Frameworks for fostering cross-agency interoperability in eGovernment initiatives

Interoperability has been identified as a major issue to be addressed by every egovernment initiative. In order to tackle this issue, egovernment agencies have developed tools to facilitate the interchange of information between agencies when providing public services to citizens and businesses through internet. The tools are called frameworks. The chapter surveys a sample of egovernment agencies in Europe and the United States that have developed different frameworks, which are classified as either interoperability frameworks or enterprise architecture frameworks. The survey includes a comparative analysis which shows the common features and differences between both types of frameworks. The survey also shows concrete cases of application of the frameworks and focuses on the use of the frameworks as catalysts of cross-agency interoperability. Finally, the chapter proposes an explanation to the adoption of each kind of frameworks by the egovernment agencies.

Keywords: eGovernment – Interoperability – Interoperability framework – Enterprise architecture

Introduction

In the late 90’s, most governments in OECD (Organisation for Economic Co-operation and Development) countries released their egovernment strategies. The egovernment strategies were supported by so-called framework policies, covering security, confidentiality, delivery channels, etc. One of such policies was the interoperability policy (CEC, 2002, p. 10; OECD, 2003, pp. 62 & 99).

Since the beginnings of the IT in public administrations, there has been high concern on the issue of interoperability. In the beginnings, the concern showed up when public administrations struggled to avoid vendor lock-in when procuring themselves with IT infrastructure. In the 80’s, the concern meet a response by means of the standardisation. In 1984, the International Organisation for Standardization (ISO) produced the Open Systems Interconnection (OSI) Reference Model and standards, which helped governments in the area of networking. The existing information systems networking technology had been typically developed as proprietary systems, and interoperation between these systems was non-existent. Additionally, there was a demand for standards to facilitate cooperating processes and applications independent of platforms.

Recently, the rise of egovernment has put the above concerns again on the agenda of public administrations. Now, concern is shared worldwide, and egovernment agencies have shown up in the discussion and in the search for solutions. Large investments have been made in IT procurement in public administrations for egovernment service delivery and policies are being implemented in order to guarantee that open standards – and sometimes open source software – are now adhered to by IT vendors. Furthermore,
new ways of public service delivery involving a customer-centric approach, –which hides the complexity of the administrative procedures –, and involving a high degree of interaction between local, national and regional –e.g. European– governments, have just started to be implemented.

In this scenario, interoperability is clearly a key issue and it has shown up as a principle in the conception and deployment of egovernment initiatives. Indeed, egovernment agencies have developed tools to facilitate egovernment interoperability. The tools are called frameworks within the chapter. The chapter surveys a sample of egovernment agencies in Europe and the United States that have developed different frameworks, which are classified as either interoperability frameworks or enterprise architecture frameworks. The survey focuses on the use of the frameworks as catalysts of cross-agency interoperability.

The chapter is structured as follows. In the first section, the basic concepts to be dealt with in the rest of the chapter are defined, such as interoperability and enterprise architecture. In the second section, the egovernment initiatives of the following governments are described: the United Kingdom, the European Union, and the United States. The description is focused on the interoperability policy and on the frameworks that help implement the policy. In the third section, the frameworks are classified, and the commonalities and differences between each class are explained. In the fourth section, examples of use of egovernment frameworks as a catalyst of cross-agency interoperability are provided. And finally, some conclusions are drawn.

**Concepts**

In this section, the basic concepts to be dealt with in the rest of the chapter will be defined. Firstly, different definitions of the term interoperability which are found in the literature are gathered and discussed. And secondly, the framework types for egovernment interoperability which will be analysed in the rest of the chapter are introduced. The frameworks are the interoperability frameworks and the architecture frameworks.

**Interoperability**

Interoperability can be defined as “the ability to exchange information and mutually to use the information which has been exchanged”, according to the European Commission (CEC, 1991). But more technical definitions may be found in the literature, such as the following one: “Interoperability is the ability to exchange functionality and interpretable data between two software entities. It can be defined in terms of four enabling requirements: communications, request generation, data format, and semantics” (Mowbray, 1995, p. 28), where the definition goes into detail enumerating the sort of requirements that interoperability must tackle.
Interoperability is a complex issue, so there have been proposals aimed at decomposing the interoperability concept in smaller and more manageable components. One of the first proposals were made by Arms (2002), which stated that interoperability “requires agreements to cooperate at three levels technical, content and organisational.

