ISO Adobe

Some services to be delivered to the citizens will require more extensive functionality in the browser. Where such extensive functionality is required, the used standards should be selected from those listed in the table below.

Table 7: Additional standards for information access

Component	Standard	Standard Body
Multimedia audio/visual content	Moving Picture Experts Group (.mpg) MPEG-1 (ISO/IEC 11172) MPEG-2(ISO/IEC13818) MPEG-4 and ogg (http://www.xiph.org)	ISO
Browser scripting	JavaScript (ECMA 262)	ECMA
Internet Conferencing	H323	ITU-T
	SIP (RFC3261)	IETF

File archival and compression	tar(POSIX.1-2001)	POSIX
	gzip (RFC1951 and RFC1952)	IETF
	zip (http://www.pkware.com)	
	bzip2 (http://www.bzip.org/)	

2.3.7 Standards for Content Management Metadata

The recommended standards for Content Management Metadata are:

Table 8: Standards for Content Management Metadata

Component	Standard	Standards Body
Content management metadata elements and refinements	Dublin Core	ISO15836
Metadata harvesting	Open Archives Initiative Protocol for Metadata Harvesting 2.0 (OAI-PMH) for metadata collection. Protocol Version 2.0 of 2002-06-14 Document Version 2003/02/21 TOO:00:OOZ Http://www.openarchives.org/OA/op enarchivesprotocol.html	

2.3.8 Disaster recovery standards

Most important disaster recovery standards and guidelines are presented in the table below.

Table 9: Disaster recovery guidelines and standards

Component	Standard	Standards Body
Disaster Recovery Planning	Disaster Recovery Planning Business Continuity	BS7799/ISO17799.
Disaster Recovery	Guidelines for information and communications technology disaster recovery services	ISO/IEC 24762:2008

2.4 Procedures to achieve and maintain the standards
2.4.1 Organizational Framework

Contrary to what is often thought, the biggest challenge when developing an information society does not lie in how to get the information technology together, but in shaping the organizational, legislative and fiscal framework of the local government to support the development of e-governance.

The proposed organizational model (see Figure 4) offers the local governments a framework in which to situate the decision-making processes and project management activities, related to introducing e-government.

As stated above, the organizational model can differ according to the size and the level of organization of the local government it is to be applied to. A further division is made between the internal (applying to the back-office of the local government) and the external aspects (applying to the interaction with central government) of organization

2.4.1.1 Internal organization for bigger municipalities

Even if the basic responsibility of ICT development remains in the hands of the city mayor or head of administration of the municipality, in local municipalities that can allocate sufficient resources, the responsibility concerning ICT projects should be delegated to a specialized ICT manager [26].

The ICT manager, which we will refer to as "CIO" or "**Chief Information Officer**", should be placed at a sufficiently high level within the municipality (usually at the level of head of department). He or she will be responsible for:

- Creating and implementing an ICT action plan on the level of the municipality;
- Planning and preparing the annual ICT budget, in line with both the municipality and the central government ICT action plans;
- Implementing projects, including procurement, the organization of supervision and answering to the municipalities training needs;
- Maintaining the ICT architecture and user support;
- Participating in an ICT task group of municipalities, to be lead by the Central Coordination Unit of the Ministry of Local Governments.

Benefiting from the supportive, advisory and preparatory activities of the CIO, a city ICT council should be established to assist the mayor in overall strategic decision-making. Such an ICT Council:

- Is headed by the city mayor or head of administration;
- Consists of the key persons in the main departments and sub-units of the municipality;
- Coordinates the efforts of all actors involved in the ICT projects and integrates the changes in the internal working of the departments;
- Benefits from the preparatory work of the CIO;
- Has the authority to approve all the strategic initiatives concerning the development of ICT in the municipality, including propositions to initiate new projects, the annual ICT budget, intermediate reports on ongoing projects and measures needed to implement re-engineered processes.

The tasks of the ICT Council can, depending on the size and specialization and on the existing organizations within the municipality, be taken up by the City Council itself. In bigger municipalities and municipalities with a more complicated division of tasks, ICT **Correspondents** can be appointed. Preferably, they have a better knowledge and understanding of ICT issues. They support the implementation of new technology in the department and act as contact persons for the CIO. IT Correspondents need to be offered more intensive training on ICT and can be rewarded for their extra efforts using financial and non-financial incentives.

With ICT comes the issue of data protection. Where at first basic physical and procedural security measures can be sufficient, a comprehensive security policy has to be developed over time. The need for such a policy grows with the development of different systems and the exchange of data, enlarging the risk of unauthorized use of information.

The issue of data protection should be tackled by a **Data Security Officer**, who can be especially appointed and trained or whose tasks can be observed by a senior official within the municipality. The Data Security Officer implements organizational, physical and technical data protection measures after analyzing the risks connected to the implemented mechanisms of information gathering and exchange. Ideally, the work of the Data Security Officer is supported through feedback gained from regular external security audits.

Part of the activities, such as training and software development, can be separated from the municipal government and can grow into independent companies. Other tasks and activities can be performed in cooperation with ICT departments of other municipalities, either through direct cooperation or through creation of a specialized (non-profit) entity, working primarily or exclusively for the municipalities that control it.

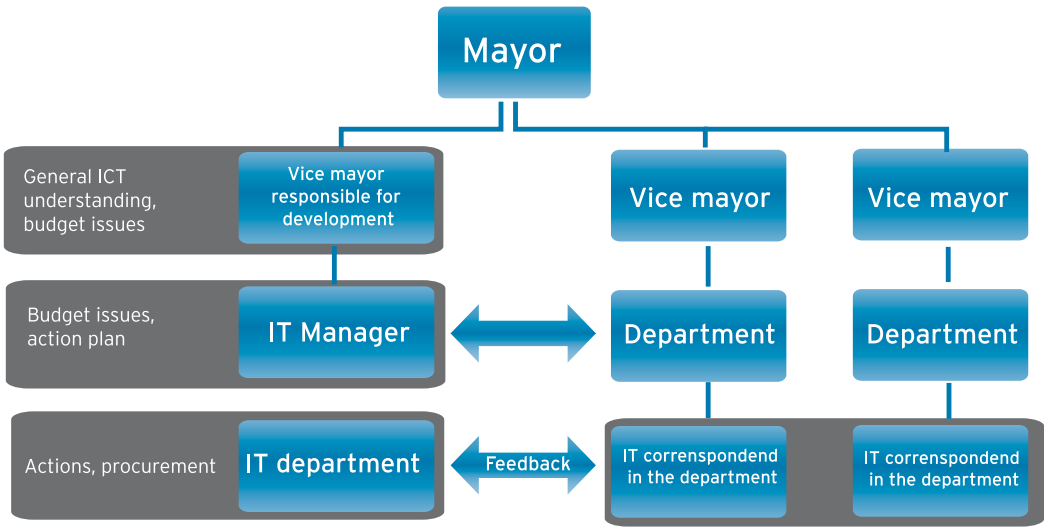

Figure 4: Municipality organization with respect to ICT

2.4.1.2 Internal organization for smaller municipalities

ICT manager in small municipality is not necessarily a full-time job. His/her working time could be shared with other institutions – school, government institution or private company. The responsibilities of ICT manager could also be outsourced and bought from the company/ entrepreneur. The main role of the person is to have a clear vision of the future developments and understanding of the municipality needs – both in the office and beyond.

All services could be outsourced as well. But there is dangerous moment – somebody from the municipal organization should be wise subscriber and contractor for the outsourcing partner.

2.4.2 Legislative/regulative framework

ICT is the most important development component of modern world and valuable foundation of information society. In developed countries its use and implementation is based on optimally arranged regulations and international standards that create a stable and predictable legislative environment with laws that are clearly formulated, transparent, non-discriminatory and technologically neutral.

Privacy protection and data handling, intellectual property rights, contract law, electronic signature law, electronic commerce law, telecommunications law and many oth-

ers, need to be enacted to provide a secure, stable and attractive environment. On the other hand, some modern and well-written laws, such as those providing for intellectual property protection, have been tabled already, but they still lack enforcement mechanisms. This means that changes of the existing legal system are still necessary in the region.

Key steps to a new e-legislation are harmonization with EU legislation, fulfilling the obligations from the eSEEurope Agenda and WSIS Action plan, amending existing laws and adopting new laws and by-laws.

2.4.3 Fiscal framework. Structure of budget.

ICT budget planning is part of the general municipal budget planning. From several best practice examples, it is important to fix the structure and methods of ICT budget planning by internal regulation of the Municipality. It is recommended to describe ICT-related expenses clearly in the municipal budget. Ideally, half of the IT-budget is used for running and maintenance costs and half for development and investments. From international experience, the share of ICT expenses from the general budget is 1-2%.

In parallel with financing possibilities from the municipal budget, international donors are also often supporting development projects. The choice of possible development projects depends on the strategic tasks of these organizations. Quite often, this financing is aimed to support the projects related to the development of civil society, transparency, e-Democracy and anticorruption issues. In these cases the mechanisms and rules of financing depend on the regulations of these international organizations.

In spite of these external possibilities, the ICT budget should be one of the priorities of the municipal budget, regardless of its share. It is directly connected to the sustainability of systems.

ICT budget is often divided into:

- Running costs of systems and infrastructure. There is the need to renew ca. 20% of the infrastructure every year. The calculation formula can be used to evaluate the need for this renovation: c=a*b*0.2 (c = need for infrastructure renovation budget, a = number of ICT workplaces in municipality, b = estimated cost of a unit of infrastructure, usually 2-3 000 EUR). In addition to the renewal of the infrastructure, some other costs should be estimated – cost for internet connectivity service, cost of soft- and hardware maintenance, cost of software licenses, cost of staff ICT training etc.
- Cost of development projects. This cost is often evaluated by using the external expert method.