- Technical agreements cover formats, protocols, security systems, etc., so that messages can be exchanged.
- Content agreements cover the data and the metadata, and include semantic agreements on the interpretation of the information.
- Organisational agreements cover the ground rules for access, preservation of collections and services, payment, authentication, etc.”

More recently, the European Commission presented in 2004 a set of guidelines which proposed a classification which have become canonical. According to that classification three aspects of interoperability need to be considered (IDABC, 2004b):

- Organisational interoperability, which is concerned with defining business goals, modelling business processes and bringing about the collaboration of administration that wish to exchange information and may have different internal structures and processes.
- Semantic interoperability, which is concerned with ensuring that the precise meaning of exchanged information is understandable by any other application that was not initially developed for this purpose.
- Technical interoperability, which covers the technical issues of linking computer systems and services.

**Interoperability framework**

An interoperability framework is a tool for guaranteeing interoperability. The recipients of the interoperability frameworks are those agencies that are engaged in egovernment initiatives. And the final aim of an interoperability framework is to make easy the integrated provision of services to both citizens and businesses by means of egovernment.

At least, an interoperability framework contains a technical standard catalogue. A technical standard catalogue list those technical specifications that are recommended for the deployment of egovernment systems within the public administration. The technical specifications that can be incorporated in some catalogues are required to be developed by standardisation bodies, but other catalogues do include any technology which has wide market acceptance. Guijarro (2005) discusses thoroughly this issue. In addition to the technical standard catalogue, some interoperability frameworks also state policies, guidelines and best practices.

Interoperability frameworks cover both technical and non-technical issues. Among those non-technical issues that are relevant to egovernment interoperability, the organisational issues are worth mentioning. Between the technical and the organisational issues, there is a range of issues that falls in the semantics.
Architecture framework

The term enterprise architecture refers to a comprehensive description of all the key elements and relationships that make up an enterprise. In this definition, an enterprise may be a company, an institution or a department within a company or an institution. And the elements to be described may be data, network equipments, software components, business locations, human resources, etc. When applying enterprise architecting to IT management in public administration, the enterprise may be the whole government, a department, a ministry or an agency, or a set of departments/ministries/agencies engaged in a collaborative initiative.

Enterprise architecting aims at aligning the business processes and goals of an enterprise and the applications and systems that build up the technical infrastructure of the enterprise. There are many different approaches to describing the elements of an enterprise architecture (Schekkerman, 2004). Such approaches are named ‘enterprise architecture frameworks’. One framework that has grown in popularity in the last decade was developed by John Zachman (1987). The Zachman Enterprise Architecture Framework organises the descriptive representations of an enterprise in a matrix. Each cell in the matrix represents the intersection of a particular focus (data, function, network, people, time, and motivation) and a perspective (contextual, conceptual, logical, physical, and out of context). Each focus relates to one of the Aristotelian questions “what, how, where, who, when and why”, and each perspective relates to one of the following roles: the planner, the owner, the designer, the builder and the subcontractor. Finally, models (e.g. business models, data models, object-oriented models) are the language of the framework, and are contained within the cells. For example, a business process model may be used for describing the enterprise from the conceptual perspective and the function focus, whereas describing the enterprise with the same focus but from the logical perspective, that is, the perspective of the designer, may be better fulfilled by an application architecture.

Egovernment initiatives

In this section, the egovernment initiatives of the following governments are described: the United Kingdom, the European Union, and the United States. The description is focused on the interoperability policy and on the frameworks that help implement the policy. The frameworks will be comparatively analysed in the following section.

More comprehensive analysis of interoperability initiatives can be found in Guijarro(2005) and Guijarro(2007a). Both articles comprise the government initiatives covered below, with the addition of the cases of France and Germany. In the present chapter, we have decided to reduce the number of cases under analysis, due to the high degree of similarity between the initiatives in the EU member states.