2.4.4 Technical Model

The technological model for municipalities consists of two basic parts:

- IT- infrastructure
- Information systems

The basic components of both parts are similar, since most of the functions that municipalities are called to perform are common and established by law. There are some differences between city-type municipalities and small rural municipalities, but they are relatively minor and will be dealt with in the text.

2.4.4.1 ICT infrastructure

The ICT infrastructure for the municipality is the physical part of the e-model for municipalities. The equipment and the connectivity, whether wired or wireless, are the backbone of information exchange both within a municipality and between municipalities. Since ICT equipment is also the most expensive part of the e-model that has to be implemented with very scarce resources, one has to be very careful in the planning process. A general recommendation is to aim at harmonious development of the infrastructure to avoid creation of artificial bottlenecks that do not allow efficient use of resources.

The ICT infrastructure for a typical municipality consists of personal computers, local area network(s), user identification and authorization systems and basic software. For the uninterrupted flow of data that is a precondition of data exchange between administrations, one needs to aim at developing a broadband internet connection in every local authority. Since this is also a need on behalf of central government, it is advisable to create a centrally launched and financed project to reach that aim whereby the central government will pay for the initial setup of the broadband connection and municipalities would be responsible for the running costs. Such a layout will set a basis for sustainable functioning and development of municipal ICT systems.

It is strongly recommended that every person who needs to have a workstation would have it connected to internet and equipped with a basic set of software tools. Local governments should themselves develop a fixed standardized list of necessary software for an ordinary workstation of their municipality in order to facilitate the exchange of information and keep track of proprietary issues of the software.

The introduction of an ICT system at local level would typically go through the following steps:

- Systemic analysis of processes and procedures of local self-government
- Feasibility analysis of the information system

- Design of the network
- Installation of the information system
- Training of users
- Implementation of a monitoring system for model usage

In order to have a fully functioning information system, the following basic technical preconditions should be met:

- Local network - all the computers in the local administration should be networked, or at least one computer in each department or office should be in the network
- Central server - is required to host the model and supporting software
- Internet connection - according to the needs of the local government network and its financial capacity. Large municipalities might use a dedicated line, providing twenty-four hour connection with internet. Smaller local governments may only be able to afford a more limited connection

For the implementation of the local information system, the following infrastructure is needed:

- Minimum informatic equipment of the local government is one computer in each department or office. One high quality computer will function as server.
- Knowledge of Windows and internet by employees who will perform the interactive work with clients.
- An appropriate software package including users' manual.
- A team of experts to conduct the basic systemic analysis, install the model, and train the users.

In order to provide for a better comprehension of the process of development of e-Government and for a competent demand for electronic administrative services, it is necessary:

- To carry out regular monitoring of the perceptions for the consumption of electronic administrative services.
- To organize and implement an awareness programme for the utilization by businesses, citizens and administration of electronic services.
- Using the capabilities of e-government the traditional channels for service delivery must be preserved, developed and organized according to the "one-stop-shop" concept in order to avoid the "digital divide" between the different target groups.
- To carry out a periodic evaluation of the advancement in the implementation of electronic services.

2.4.4.2 Information systems

A municipality usually has the following information systems:

Document management system (DMS) – document management processes are deeply connected to the core duties of the municipality. In big city-type municipalities, document management with approval/digital signature mechanisms are part of the core information system. The document management system should follow the basics of state IT-architecture, document semantics and be able to communicate with state ICT basic infrastructure.

E-mail systems. There is a wide variety of commercial e-mail systems on the market. Also open-source solutions are available. It would be advisable to integrate e-mail system to the document management and resource planning system of municipality.

Finance and personnel management systems. It would be good to reach the situation where basic finance and personnel management information systems are developed together – with unified interfaces in order to simplify data transfers to the central institutions, statistics etc.

Webpages of municipalities and e-democracy tools. It is reasonable that basic tools for e-democracy are to be developed together under the "umbrella" of local government association or other common institutions. There are several recommendations for the IT-architecture, which are describing standards for web development. Several open-source tools are available to manage municipality information on the web. The Public Information Act should regulate the list of information for all municipalities that should be set up on their websites.

State registers. Most functions related to the registration of population, real estate, businesses and cars are centralized to the central level state register. At the same time, different municipalities have different needs for information. It should be discussed to which amount existing state register datasets need to be enlarged by certain municipalities. There are possible IT mechanisms that allow the integration of data sets of state registers with important information at municipal level. Clear understanding should exist about ownership of data and its cross-use by central government and municipalities (use of data for analysis, privacy, financial issues).

2.4.4.3 Front office

The term "front office" refers to government as its constituents see it, meaning the information and services provided and the interaction between government and both citizens and business. The implementation of e-government initiatives concerns two areas regarding the front office: implementation of online services and engagement of citizens.

2.4.4.4 Back office

The term "back office" refers to the internal operations of an organization that support core processes and are not accessible or visible to the general public. The implementation of e-government goes hand-in-hand with a number of back office reforms. On the one hand, e-government will help bringing these reforms, while, on the other hand, e-government requires such reforms in order to be successful.

2.5 Benchmarking

For strategy and action planning reasons, it is important to know what the ICT situation of the municipality is like. Providing local eGovernment services extends simple availability of public services in electronic form. There is no use in delivering eGovernment services if these are not used or do not deliver the expected benefits to users. The end results must reflect the outcome they deliver for citizens, businesses and government itself. This outcome proves itself through usage, delivery of relevant high impact services, convenience, and time- efficiency gains. A recent study by T.E.Wohlers[40] shows that local e-government sophistication increases for municipalities governed by professional managers, endowed with more organizational resources, characterized by higher socioeconomic levels, and increasing population size.

One example of an assessment that **balances** efficient administrations with responsive democracy is the BEGIX (Balanced e-Government Index) [24] tool focused on measuring 'balanced e-government' by combining electronic and participatory services.

The self-evaluation tool BEGIX (Balanced E-Governance Index) is based on the concept of balanced e-government, according to which a "correct" e-government is a balanced combination of electronic services and forms of electronic participation that is developed within change management framework. The concept was developed in the course of a benchmarking survey carried out by Bertelsmann Foundation and BoozAllenHamilton.

The **balanced e-government scorecard** serves in the recording and evaluation of various dimensions of e-democracy and e-government services, as can be seen from Figure 5.

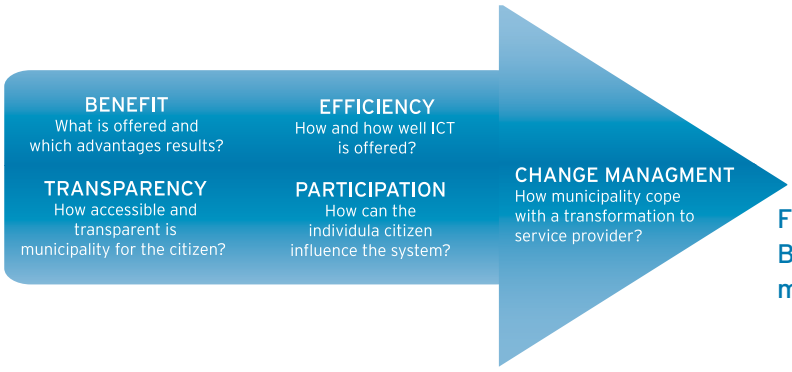

Figure 5: Balanced e-Government Scorecard

Scorecards allow uniform checking of different objectives within the framework of a higher order strategy. The matrix, which forms the basis for the e-government scorecard, comprises a dynamic and a static component – with a total of five fields – as follows:

Benefit: This first scorecard area relates to the quality and quantity of the services and, therefore, to the benefit that the citizens derive from the service offering, e.g.:

- The range of services that have already been implemented
- The realization of the "one-stop shop" (accessibility of all services via one portal)
- User-friendliness of the services

Efficiency: The extent to which actual improvements in efficiency are realized, e.g.:

- Availability of a process, application, system and database architecture
- Elaborated finance and resource planning (business case)
- State of the utilized ICT infrastructure and platform technologies
- Quality and scope of the training and qualification programs for staff and managers

Participation: This part of the matrix is concerned with the question of whether the services are designed so as to promote political communication and enable a higher degree of citizen participation:

- Direct user access to relevant contact persons via e-mail or the web
- Consideration of user wishes
- Influence and consultation of citizens in decision-making processes
- Possibilities for debating public topics (chat rooms, forums etc.)

Transparency: Whether e-government contributes to the realization of the transparent state is recorded here. Inter alia, the following aspects are measured:

- The amount of information on executive and legislative processes (such as, for example, committee meetings, press conferences, local meetings)
- The extent to which the processing of a query can be traced – i.e. real time information for the clients about ongoing queries or applications
- The topicality of information

Change management: The course of the planning and implementation process in the e-government program is determined via this section of the scorecard. For example:

- Strategy development, e.g. the degree to which regular comparisons are made with other e-government programs
- Monitoring and controlling
- Inclusion and motivation of the employees

The self-assessment questionnaire is given as annex to this document and can be found online at www.begix.net.

For **strategy and action planning purposes,** it is important to know what the ICT situation of the municipality is like. The questionnaires about IT situation should be filled in at least once a year. Examples of these forms are given in the Appendix 4. There are questions about infrastructure (not only internal municipal government, but also about the situation in the territory of municipality). Also databases, hardware and software of the municipality are analyzed.

There are other more simplified, but also efficient benchmarking procedures. For example, according to the Conceptual framework for benchmarking the digital Europe, created by Europian Union Commision [38], the e-Public services can be benchmarked using following three indicators:

- E1: Online availability and interactivity of the 20 basic public services for citizens and enterprises
- E2 : % of individuals using the internet for interacting with public authorities by level of sophistication
- E3 : % of enterprises using the internet for interacting with public authorities broken down by level of sophistication

The benchmarking model reflects how businesses and citizens can interact with public authorities. Governments' service delivery processes are described according to the following stages: (i) information, (ii) one-way interaction, (iii) two-way interaction, (iv) transaction, and finally (v) targetisation as shown on Figure 6.

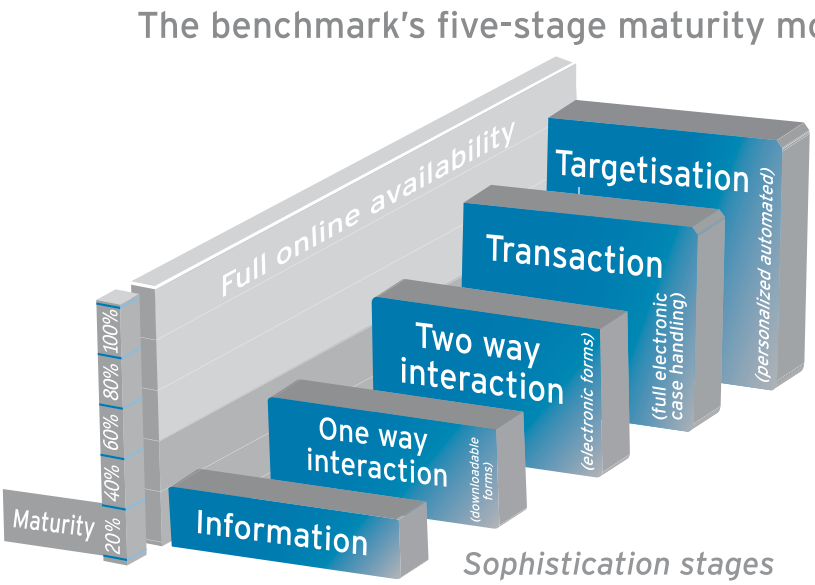

Figure 6:
The five stage maturity model

The third and the fourth level of the benchmarking five stage maturity model, two-way interaction and transaction, have become a standard for many countries: electronic forms are available for most services; transactional - also called full electronic case handling – where the user applies for and receives the service online, without any additional paper work, is increasingly becoming mainstream. The fifth level, targetisation, provides an indication of the extent by which front- and back-offices are integrated, data is reused and services are delivered proactively. The fourth and fifth levels are jointly referred to as "full online availability".

A positive User Experience is a pre-requisite for repeated visits and inclusiveness of eGovernment services. The findings of the European Commision 2009 study on "Smarter, Faster, Better eGoverment 8th benchmark measurement"[39] has been used to define, measure and report on various components of User Experience that can be measured through the web. In that study, five indicators have been used to assess User Experience:

1. Accessibility: A web-crawler performed an automated assessment of compliance with Web Content Accessibility Guidelines (WCAG1.0 standards). A typical criteria set is "Is the eGoverment portal accessible to people with disabilities?d

2. Usability: Typical criteria set is "Can you use a channel of choice, does the website allow for progress tracking, is there a help functionality available and are privacy policies duly mentioned and explained?"

3. User Satisfaction Monitoring: Typical criteria set is "Do websites allow for user feedback and reporting on certain issue?"

4. One-stop-shop approach: Typical criteria set is "What proportion of the 20 basic government services are available on the principal portal(s)?

5. User-focused portal design: Typical criteria set is "What is the ease of finding information on the different websites and are they structured by theme or life-events for instance?"

3. ICT Strategy

3.1 ICT Strategy of Municipality

In theory, the ICT strategy should be developed according to the general development strategy of the municipality and not vice versa. Bigger municipalities often have some general strategy papers, while smaller ones sometimes do not have any strategic plan at all. In most cases, the strategy is built by combining bottom-up planning (development needs proposed by the different units of the municipality according to their everyday needs) and top-down planning (from some strategic considerations of development, including tasks set by the national Information Society Strategy). The strategy development is a collective work of all of the municipal staff and especially the ICT department. The time horizon of a typical ICT strategy is often 4 to 5 years and this is the base for operative plans – annual action plans.

The following goals are often found in the Municipality ICT strategy:

- To increase efficiency in administration, benefiting both the business sector and the citizens of the municipality in everyday life – the activity directed to the external dimension;
- To increase efficiency and transparency (questions about anticorruption etc.) of the business of the municipality itself – the activity focused on the internal dimension, aimed to improve back-office processes of the municipality;
- To support democratic processes through the tools of e-democracy – the activity focused on the external processes;
- To increase access to internet and public information. Questions about e-inclusion, broadband strategy – the activity focused on the external processes.

It is utmost important that this strategic development is managed by the top leaders of the municipality. There are several reasons:

- The implementation of the ICT systems causes changes in the organization and processes. These changes cannot be managed by ICT managers. These are general top management questions;
- ICT development is derived from general development plans of the municipality. This is the issue of top management of the municipality;
- Efficiently functioning ICT systems establish an environment for economic development, increase foreign investments, transparency of local government etc. Personal leadership in these developments will give political credibility and reliability;

- Well-managed and functioning ICT systems will build ground for growth of the financial stability of the municipality. This will give a clear message to the voters of the community about positive changes and stability.

The ICT strategy of the municipality should be clearly documented and should be based on rules and regulations. Concerning ICT, a set of basic documents has to be created over time (see Table 10).

Table 10: ICT strategy documents

Document	Priority
Rules of use of the ICT system	1
Web content management rules	1
Hardware assets management rules	1
Software assets management rules	1
ICT action plan (2-3 years)	1
ICT budget (current year + forecast for 2 years)	1
ICT strategic plan for municipality (for 5 years)	2
Rules for starting, running and implementation ICT projects	2
Document management rules (adding Digital document management rules)	2
Rules to create backup copies	2
Data protection policy	1

3.2 Action Plan for Implementation of ICT

Annual action plans contain more concrete project descriptions where several more concrete aspects are defined in parallel with the strategic aims. Usually, these are specific aims of the project, expected timeframe, responsible persons or organizations, general methods to proceed with the project, predicted budget and human resource needs and main deliverables. Action plans are normally prepared by the CIO and approved by the ICT Council. In small municipalities, where CIO and Board do not exist, the plans are prepared by an ICT advisor and approved by the head of municipality. ROI and profitability are one aspect that is often under discussion when action plans are prepared.

Action plans often include benchmarks to measure the success of development. These benchmarks also include financial issues. The supervision of the planning process is the duty of the top management of the municipality. This is in many cases accompanied with financial and ICT auditing processes.

The goal of the action plan is to define the priority activities in each municipality for the introduction and implementation of e-governance at local level.

The action plan format is a matrix that involves all the necessary aspects of e-governance and can be used by each municipality.

The matrix consists of the following components:

- Actions – the activities that should be taken by municipality in order to achieve the development of e-governance at local level.
- Expected results – end result/target of the activity
- Person/department – who is responsible for the fulfillment of an activity?
- Required resources – what is needed to complete the activity?
- Funding source – from where the funding should/ can come (municipality budget, donor organization etc).
- Success criteria – the preconditions that are needed for implementation.
- Deadline – when the task should be completed.
- Status – status description after each 3-6 months
- Financial resources – what is the financial measure for the activity?

The activities are divided into 5 action lines. Action lines are important components for the successful implementation of e-governance in the municipalities. Each action line has several sub-activities and municipalities can continuously add new necessary activities.

Action plans could have the following major action lines:

1. Organization related

   a) Human Resources

2. IT Systems

   a) IT Infrastructure

   b) Information Systems

3. Security

4. E-services and e-democracy

5. Other

The following activities should be considered in order to ensure implementation of the action plans:

1. Each municipality should appoint a person responsible for the implementation and revision of the action plan.
2. The action plan should be an active document and it should be reviewed and modified by municipalities at least after each 3-6 months.
3. The progress of the action plan should be monitored. Assistance should be provided to the municipality - it is good to involve external expertise to measure the implementation of the action plans.
4. A network between municipalities should be developed. Regular meetings between the municipalities during which the action plans are to be discussed, together with new ideas, should be organized.

Table 11: Action plan format

Action	Expected result	Person/department responsible	Required resources	Funding resources	Success criteria	Deadline	Status
Action line I: Organization-related							
3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	3.2.7	3.2.8
Human resources							
3.2.9	3.2.1.0	3.2.11	3.2.12	3.2.13	3.2.14	3.2.15	3.2.16
Action line II: ICT systems							
3.2.17	3.2.18	3.2.19	3.2.20	3.2.21	3.2.22	3.2.23	3.2.24
IT infrastructure							
3.2.25	3.2.26	3.2.27	3.2.28	3.2.29	3.2.30	3.2.31	3.2.32
Information systems							
3.2.33	3.2.34	3.2.35	3.2.36	3.2.37	3.2.38	3.2.39	3.2.40
Action line III: Security							
3.2.41	3.2.42	3.2.43	3.2.44	3.2.45	3.2.46	3.2.47	3.2.48
Action line IV: E-services and e-democracy							
3.2.49	3.2.50	3.2.51	3.2.52	3.2.53	3.2.54	3.2.55	3.2.56
Action line V: Other							
3.2.57	3.2.58	3.2.59	3.2.60	3.2.61	3.2.62	3.2.63	3.2.64

4. Roadmap

E-government is not simply a matter of giving computers to government officials, or automating old practices. Neither the use of computers nor the automation of complex procedures can bring about greater effectiveness in government or promote civic participation. Focusing only on technological solutions will not change the mentality of bureaucrats who view the citizen as neither a customer of government nor a participant in decision-making.