Thus, this section presents, on one side, the initiative of the UK and the supranational framework setup by the institutions of the EU, and on the other side, the initiative of the federal government of the US.
United Kingdom

The UK egovernment strategy was prepared by the Cabinet Office and it was published in April 2000 under the name “E-Government. A Strategic framework for public services in the information age” (Cabinet Office, 2000). To execute the strategy, the Office of the e-Envoy was created within the Cabinet Office.

One of the strategic building blocks of the strategy was interoperability. The strategy stated that common standards and infrastructure were to establish in order to enable interoperability across government departments and the wider public sector. Furthermore, it stated that the common policy and standards would be set out in the interoperability framework policy.

The strategic direction setup by the UK government was implemented in September 2000 when the first version of the interoperability framework was published. The framework was to be known as e-GIF. E-GIF would set out the government’s technical policies and specifications for achieving interoperability and information systems coherence across the public sector. Furthermore, e-GIF made clear from the outset that it would define “the essential pre-requisites for joined-up and web enabled government” and that “adherence to the e-GIF specifications and policies is mandatory” (Cabinet Office, 2005).

E-GIF comprises two parts. The first part, known as the framework, contains the high level policy statements, management, implementation and compliance regimes, and the second part, known as technical policies and specifications, contains the technical policies and tables of specifications.

E-GIF mandated a set of key policies, which have spread as good practices in many other national and international egovernment initiatives:

- alignment with the Internet: the universal adoption of common specifications used on the Internet and World Wide Web for all public sector information systems
- adoption of XML as the primary standard for data integration and presentation tools for all public sector systems
- adoption of the browser as the key interface; all public sector information systems are to be accessible through browser based technology; other interfaces are permitted but only in addition to browser based ones
- the addition of metadata to government information resources
- the development and adoption of the e-GMS (e-Government Metadata Standard) based on the international Dublin Core model
- the development and maintenance of the GCL (Government Category List)
- adherence to the e-GIF mandated throughout the public sector.

E-GIF covers the exchange of information between government systems, including central government departments and their agencies, local government, the devolved administrations as voluntary partners, and the wider public sector, e.g. non-departmental public bodies and the National Health Service. The e-GIF specifications are mandated on all new systems that fall within this scope.
E-GIF covers four areas: interconnectivity, data integration, e-service access and content management.

With regard to the management and update processes, the framework would be reviewed annually and updated as necessary, whereas the specification would be revised and updated every six months. The most recent e-GIF version is version 6.1, published in March 2005, and the most recent version of the second part, which is currently known as “Technical Standards Catalogue”, is version 6.2, and it was published in September 2005.

In November 2005, after a period when the egovernment strategy of the UK government had undergone a revision, a new strategy was made public under the name of “Transformational Government. Enabled by technology”. As a result of that, the CIO council became responsible for the implementation of the new strategy.

Enterprise architecture in UK

Enterprise architecting in UK egovernment initiatives has been always present but it has not been prioritised.

The Cabinet Office used to place e-GIF within the e-Services Development Framework (e-SDF). The e-SDF was a framework for guiding and supporting the development process of e-services in egovernment (Cabinet Office, 2002). Requirements, design and implementation were the three phases of the development process, and the e-SDF provided two categories of artefacts for assisting the process. At one level, e-SDF provided sets of reusable elements (patterns, components, and resources) for improving the consistency and reducing costs in the development at the different phases. At a higher level, e-SDF provided the High Level Architecture, which was a single set of top-level specifications and standards to be used for developing government e-Services. The High Level Architecture was composed of:

- The Government Common Information Model (GCIM), which is a high level model of business activities. Its focus is explicitly on the specification of interoperability requirements.
- The Government Data Standards Catalogue, which describes the data elements and data types which are referred to in both GCIM and CMRM.
- The Government Message Reference Model (GMRM), which is a high-level reference model of information that is exchanged between applications.
- And the e-GIF, which provides the supporting guidelines and technical specifications for implementation.

The High Level Architecture was actually an enterprise architecture. And the e-GIF was the artefact chosen to describe the technology view of that enterprise architecture.

No progress was made beyond the publication of the first version of the High Level Architecture reference models. In the end, the Cabinet Office left this approach behind when released version 6 of e-GIF in April 2004, and no mention to the High Level Architecture has been found in the e-GIF since then.

Recently, however, with the new thrust given by the Transformational Government strategy of 2005, there was a renewed interest in the UK government on enterprise
architecting. The strategy implementation plan has given priority to agree and publish a standard Enterprise Architecture reference model. The model will enable:

- The identification of actual or potential duplication of components and solutions across government, and so encourage shared services and re-use of existing components.
- Prioritisation of future common infrastructure developments.
- The agreement of interface standards to enable easier, cheaper and quicker inter-working between agencies, including one agency acting as an agent or intermediary for another.
- Greater competition in the supply of IT services and products, including the introduction of new, innovative components for particular, standard architectural elements.

As part of this priority, a working document was published in late 2006, which highlights the main characteristics of the cross-Government Enterprise Architecture (xGEA). The xGEA will include the Enterprise Architecture reference model, “which would help align existing and emerging technical architectures across government with the xGEA” (CTOC, 2006, p. 1). A first version of the reference model has been released, and it aims at providing a common language which will facilitate the easier communication of exemplars to be shared.

**European Union**

The European Union has set up different initiatives in the area of egovernment within the limits of its powers in the domain of Public Administration (Alabau, 2004). The EU interest on interoperability within the area of egovernment showed up in the framework of IDA (Interchange of Data between Administrations) Programme, which is managed by the European Commission. The founding objective of the IDA Programme was the improvement of the telematic interchange of information between the EU member states and between the member states and the EU institutions. The IDA Programme ran from 1995 until 1999 and the IDA II Programme ran from 1999 until 2004. Currently, the Programme is called IDABC, where B stands for businesses and C stands for citizens and it spans from 2005 until 2009. During the approval process of IDA II, the Decision 1720/1999 was adopted by the European Parliament and by the Council, which was highly relevant for the EU commitment to the egovernment interoperability. The Decision committed itself to work with the objective of “the achievement of a high degree of interoperability, within and across different administrative sectors and, where appropriate, with the private sector, between the telematics networks established in the Member States and between the Community and the Member States” (European Parliament and Council, 1999, Art. 1).

One of the first practical result of the above Decision was the publication of the version 4.1 of the “Arquitecture Guidelines for Trans-European Telematic Networks for Administrations” (hereafter, AG), in March 1999. The most recent version of the AG is
version 7.1 (IDABC, 2004a) and it was released in September 2004. The AG enables the coherent deployment of the Trans-European Telematic Networks and the access to networks and services that are developed within the frame of IDA, such as TESTA, which is the European Community’s own private, IP-based network.

The AG comprises:
- Implementation Principles, e.g. the open standards policy and the open source software policy.
- Implementation Approach and Guidance, which provides architectural models, services and standards, in the following areas:
  - interconnection services
  - data integration and middleware
  - data presentation and exchange
  - security services

More recently, as part of the egovernment action plan set out by the European Commission within the eEurope 2005 initiative (CEC, 2002), IDA published the European Interoperability Framework (EIF) in November 2004. The objective of EIF was to support the delivery of pan-European egovernment services to citizens and enterprises (IDABC, 2004b). In order to achieve the objective, EIF defines a set of recommendations and guidelines for egovernment services so that public administrations, enterprises and citizens can interact across borders, in a pan-European context.

EIF comprises:
- the underlying principles, e.g. the multilingualism and the use of open standards;
- the framework, which promotes the three aspects of the interoperability, already mentioned above, that is, organisational, semantic and technical;
- the recommendations, for each interoperability aspect;
- and the recommendations for national interoperability frameworks.