Understood correctly, e-government utilizes technology to accomplish reforms by fostering transparency, eliminating distance and other divides, and empowering people to participate in the political processes that affect their lives. Various governments have different strategies to build e-government. Some have created comprehensive long-term plans. Others have opted to identify just a few key areas as the focus of early projects. In all cases, however, the countries identified as most successful have begun with smaller projects in phases on which to build a structure.

To assist policymakers in devising their own plans and initiatives, e-Government implementation can be divided into three phases [25]. These phases are not dependent on each other, nor need one phase be completed before another can begin, but conceptually they offer three ways to think about the goals of e-government.

Within those phases, the same services should be deployed in a different way, depending on the environment and the technological advancement of the municipality. Figure 7 represents an effort to present a simplified road map of local e-Government services using this approach.

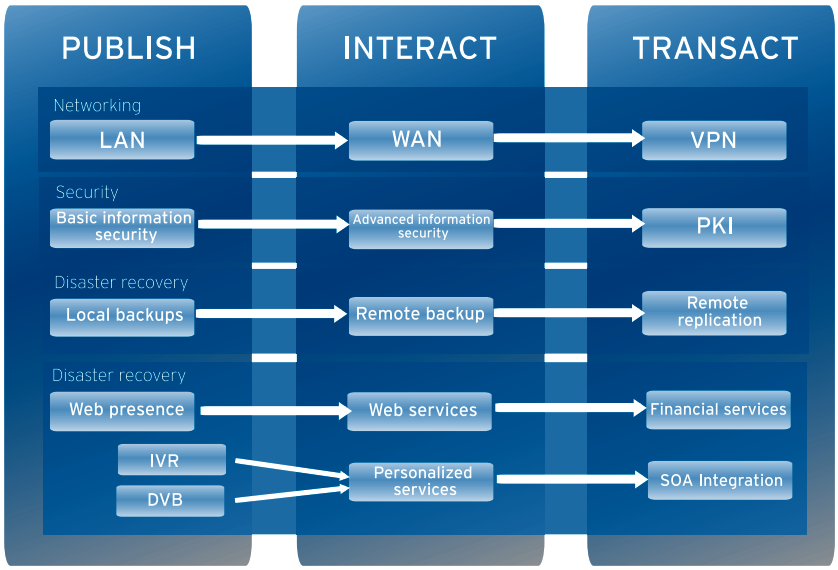

Figure 7: E-Government aRoadmap

4.1 LAN, WAN and MAN design

Networking represents the foundation of the e-government infrastructure. The Local Area Network – LAN enables interconnectivity of the computers, servers and workstations, within the premises of the institutions. Standards for networking are given in 2.3.3, while the principles are defined in 2.3.2.1 and 2.3.2.5. The need for Wide Area Networking arises when transitioning toward the Interact phase. When choosing technology, local governments should follow the national strategies for internet working, enabling information exchange between different levels of government instances. Standards for information exchange are presented in 2.3.4 and 2.3.2.8. Increasing the level of e-interaction, especially G2B, G2C, G2G and vice versa may require the establishment of secure networking channels to protect sensitive information (mostly financial). This will require Virtual Private Networking – VPN installations to be enabled over the WAN connections.

4.2 Basic level of security

As the level of interaction increases, so does the level of security required to protect the sensitive information. Basic level of security may include access control, authentication and authorization, etc. Some standards are mentioned in 2.3.2.2. Advanced level of security usually refers to stronger protection of the stored and/or transmitted data. Moving toward the Transact phase requires establishment of advanced security mechanisms such as Private Key Infrastructure, Certification Authority, asymmetric encryption etc.

4.3 Disaster recovery

Supporting the government activities with large amount of digital data requires extra precaution. Special activities and procedures have to be taken to protect these data and to enable disaster recovery mechanisms. The simplest form of disaster recovery means backing up all important data to a safe location. This will enable restoring the data to the last backup point in case of damage to the operational data. A more advanced approach is to store the backups to a remote location for physical protection. If the data is sensitive and it has to be restored with as little as possible downtime (time when the systems are not operating), then remote replication should be considered. This technology enables copies of the working data to be stored in storage on remote location, so when incidents occur, the work of the systems will be resumed using the data at that remote location almost instantly. A list of standards and guidelines is presented in 2.3.8.

4.4 Internet presence

One of the basic forms of e-Governmental services is the internet presence. Depending on the position on the road map, it can vary from basic static internet pages (2.3.3), alternative information delivery channels (2.3.2.10) in the Publish stage, to personalized information delivery in the Interact stage. According to 2.3.2.11, web services should be used extensively, especially in the Publish and Interact stage. The standards for web services are given in 2.3.5. In the Interact stage, local governments should focus toward full SOA integration and toward offering financial services to their citizens, businesses and other participants.

4.5 Accessibility and usability of the webpages

To illustrate the issues pertaining to webpage design, one should consider that many users may be operating in contexts very different from the traditional ones [27]:

- They may not be able to see, hear, move, or may not be able to process some types of information easily or at all.
- They may have difficulty reading or understanding text.
- They may not have or be able to use a keyboard or mouse.
- They may have a text-only screen, a small screen, or a slow internet connection.
- They may not speak or understand fluently the language in which the document is written.
- They may be in a situation where their eyes, ears, or hands are busy or interfered with (e.g. driving to work, working in a loud environment, etc.).
- They may have an early version of a browser, a entirely different browser, a voice browser, or a different operating system.

Content developers must consider these different situations during page design. While there are several situations to consider, each accessible design choice generally benefits several disability groups at once and the Web community as a whole. For example, by using style sheets to control font styles and eliminating the FONT element, HTML authors will have more control over their pages, make those pages more accessible to people with low vision, and by sharing the style sheets, will often shorten page download times for all users.

The Web Accessibility Initiative – WAI [28] constantly develops handbooks and instructions for web developers helping them to address the accessibility issues.

4.6 Equipment procurement and specification

Equipment procurement and specification should always comply with the principles defined in 2.3.1. Most important is the compliance with the National Purchasing Policies, which apply to all government procurements. An excellent example of ICT procurement policies and statements is the Australian government ICT procurement standards website [30]. They have also produced a best practices guide available at [31], identifying components and key steps in the ICT procurements. It also contains a detailed description of all the important processes (offer, evaluation, de-briefing). Since procurement strongly depends on the National Policies, it is strongly recommended that each country should develop a document similar to the one mentioned.

4.7 System maintenance

System maintenance can be defined as the modification of a system to correct faults, to improve performance, or to adapt the system to a changed environment or changed requirements. The maintenance of ICT systems is of very high importance, with its importance getting even higher when moving toward the Trasact phase of the Road map. Depending on the size of the municipality, it should either be done by own IT maintenance team, or should be outsourced. Some of the most important activities regarding system maintenance include:

- Keeping the antivirus software up-to-date for virus protection
- Application of the latest fixes and patches to the operating systems and application software
- Updating device drivers and other software components
- Monitoring the critical servers for possible fault indicators
- Optimizing computer systems (defragmenting, stopping unnecessary services, etc.)
- Malware protection

4.8 Security checks

When relying on daily operations of ICT, special measures have to be taken to check and enforce security policies and recommendations. It is an activity that should preferably be done by an external company specialized in such checks. The checks should evaluate the processes and the supporting infrastructure of the municipality, and should provide recommendations for improving the security. The checks may consist of gathering information through workshops and interviews, conducting vulnerability assessments to identify weaknesses in administrative (e.g. business organisation, business processes, etc.) and technical areas (e.g. software systems, computer networks, etc.), and should produce a detailed report highlighting the threats that the municipality faces, the vulnerabilities that can be exploited, and recommendations to protect it. The principles for security are listed in 2.3.2.2.

5. Risk analysis

Most e-government projects have difficulties during the implementation, deployment or usage phase. Some of these difficulties are very serious and can result in a failure of service. Therefore, it is important to perform some kind of risk assessment on the establishment of e-Government service project. This section offers some basic guidance on how to assess risk of e-government projects in developing/transitional countries [34].
The Factor Model for eGovernment Success and Failure shown in Figure 8 summarizes the reasons behind success and failure of e-government projects. Left-pointing items encourage failure; right-pointing items encourage success. The factors are explained in more detail in the Tables 12 and 13 below.

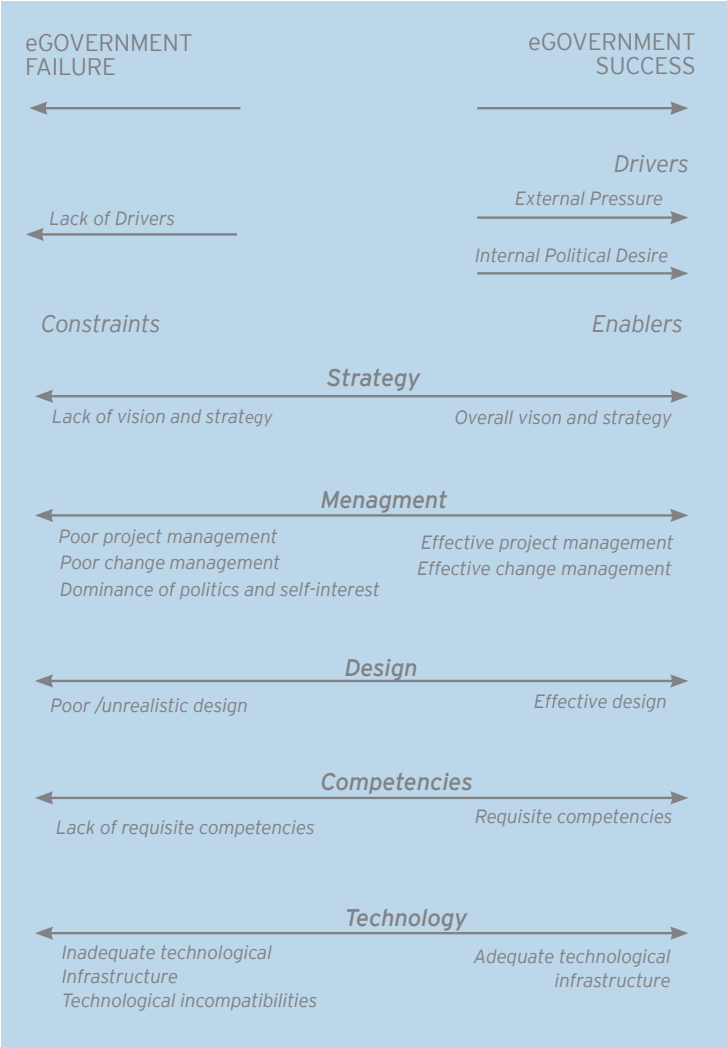

Figure 8:
Factor Model for eGovernment Success and Failure

Table 12 lists and explains some of the main factors that support success of e-government in developing/transitional countries. Cases in which these factors have been identified are cited in the right-hand column.