EIF provides a common framework for discussion around interoperability, pinpointing which interoperability issues should be addressed when implementing pan-European egovernment services, but it avoids prescribing any concrete architecture or standard catalogue, which was to be the main objective of successive releases of AG. Neither AG nor EIF cover the same scenario as the national interoperability frameworks. However, AG and EIF are to have an indirect but strong influence on them.

In 2006, the Commission started the revision of AG and EIF. A draft version of EIF v2.0 is expected by the end of 2007 and the AG v8.0 will be prepared during the first half of 2008.5

United States

In 2002, the US Congress passed the eGovernment Act (HR, 2002), which was to expand the use of the Internet and computer resources in order to deliver government
services for a citizen-centred, results-oriented, and market-based government. However, the egovernment implementation in the USA has been highly influenced by the Clinger-Cohen Act of 1996. The Act shaped federal agencies’ approach to IT acquisition and management. In particular, it required all federal agencies to establish an architecture program that integrated a process to select, control, and evaluate their IT investments. Following the Clinger-Cohen Act, the Office of Management and Budget of the Executive Office of the President of the US (OMB) required in 1997 that an IT architecture should be developed and maintained in agencies (OMB, 1997). This initial thrust shows the importance that enterprise architecting has deserved from the beginning within the frame of egovernment initiatives.

As a result of OMB guidelines, the CIO Council (CIOC) published the Federal Enterprise Architecture Framework (FEAF) (CIOC, 1999). The FEAF was to provide architecture guidance for federal cross-agency architectures. It is based on the Zachman Framework, and it does not specifies any work products. The FEAF focused on introducing enterprise architecture concepts and was planned to undergo revision to provide guidance on architecture work products, Technical Reference Model and standards, etc.

Initially, the CIOC adopted the FEAF as the framework for egovernment initiatives (CIOC, 2002), which comprised four architectures, namely:

- **Business architecture**, which identifies the functions, process, organization, and information flow for accomplishing the mission of the organization.
- **Data architecture**, which defines the major types of data needed to support the business, its meaning, and its form.
- **Application architecture**, which defines the applications and supporting capabilities to effectively manage the data and information needed to support business objectives.
- **Technology architecture**, which defines the enabling hardware, software, and their physical locations to support the business applications/data and functions.

Within each one of the four architectures in the FEAF, the CIOC was to define one or more models which would guide the development of egovernment solutions.

However, the FEAF initiative was never completed as the emphasis shifted towards the development of the Federal Enterprise Architecture (FEA) for the OMB. OMB established in 2002 the FEA as a business-based framework for cross-agency, government-wide improvement, which consists of five reference models (FEAPMO, 2006):

- **Performance Reference Model**, which is a framework for performance measurement providing common output measurements throughout the federal government.
- **Business Reference Model**, which provides a framework that facilitates a functional (rather than organizational) view of the federal government’s lines of business independent of the agencies that perform them.
• Service Component Reference Model, which classifies Service Components according to how they support business and performance objectives.
• Technical Reference Model (hereafter, TRM), which is a component-driven, technical framework that categorizes the standards and technologies to support and enable the delivery of Service Components and capabilities.
• Data Reference Model, which is intended to promote the common identification, use, and appropriate sharing of data/information across the federal government.

Bellman (2004) argues that the FEA is not a framework. However, the FEA models are a set of categories that comprise models for defining business, performance, data, service component, and technical reference; and OMB requires alignment of all Departments and cross agency architecture with the FEA models. Accordingly, the FEA would be merely a mechanism for the OMB to determine duplications and overlaps in project expending, including egovernment initiatives, and take action during the appropriations process in streamlining certain operations. Despite Bellman’s arguments, we will check in the following sections, that the FEA exhibits enough flexibility so that it can be regarded as an architecture framework.

E-government frameworks for interoperability

In the previous section, each government approach to interoperability was described and the different frameworks used for implementing the approach were presented. In this section, the frameworks are classified, and the commonalities and differences between the identifies framework classes are explained.

The frameworks used by most egovernment initiatives, and specifically the frameworks described in the previous section, can be classified as either interoperability framework or enterprise architecture frameworks.

On the one hand, e-GIF from the UK, AG and EIF from the EU and FEA TRM from the US can be included in the interoperability framework class. With regard to AG and EIF, note that the abstraction level of EIF is higher than the one of AG. The reason is that EIF is a framework focused on defining technical policies, whereas AG is more focused on recommending technical specifications. In fact, e-GIF incorporated since its inception this dual objective, and it was the reason for separating the technical specification part as a separate document under the name of Technical Standard Catalogue.

FEA TRM can be classified as interoperability framework, despite the fact that it is a building block of the Federal Enterprise Architecture. We argue that the TRM effectively defines a taxonomy of the different information services at the public administration and it recommends technologies for providing those services. That is exactly the purpose of an interoperability framework. Furthermore, the Clinger-Cohen Act described the TRM as “the cornerstone of interoperability”.

On the other hand, the whole FEA can be included in the enterprise architecture framework class. And the xGEA proposal from the UK may also be an enterprise architecture framework.
FEA, as it was discussed in the previous section, is not purely an enterprise architecture framework. However, FEA has become the de facto guidelines for the elaboration of enterprise architecture at the federal agencies, whether they operate autonomously or they collaborate in interagency endeavours. From that point of view, the FEA can be considered a framework.

The work in the development of xGEA seems to be aimed at achieving similar objectives as FEA.

**Comparative analysis. Interoperability vs. enterprise architecture frameworks**

The main commonality between an interoperability framework and an architecture framework is that both of them are frameworks. That is, they are methodological tools that public administrations have standardised with the objective to assist to their departments and agencies in their processes. In the cases of interoperability frameworks and architecture frameworks, the context of the processes are the egovernment deployment programmes, within the general framework of the impulse of IT in public administrations.

As regards the differences, three main aspects can be identified between interoperability frameworks and architecture frameworks:

- **The approach**, defined as the abstraction level where each kind of framework is positioned. Note that the abstraction level determines the use of the framework. Besides, the abstraction level may suffer an evolution as the framework matures.
- **The orientation**, defined as the immediate purpose of the use of each kind of framework.
- **The management and governance**, defined as the procedures for the definition, the use and the update of the framework. The procedures are designed and executed within the context of the organisation.

**Approach: bottom-up vs. top-down**

Interoperability frameworks adopt a bottom-up approach whereas architecture frameworks adopt a top-down approach.

The first interoperability frameworks only made reference to technical specifications on the technical aspects of interoperability. The semantic and organisational aspects of interoperability were either absent in the frameworks, e.g. the first versions of e-GIF, or just mentioned as necessary to achieve the “interoperability goal” (Arms, 2002). As the different governments became aware of the semantic and organisational aspects – the EIF made an important contribution to this awareness – and as the technology in this area were deployed, the interoperability frameworks began to incorporated these aspects in their catalogues.

Furthermore, those egovernment agencies that are currently starting to elaborate interoperability frameworks usually setup technical task forces. This biased composition then favours that technical issues are the first ones to be tackled on. Indeed, the
technical units are the ones that promote the starting of processes of elaboration of interoperability frameworks within the egovernment agencies.

On the other side, the architecture frameworks are conceptually a tool with a higher abstraction level. An architecture framework aims, by definition, to align the technological with the business views of an enterprise. For that reason, the architecture frameworks, have given, since their inception, priority to the business process modelling, and, they have regarded the technical standards catalogue as dependent from the business reference models. As an example, in the FEA case, federal agencies involved in an enterprise architecture elaboration process have always followed a downward path, which begins with the conception of the Business Reference Model, continues with the Service Reference Model and eventually ends with the Technical Reference Model.

**Orientation: interoperability-oriented vs. reuse-oriented**

Interoperability frameworks are interoperability-oriented, whereas architecture frameworks are reuse-oriented.

On the one side, an interoperability framework contains the standards that two or more organisation agree in order to conduct a desirable interaction. The standards may cover various issues, e.g. procedures, information and technology. The interoperability framework is a registry of the interfaces between organisations that are identified and the standards that are defined for the interfaces. Being limited to the interfaces, the organisation core – at both the business and technical dimensions – is not affected at all by the interoperability framework.