Table 12: Main factors that help support success of e-government in developing/transitional countries

Factor	Explanation	Examples
External pressure	Drive for reform from outside government, e.g. from civil society	Brazil eProcurement Douala Port
Internal political desire	Drive from key government officials for reform and for achievement of e-government goals	Trust Automation Brazil eProcurement Douala Port Mexico eProcurement Citizen Centre
Overall vision and strategy	Overall vision and master plan for good governance and for e-government, identifying 'where we want to get to', seeing IT as the means, not the end, and integrating IT with broader reform objectives	Cameroon Tax
Effective project management	Including clear responsibilities, good planning and consideration of risk, good monitoring and control, good organisation of resources, and well-managed partnerships between public agencies, and public-private	Pensions System Citizen Centre
Effective change management	Including leadership with a project champion, use of incentives to create commitment to and ownership of e-government project, and stakeholder involvement to build support and minimise resistance	Supporting Democracy Birth Registration FRIENDS Centres Pensions System

Effective design	An incremental/piloting approach with feasible objectives and quick, scalable outcomes; participatory involvement of all stakeholders, leading to designs that meet real user needs and match real user contexts	Social Investment Fund Balochistan MIS Douala Port Mexico eProcurement Birth Registration FRIENDS Centres Pensions System
Requisite competencies	Presence of the necessary skills and knowledge, especially within government itself; need both management and IT skills and knowledge	Supporting Democracy Trust Automation Citizen Centre
Adequate technological infrastructure	For example, encouraged through appropriate telecom policies	

Other critical success factors identified include: luck, perseverance, and adequate funding.

Table 13 below lists and explains some of the main factors that underlie failure of e-government in developing/transitional countries. Cases in which these factors have been identified are cited in the right-hand column.

Table 13: Main factors underlie failure of e-government in developing/transitional countries

Factor	Explanation	Examples
Lack of internal drivers	Pressure only from IT vendors, with no internal ownership (or understanding of e-government)	
Lack of vision and strategy	Lack of any long-term view, lack of guidance, and lack of link between ends and means; may be caused by ever-shifting senior staff and/or ever-changing policy and political environment	National Databank Universities MIS
Poor project management	Dispersed responsibilities due to multiple ownership of project; absence or weakness of controls; ineffective procurement	Social Investment Fund

Poor change management	Lack of support from senior officials (causing lack of resource allocation, and negative message to other groups); lack of stakeholder involvement (causing lack of ownership)	Warana Kiosks Natural Resource IS Durban Council Universities MIS
Dominance of politics and self-interest	Focus of key players on personal needs and goals, often related to 'playing politics', with symptoms like infighting, resistance where loss of power is feared, 'me too' copying of e-government solutions for image purposes, obsession with electoral impacts and short-term kudos, and corruption.	Social Investment Fund Douala Port Beira City Citizen Centre Uganda Voters Foreign Affairs Ministry National Databank
Poor/unrealistic design	Caused particularly by a lack of inputs from key local stakeholders, leading to designs that are over-technical, over-ambitious, or mismatched to local environment (culture, values) and needs; occurs particularly where foreign donors, firms and consultants are involved. Other design problems: lack of piloting, lack of fit to organisational structure.	Warana Kiosks Golaganang
Lack of requisite competencies	Lack of IT knowledge and skills among developers, officials and users/operators; lack of local knowledge among developers	Durban Council
Inadequate technological infrastructure	Lack of sufficient computers or networks	Cameroon Tax Foreign Affairs Ministry
Technological incompatibilities	Inability of computerised systems to interchange data	

Assuming a typical project lifecycle as Feasibility-Analysis-Design-Construction-Implementation, the typical timing for risk assessment is during the Feasibility stage (in a short and overall form), and a more detailed assessment during the Analysis stage. The earlier risk is assessed, the harder it is to know the risks accurately. The later the risk is assessed, the harder it is to do anything about the risks identified.

A small team consisting of a mix of different stakeholders is the best unit to assess risk. If fewer people are involved, the chance to miss an important risk is increased. If more people are involved, the time and costs of the risk assessment are increased.

There are many risk assessment techniques for ICT related project. Different countries can adopt or develop their own specific techniques. A typical example can be the State of California, which uses Risk Assessment Model explained at [33].

However, according to [34], the e-Government service projects can be assessed using variations of one of the following two techniques: Simple Factor Rating technique or Design – Reality Gap assessment technique.

5.1 Simple Factor Rating

Simple Factor Rating technique takes a very general and subjective approach, based on an analyzed list of success and failure factors for e-government projects. This approach provides a rating for the presence and absence of these factors.

The assessment consists of questions relating to a series of factors, with attached rating numbers. The factor questions are answered one by one. Each answer is rated with a rating number. The rating for each answer can be anywhere on a scale from zero to ten: the higher the number, the safer the project. It may be necessary to conduct further gathering of data (interviews, document analysis, observations, questionnaires, etc.) in order to answer the questions adequately.

5.1.1 Factor questions related to "Drivers"

Factor Question 1a. How strong is the drive for change from outside the public agency (e.g. from central government, or from an aid donor, or from citizens, etc.)?

Answer Rating : from 0 for 'non-existent' through 5 for 'moderate' to 10 for 'intense'.

Factor Question 1b. How strong is the drive for achievement of e-government goals from key agency officials?

Answer Rating : from 0 for 'non-existent' through 5 for 'moderate' to 10 for 'intense'.

5.1.2 Factor questions related to "Strategy"

Factor Question 2. Is there a clear, long-term strategy for e-government that sees IT as a means to achieving broader reform objectives?

Answer Rating : from 0 for 'no strategy at all' through 5 for 'partial strategy' and/or 'only partly clear' and/or 'somewhat unstable' and/or 'sees IT more as an end than a means' to 10 for 'strategy that meets all the stated criteria'.

5.1.3 Factor questions related to "Management"

Factor Question 3a. How good is the project management for the project?

The assessment should cover at least the following six sub-points as examples of good practice: the presence of clear project responsibilities; consideration of risk; good monitoring and control; good organisation of resources (including staff); good management of partnerships (with private suppliers and with other public agencies); and effective procurement.

Answer Rating : from 0 for 'very poor' through 5 for 'moderate' to 10 for 'very good'.

Factor Question 3b. How good is the change management for the project?

The assessment should cover at least the following four sub-points as examples of good practice: strong leadership from a project champion; support of senior officials and other powerful stakeholders; use of incentives to create commitment and ownership among stakeholders (including operational staff); and strong stakeholder involvement that builds support.

Answer Rating: from 0 for 'very poor' through 5 for 'moderate' to 10 for 'very good'.

Factor Question 3c. How much are key players just focusing on personal self-interest and playing politics?

Signs of this that could form a checklist include infighting; resistance where loss of power is feared; "me too" copying of e-government solutions for image purposes; obsession with electoral impacts and short-term kudos; and corruption.

Answer Rating: from 0 for 'very much' through 5 for 'somewhat' to 10 for 'very little'.

5.1.4 Factor questions related to "Design"

Factor Question 4. How effective and realistic is the design of the e-government project?

The assessment should cover at least the following four sub-points as examples of good practice: an incremental/piloting approach; quick and feasible objectives; strong stakeholder involvement ensuring design meets real needs; and an understanding in the design of the 'human factor', including local culture and values.

Answer Rating: from 0 for 'very ineffective and unrealistic' through 5 for 'moderately effective and realistic' to 10 for 'very effective and realistic'.

5.1.5 Factor questions related to "Competencies"

Factor Question 5. Are the required competencies present?

Assessment of competencies should at least approximate to a three-dimensional matrix that covers: a) the different categories of competency (skills, knowledge and attitudes); b) the different stakeholder groups (system developers, system managers, organisational managers, system operators, system users, etc.); and c) the different areas of competency (strategic, change/project management, information systems development and management, hands-on, interpersonal, 'intelligent customer' (contracts, suppliers, procurement), etc.).

Answer Rating: from 0 for 'completely absent' through 5 for 'some presence' to 10 for 'all present'.

5.1.6 Factor questions related to "Technology"

Factor Question 6. Is the technological infrastructure adequate?

Assessment would cover the presence and resilience of data systems, software, hardware, and telecommunications. Where appropriate, this can include assessing whether systems (data, software, hardware) supposed to 'talk to each other' are actually compatible.

Answer Rating: from 0 for 'wholly inadequate' through 5 for 'moderate' to 10 for 'completely adequate'.

5.1.7 Factor questions related to other issues

Factor Question 7. Are there other factors likely to cause the e-government project to fail?

These might relate to money or timescales as well as other issues.

Answer Rating : from 0 for 'yes' through 5 for 'perhaps' to 10 for 'no'.

Once all the questions are answered, the rating scores are summarized and can be interpreted according to the Table 14.

Table 14: Rating scores

Overall Rating	Likely Outcome
0 - 20	e-government project will almost certainly fail unless action is taken.
21 - 40	e-government project may well fail unless action is taken.
41 - 60	e-government might fail totally, or might well be a partial failure unless action is taken.
61 - 80	e-government project might be a partial failure unless action is taken.
81 - 100	e-government project may well succeed.

The basic factor rating technique makes a questionable assumption - that all factors are equally important to the success and failure of the project. A more complex variation would involve two rounds. In the first round, the risk assessment team would assign a weight to each of the identified factors - external pressure, internal political desire, overall vision/strategy, project management, change management, politics/self-interest, design, competencies, technological infrastructure, other. An 'ordinary' factor might be given a weight of 1; a factor that was considered 'important' in the particular e-government project could be given a weight of 2; and a factor that was considered 'very important' in the particular project could be given a weight of 3. The weighting score would be multiplied by the rating to give an overall set of weighted ratings. For example, if external pressure was felt to be very important for this specific project, it could be given a weight of 3. If that pressure was found to be only moderate, it could be given a rating of 5. The overall weighted rating for that factor would be 3 x 5 = 15.

A more complex variation again would involve three rounds. In the first round, the risk assessment team would assess which factors are relevant to the success and failure of the particular e-government project. It would consider not only those factors listed just above, but also other factors as well. The second round would weight these factors. The third round would give a rating score to each factor.

This technique is simple and quick to understand and put into practice. On the down-side, at least in its simple form, it assumes that "one size fits all" e-government projects, which we know is not really true. It should be also noted that since there is a small number of questions, they often cover quite a range of different issues in a single question.

5.2 Design-Reality Gap Assessment

A gap exists for all e-government projects between the design assumptions/requirements and the reality of the client public sector organisation. Central to e-government success and failure is the amount of change between 'where we are now' and 'where the e-government project wants to get us'. The larger the gap between design and reality, the greater the chance that the project will fail.

'Where we are now' means the current realities of the situation. 'Where the e-government project wants to get us' means the model or conceptions and assumptions built into the project's design. E-government success and failure therefore depends on the size of the gap that exists between 'current realities' and the 'design of the e-government project'.

The larger this design-reality gap, the greater the risk of e-government failure. Equally, the smaller the gap, the greater the chance of success.

The analysis of e-government projects indicates that seven dimensions - summarised by the ITPOSMO acronym - are necessary and sufficient to provide an understanding of design-reality gaps:

- **I** nformation
- **T** echnology
- **P** rocesses
- **O** bjectives and values
- **S** taffing and skills
- **M** anagement systems and structures
- **O** ther resources: time and money

Putting these dimensions together with the notion of gaps produces the model for understanding success and failure of e-government that is shown in Figure 9.

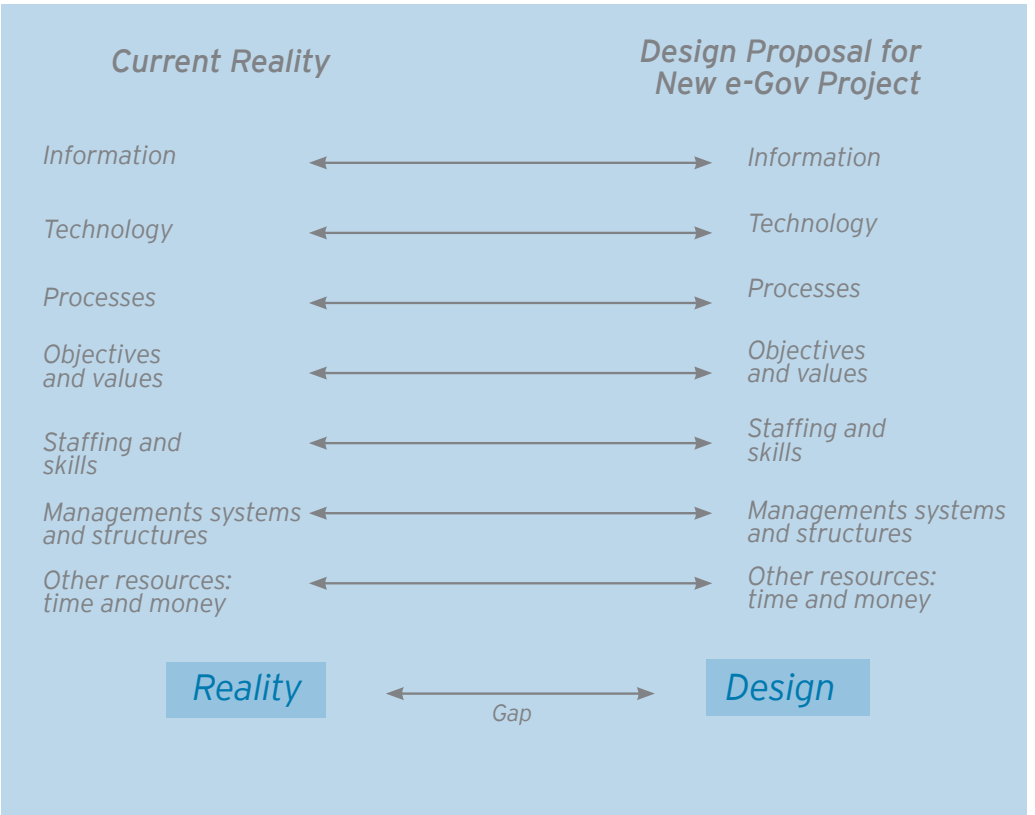

Figure 9: ITPOSMO dimensions of e-government project design-reality gaps

Design Reality Gap Assessment consists of questions relating to a series of seven 'IT-POSMO' dimensions with attached rating numbers.

At first step, using each of the seven ITPOSMO dimensions in turn, two things should be analyzed: the organisational reality relating to that dimension that exists right now at the time of analysis and the conceptions/requirements within the design of the e-government application. For each of the dimensions, a numerical rating to indicate the size of the design-reality gap on that dimension should be given. The rating for each dimension's gap can be anywhere on a scale from zero to ten where 0 rating would indicate 'no change between the design proposal and current reality', 5 rating would indicate 'some degree of change between the design proposal and current reality'; and 10 rating would indicate 'complete and radical change between the design proposal and current reality'.

For example, taking the first dimension - information - 0 would indicate that the information used in the e-government application was exactly the same as the information

currently really being used in the organisation. 5 would indicate that the information used in the e-government application was somewhat different from the information currently really being used. 10 would indicate that the information used in the e-government application was completely and radically different from the information currently really being used. Please note that although only marks 0, 5 and 10 are illustrated; all marks from 0 to 10 are possible.

The simplest interpretation of the technique is to add up the rating numbers for all seven ITPOSMO dimensions and interpret them according to the Table 15.

Table 15: Rating and outcomes for all seven ITPOSMO dimension

Overall Rating	Likely Outcome
57 - 70	E-government project will almost certainly fail unless action is taken to close design-reality gaps.
43 - 56	E-government project may well fail unless action is taken to close design-reality gaps.
29 - 42	E-government might fail totally, or might well be a partial failure unless action is taken to close design-reality gaps.
15 - 28	E-government project might be a partial failure unless action is taken to close design-reality gaps.
0 - 14	E-government project may well succeed.

The basic technique makes the questionable assumption that all dimensions/gaps are equally important to the success and failure of the project. A more complex variation would involve two rounds. In the first round, the risk assessment team would assign a weight to each of the dimensions. An 'ordinary' dimension might be given a weight of 1; a dimension that was considered 'important' in the particular e-government project could be given a weight of 2; and a dimension that was considered 'very important' in the particular project could be given a weight of 3. The weighting score would be multiplied by the rating to give an overall set of weighted ratings. For example, if 'objectives and values' were felt to be very important for this specific project, that dimension could be given a weight of 3. If the design-reality gap on that dimension to be only moderate, it could be given a rating of 5. The overall weighted rating for that dimension would be 3 x 5 = 15.

From experience, the objectives and values dimension should be given a higher weighting than other dimensions because they incorporate key elements such as politics, culture, self-interest, motivation, and the aspirations that a whole variety of different stakeholder groups seek to achieve through the new e-government system.

Design-reality gaps can be thought of as constraints or risks to implementation of an e-government project: they give a sense of what may make the project fail. They may

not give a good sense of what may make the project succeed: the drivers. The drivers can be analysed as well, and illustrated alongside the gaps/constraints/risks using a force-field diagram with drivers on one side and constraints on the other.

In the basic and variant approaches described above, two things can be borne in mind:

- The outcome: a sense of gap between design and reality.
- The process: the deeper understanding - of reality, of design, of other stakeholders - that gap analysis creates.

In some situations, the process may be more valuable than the outcome. It may then be appropriate to take a more iterative, learning approach to gap analysis. Here, stakeholder groups revisit gap analysis at regular intervals during the project cycle. They reflect on the dimensions selected, the ratings and the closure techniques. They also reflect on what has been learnt about the project and the e-government implementation process.

This technique is relatively simple and quick to understand and put into practice. One key advantage is that it matches the unique situation of each individual e-government project, rather than imposing a "one size fits all" concept. On the downside, it tries to cram a lot of issues into each single dimension (particularly into 'objectives and values' and 'staffing and skills'), and it will not work well if there are competing designs or competing ideas about what counts as 'reality'.

6. References

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7. Documentation on the Promotion of Open Document Exchange Format http://europa.eu.int/idabc/en/document/3439/5585

8. "Schemas and Standards" http://www.govtalk.gov.uk/interoperability/schemasstandards.asp

9. e-Government Interoperability Framework Version 6.1 http://www.govtalk.gov.uk/schemasstandards/egif_document.asp?docnum=949

10. Danish e-Government Interoperability Framework http://standarder.oio.dk/English/

11. The Interoperability Framework: Technical Standards: Document and data exchange http://standarder.oio.dk/English/Tekniske_standarder/Dokument-_og_dataudveksling/index.html

12. Programme for Open Standards and Open Source Software in Government http://www.ososs.nl/index.jsp?alias=english

13. The Dutch Government Open Standards Catalogue http://www.ososs.nl/matrix/matrix.jsp?id=10927

14. http://www.andwest.com/blojsom/blog/tatle/agenda/2005/06/27/Norwegian_Minister_Proprietary_Standards_No_Longer_Acceptable_in_Communication_with_Government.html

15. Commonwealth of Massachusetts - Enterprise Open Standards Policy http://www.mass.gov/Aitd/docs/policies_standards/openstandards.pdf

16. New Zealand Government Information Systems Policies and Standards http://www.e-government.govt.nz/docs/is%2Dpolicies%2Dstandards/

17. New Zealand E-government Interoperability Framework (NZ e-GIF) http://www.e-government.govt.nz/docs/e-gif-v-2-1/index.html

18. Standards, Policies and Guidelines - Malaysian Government Interoperability Framework (MyGIF) http://www.mampu.gov.my/mampu/bm/program/ICT/ISPlan/ispdoc/Interoperability%20Framework.pdf

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22. IDABC, "TAC approval on conclusions and recommendations on open document formats" http://europa.eu.int/idabc/en/document/2592/5588

23. 10 principles of Bilbao, http://www.cities-localgovernments.org/uclg/upload/template/templatedocs/10_principes_Bilbao_ENG.pdf

24. BEGIX, http://www.begix.net/

25. THE E-GOVERNMENT HANDBOOK FOR DEVELOPING COUNTRIES, http://www.infodev.org/en/Publication.16.html

26. ICT for Local Government Handbook, http://lgi.osi.hu/publications/2007/375/Annex_4_Handbook_English_final_version.pdf

27. Web Content Accessibility Guidelines 1.0, http://www.w3.org/TR/WCAG10/

28. Web Accessibility Initiative (WAI), http://www.w3.org/WAI/

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34. "Is My Project Likely To Fail?" - Assessing Risk in eGovernment Projects, http://www.egov4dev.org/success/techniques/risk_assessment.shtml

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http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/egov_benchmark_2007.pdf

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37. The best practices of cooperation between all levels of government administration in Austria on a wiki-type platform www.verwaltungskooperation.at

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7. Useful links

7.1 Standards

7.1.1 Collections

ICT Standards – General ICT Standards

http://www.tiresias.org/research/standards/ict.htm

Web Content Accessibility Guidelines (WCAG1.0 standards)

http://www.w3.org/TR/WCAG10/

7.1.2 Organizations

ISO- International Organization for Standardization

http://www.iso.org/

IETF-Internet Engineering Task Force

http://www.ietf.org/

OASIS- Organization for the Advancement of Structured Information Standards

http://www.oasis-open.org/

W3C - World Wide Web Consortium

http://www.w3c.org/

ITU - International Telecommunication Union

http://www.itu.int/

IEC- International Electrotechnical Commission

http://www.iec.ch/

ECMA- Ecma International - European association for standardizing information and communication systems

http://www.ecma-international.org/

IEEE - Institute of Electrical and Electronics Engineers

http://www.ieee.org/

ANSI - American National Standards Institute

http://www.ansi.org/

OGC - Open Geospatial Consortium

http://www.opengeospatial.org/

FIPS - Federal Information Processing Standards

http://www.itl.nist.gov/fipspubs/

ITU-T-International Telecommunication Union Standardization Sector

http://www.itu.int/

ETSI - European telecommunications Standard Institute

http://www.etsi.org/

7.2 Roadmap
7.2.1 Publish

Brazil: National Legislative Portal.

http://www.redegoverno.gov.br/

Canada: E-Government Portal. Considered one of the best government portals in the world.

http://www.canada.gc.ca/

Dubai: The nation's e-government portal is the first of its kind in the Gulf region to offer government services online.

http://www.dubai.ae/

Ghana: Environmental Information Network Project. A web-based system containing environmental data for government ministries and citizens.

http://www.epa.gov.gh/

India: JUDIS (Judgment Information System). Posts court records, case information and judicial decisions.

http://judis.nic.in/

Italy: Bologna City Portal. Encourages citizen participation at multiple levels, including forums for interactive discussion and links to civic groups.

http://www.comune.bologna.it/

Kenya: AfriAfya. A public/private consortium using the web to share medical information.

http://www.afrafya.org

Lebanon: Putting government documents and academic research online.

http://www.sdnp.org.lb/

Macedonia: e-Government portal for information about government services.

http://uslugi.gov.mk/

Mexico: E-Government Procurement Portal (Compranet). Putting government procurement procedures online.

http://www.compranet.gob.mx/

Pakistan: Anti-Corruption Web site, State of Punjab. Publishing the names and crimes of corrupt officials in an effort to stop graft.

http://pportal.punjab.gov.pk/portal/portal/media-type/html/group/797?page_name=797home&group_type=dept&group_id=797&group_name=Anti%20Corruption%20Establishment&js_pane=P-1004ba76975-10000&pview=true

South Africa: Johannesburg e-Services Web site.

http://eservices.joburg.org.za/joburg/eservices/#clkCntrl

South Africa: The official portal for the South African government.

http://www.gov.za/

United States: California Voter's Guide. An NGO site, publishing information about elections and candidates.

http://www.calvoter.org/

7.2.2 Interact

Armenia: Online Forum. An online community maintained by the Armenian National Academy of Sciences designed to foster public awareness and dialogue on public policy issues.

http://www.forum.am/

China: NGOs partner with ministries to assist in implementation of China's e-government strategy.

http://www.acca21.org.cn/english/index.html

India: The Central Vigilance Commission. Allows citizens to file online complaints about corruption.

http://www.cvc.nic.in/

Italy: Bologna City Portal. Encourages citizen participation at multiple levels including forums for interactive discussion and links to civic groups.

http://www.comune.bologna.it/

Macedonia: City of Skopje, real estate taxes for citizens.

http://e-danoci.skopje.gov.mk:8081/login.asp

South Africa: Independent Electoral Commission. Registering voters and accurately capturing election results and conveying the information in a fast, dependable manner.

http://www.elections.org.za/

United Kingdom: The Hansard Society. NGO web site that moderates policy discussion, the results of which are sent to Members of Parliament for consideration.

http://www.democracyforum.org.uk/

United Kingdom: Local Government in the United Kingdom.

http://www.communities.gov.uk/localgovernment/

Western Balkans: Portal promoting ICT cooporation opportunities with special emphasizes to the eGoverment.

http://www.ict-web-proms.eu/

7.2.3 Transact

Brazil: RedeGovereno. Offers ATM-style kiosks that allows citizens to access government online portals and services.

http://www.redegoverno.gov.br/

Chile: Government E-Procurement System.

http://www.chilecompra.cl/english/index.html

Costa Rica: SICERE. Provides instant billing for employment insurance and pension programs.

http://www.ccss.sa.cr/html/transparencia/estadisticas/d_actuarial/ept/ept2003/eptjn03.html

India: Gyandoot community-based Internet access. Entrepreneurs funded by the state use portable computers with wireless Internet connections to provide rural villages access to government services.

http://gyandoot.nic.in/

India: Drishtee. Mobile, kiosk-based e-government for rural India.

http://www.drishtee.com/

India: The Bhoomi Project. Delivery of land titles online.

http://www.revdept-01.kar.nic.in/Bhoomi/Home.htm

Phillipines: Pilot E-Procurement System.

http://www.procurementservice.net/Default.Asp

Spain: Barcelona City Portal. An easy-to-use site leading users to tools that allow them to transact multiple government services online.

http://www.bcn.es/

Austria: Federal Platform digital Austria

http://www.digitales.oesterreich.gv.at/site/6497/Default.aspx

7.3 Open source

7.3.1 Portals

eGovOS - The Center of Open Source and Government. Many useful resources here, including many policies from various government departments and reports.

http://www.egovos.org/

EU - The European Commission's Open Source Observatory:

http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showChapter&chapterID=452&preChapterID=0

UN - The United Nations Development Information Programme (UNDP) Networking and Information Technology Observatory (NITO)'s Open Source section:

http://www.sdnp.undp.org/perl/news/articles.pl?do=browse&categories=10

UNDP - The UNDP's International Open Source Network:

http://www.iosn.ne/

Austria: Open source platform for E-Government solutions similar to source force

http:// www.egovlabs.gv.at

7.3.2 Policy

UK - United Kingdom's Open Source Software policy, as issued by the Office of Government Commerce:

http://www.ogc.gov.uk/embedded_object.asp?docid=2498

Netherlands - Extensive FLOSS survey conducted by the International Institute of Infonomics at the University of Maastricht, The Netherlands:

http://www.infonomics.nl/FLOSS/report/

South Africa - South Africa's Open Source Software strategy:

http://www.oss.gov.za/docs/OSS_Strategy_v3.pdf

USA - Open Standards policy of Commonwealth of Massachusetts, United States of America

http://www.state.ma.us/itd/openstandards.htm

USA DoD - Report of FOSS usage in the US Department of Defense, prepared by MITRE Corporation:

http://www.egovos.org/rawmedia_repository/588347ad_c97c_48b9_a63d_821cb0e8422d?/document.pdf

Sweden - Feasibility study conducted by the Swedish Agency for Public Management:
http://www.statskontoret.se/pdf/200308eng.pdf

Denmark - "Open-source software in e-government" report produced by the Danish Board of Technology:
http://www.tekno.dk/subpage.php3?article=969&survey=14&language=uk&front=1

7.4 Risk analysis
7.4.1 eGov4Dev Cases

India - Village Information Kiosks for the Warana Cooperatives in India
http://www.egov4dev.org/success/case/warana.shtml

South Africa - Supporting Democracy with ICTs: South Africa's Independent Electoral Commission
http://www.egov4dev.org/success/case/iec.shtml

East Africa - Problems for a Natural Resource Ministry's Scientific Information System
http://www.egov4dev.org/success/case/fishsis.shtml

Pakistan - First Steps in Implementation of Pakistan's National Database & Registration Authority
http://www.egov4dev.org/success/case/nadra.shtml

South America - Using Information Systems to Support a Social Investment Fund in South America
http://www.egov4dev.org/success/case/sif.shtml

West Africa - Automating a Social Security and National Insurance Trust in West Africa
http://www.egov4dev.org/success/case/ssnit.shtml

Turkey - Turkey's Local Government Portal, YerelNet
http://www.egov4dev.org/success/case/yerelnet.shtml

Pakistan - A Management Information System and GIS to Support Local Government in Balochistan
http://www.egov4dev.org/success/case/balochistan.shtml

Cameroon - The Cameroon Government Web Portal
http://www.egov4dev.org/success/case/camportal.shtml

Cameroon - Starting Up the Cameroon Department of Tax's Web Site
http://www.egov4dev.org/success/case/camtax.shtml

South Africa - Durban Council's Community Information Link
http://www.egov4dev.org/success/case/durbancil.shtml

Brazil - eProcurement by Brazil's Federal Government
http://www.egov4dev.org/success/case/brazeproc.shtml

Cameroon - Integrated Information System for Trade at Douala Autonomous Port
http://www.egov4dev.org/success/case/doualatrade.shtml

Mexico - eProcurement by Mexico's Federal Government
http://www.egov4dev.org/success/case/mexeproc.shtml

India - Planning Web-Enabled Services for Citizens in Orissa
http://www.egov4dev.org/success/case/orissa.shtml

Bangladesh - Electronic Birth Registration in Rajshahi, Bangladesh
http://www.egov4dev.org/success/case/rajshahi.shtml

India - Front-End First: Citizen Payment at FRIENDS Centres in Kerala
http://www.egov4dev.org/success/case/friends.shtml

Former USSR - Pension Payment and Contribution Collection System in the Former USSR
http://www.egov4dev.org/success/case/pension.shtml

India - eShringhla: An Information Kiosk Scheme in South India
http://www.egov4dev.org/success/case/eshringhla.shtml

Mozambique - A Land Licensing and Planning System for Beira City, Mozambique
http://www.egov4dev.org/success/case/beira.shtml

India - SETU: A Citizen Facilitation Centre in India
http://www.egov4dev.org/success/case/setu.shtml

Uganda - Failed Electronic Voter Registration in Uganda
http://www.egov4dev.org/success/case/iecuganda.shtml

West Africa - Problems in Computerising the Ministry of Foreign Affairs
http://www.egov4dev.org/success/case/mofa.shtml

Bangladesh - The National Data Bank Project: An Expensive Lesson for Bangladesh

http://www.egov4dev.org/success/case/ndb.shtml

Nigeria - Challenges to Management Information Systems in Nigerian Universities

http://www.egov4dev.org/success/case/misuniv.shtml

Soth Africa - (Not) Providing Computers for all South African Civil Servants

http://www.egov4dev.org/success/case/golaganang.shtml

7.4.2 eGov4Dev Design-Reality Gap Cases

South Asia - Automating Public Sector Bank Transactions in South Asia

http://www.egov4dev.org/success/case/bankauto.shtml

Central Asian - Computerising a Central Asian Epidemiology Service

http://www.egov4dev.org/success/case/epidemiology.shtml

South Africa - Computerised Integration of Two Pension Funds in Southern Africa

http://www.egov4dev.org/success/case/twinpension.shtml

South Africa - A Single Personnel Information System for a Southern African Government

http://www.egov4dev.org/success/case/centralpersis.shtml

Middle East - An Integrated Information System for Defence Force Management in the Middle East

http://www.egov4dev.org/success/case/defenceiis.shtml

7.4.3 Design-Reality Gap eGov Case Proposals

East Asia - Electronic Networking for a Ministry of Education in East Asia
http://www.egov4dev.org/success/case/educnetwork.shtml

West Africa - Computerising Election Results Management in West Africa
http://www.egov4dev.org/success/case/electcomput.shtml

East Africa - Campus-Wide Networking for a Public University in East Africa
http://www.egov4dev.org/success/case/univnetwork.shtml

7.4.4 Other Cases - Since 2001

Colombia - SIMEP...Colombians International Cooperation in Real Time (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4961

India - Connecting India Village by Village (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4956

Zambia - The Agricultural Marketing Information Centre (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4898

India - SEVANA - Towards a Holistic and Human-Centred Approach to E-Governance (IICD/infoDev) http://www.iconnect-online.org/Stories/Story.import4932

Kenya - Harnessing ICTs for Community Health - The AfriAfya Initiative (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4924

India - Sustainable Development Networking Programme, India - A Success Story (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4680

India - Providing Citizen Services online: E-seva in Andhra Pradesh State of India (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4918

Brazil - Control of Transport Fleet and Trips (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4904

Brazil - Acessa São Paulo Program - Sharing Knowledge for Development (IICD/infoDev)
http://www.iconnect-online.org/Stories/Story.import4896

Ghana - Implementation of the Environmental Information Network Project in Ghana (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4862

Solomon Islands - ICT Project Brings Hope to the Troubled Solomon Islands (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4806

Panama - INFOPLAZAS - Bringing Technology and Knowledge to Everyone (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4795

Ghana - ICT in Non-Traditional Exports Trade in Ghana (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4756

India - Transition from Disaster to Development through ICT (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4923

7.4.5 Other Cases - 1999-2001

Ghana - Bringing the Internet to Ghana (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import114

Costa Rica and the Dominican Republic - Integrating Health and Technology through Engaging Local Cultures: The Story of LINCOS/InfoComm (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import83

South Africa - Window to the World (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import56

Bangladesh - Sustainable Development Networking Programme of Bangladesh (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4419

Ghana - What has a Farmer to do with a Computer? (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4345

Brazil - WIDE - Web of Information for Development (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4378

Zambia - From Zero-Rated on Computer Literacy to Higher Ways: Ideas for ICT in National Education (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4403

Brazil - ReAACT - Science and Technology Support and Management Online (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4382

Colombia - Local Information Services: Technology to the Aid of the Community (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4283

Colombia - Connecting Colombian Schools: the Bilinguist and Informatic National Program (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4074

Southeast Asia - The Tao Project (Teacher Amelioration for Optimum Welfare) (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4111

Colombia - Use of ICT: A Hope for a New Generation of Kids in the Coffee Region in Colombia (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4068

Honk Kong - Electronic Library Project in the Open University of Hong Kong (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4060

Zimbabwe - ZimSciNet - IT Support for Rural Science Teachers (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import4011

Zambia Health Management Information System (IICD/infoDev)

http://www.iconnect-online.org/Stories/Story.import3993

India - Land/Property Registration in Andhra Pradesh (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20485989~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

China - Beijing's Business E-Park (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20485996~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

India - Bhoomi: Online Delivery of Land Titles in Karnataka, India (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20484902~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

India - Central Vigilance Commission Website: A Bold Anticorruption Experiment (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20485999~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Chile - Chile's Government Procurement E-System (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486003~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Chile - Chilean Tax System Online (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486006~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Brazil - Citizen Service Centers in Bahia, Brazil (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486008~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Colombia - Colombia's Government Portal (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486010~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

India - Computerized Interstate Check Posts in Gujarat (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486012~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Mauritius - Contributions Network in Mauritius (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486015~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Argentina - Cristal: A Tool for Transparent Government in Argentina (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486017~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

India - Empowering Dairy Farmers in India through a Dairy Information and Services Kiosk (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486020~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

India - Gyandoot: Community-Owned Rural Internet Kiosks (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486032~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Jamaica - Jamaica Customs Automated Services Online (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486047~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Kothmale Community Radio/Internet Project: Expanding the Knowledge Base (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486095~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Mandals Online in Andhra Pradesh (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486051~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Singapore - Modernizing Tax Administration in Singapore (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486053~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

S. Corea - OPEN: Seoul's Anticorruption Project (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486058~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Philippines - Philippine Customs Reform (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486062~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Brasil - São Paulo's Centers for Attending to the Citizen (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONAND-COMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486067~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Thailand - Thailand's Troubled Tax Computerization Project (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONAND-COMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486040~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

Vietnam - Vietnam's Tale of Two Cities (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONAND-COMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486036~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

India - VOICE: Online Delivery of Municipal Services in Vijaywada, India (World Bank)

http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONAND-COMMUNICATIONANDTECHNOLOGIES/EXTEGOVERNMENT/0,,contentMDK:20486038~menuPK:1767268~pagePK:210058~piPK:210062~theSitePK:702586,00.html

7.5 Other resources

Japan - Best Practices in e-Local Government

http://www.nippon-net.ne.jp/its/bestpractice/english/

Austria – Best Practices in e-Government including e-Local Government

http://www.verwaltungskooperation.at

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