Actually, e-GIF explicitly states that “the selection of e-GIF specifications has been driven by: interoperability – i.e. only specification that are relevant to systems interconnectivity, data integration, information access and content management are specified ...” (Cabinet Office, 2005, p.8). Furthermore, EIF recommends that “[Public administrations] should agree on the necessary Business Interoperability Interfaces through which their business processes will be able to interoperate at pan-European level and the definition of common BII standards should be studied” (IDABC, 2004b, p. 18).

On the other side, the guiding purpose of architecture frameworks is different. The enterprise description that is achieved through the enterprise architecting efforts is conducted with the support of a unique set of reference models, which are defined using a common taxonomy and a standardised language. Such effort have the virtuous consequence of identifying common and redundant assets in the organisations, and of promoting the reuse of these assets. The architecture frameworks are then oriented towards the reuse. As the following section will explain in detail, the OMB set up an initiative, called “Lines of Business”, that have provided with sound successes as far as the reuse is concerned. The interoperability is achieved as a consequence of the alignment of the architectures of two or more enterprises. Indeed, the FEA TRM defines the interoperability as “the capabilities of discovering and sharing data and services across disparate systems and vendors” (FEAPMO, 2006, p. 86); note that this capability may only be effective when the TRMs are aligned.
Management and governance

Interoperability frameworks management and governance are less complex than in architecture frameworks.

On one side, the interoperability frameworks have impact only on the external interfaces of the organisation. Therefore, each organisation keeps full powers over the management of its internal systems.

On the other side, each organisation involved in an enterprise architecting effort is required to map every element that is relevant for the enterprise architecture on the reference models that made the agreed architecture. This mapping requirement makes managing architecture frameworks very difficult. Actually, in the FEA case, the mapping decisions have consequences in the IT investment process of each agency. This effect has been caused by the OMB when requiring through the Memo 97-16 (OMB, 1997) that every agency should use an enterprise architecture to select, control and evaluate their IT investments. This effect would be the reason which explains why the FEA elaboration has been steered from a project management office setup within the OMB and why it has not been left in the hands of a task force nor an inter-agency committee.

To conclude, the choice of one kind of framework or the other one as a tool for facilitating egovernment interoperability is a trade-off between the cost of managing the elaboration process and the interoperability degree that may be accomplished.

Indeed, an interoperability framework is relatively easy to elaborate and to use. Firstly, it may be built and used step by step, that is, taking care first of the technical issues and then the organisational ones. And secondly, in the early phases, it may be elaborated by task forces where a small number of managerial levels and a small number of departments are involved; in the later phases, the participation may be enhanced with additional stakeholders. Nevertheless, this easy management has a drawback: the interoperability degree that is achieved has lower outreach and stability than in the case of enterprise architecture frameworks.

The enterprise architecture frameworks, as mentioned above, has several implications within a public administration, some of them being profound. In addition, the implications usually affect several departments. That increases the complexity of the elaboration and use of an enterprise architecture framework. Firstly, an enterprise architecture should be built from the business perspective, which has a higher abstraction level than the technical perspective. In some sense, the enterprise is modelled following a holistic approach. And secondly, task forces should incorporate every stakeholder from the very beginning of the elaboration process. Nevertheless, this complex management has an advantage: the interoperability degree that is achieved has higher outreach and stability in the case of interoperability framework.
E-government frameworks use for cross-agency interoperability.

E-government initiatives make different uses of the interoperability and architecture frameworks. One important area where egovernment frameworks are used is public procurement. Egovernment frameworks are being used by governments to guide public procurement in the area of egovernment service delivery. In particular, the technical standard catalogue of an interoperability frameworks may be enforced on IT systems procured to governments (Guijarro, 2007b).

This chapter is focused on the use of egovernment frameworks as a catalyst of cross-agency interoperability, where agencies may belong either to the same administration or to different administrations. This section provides some insight into this issue. Firstly, the policies that guide the use of the frameworks are scrutinised, based on the lines defined by egovernment strategy documents. And secondly, concrete study cases are described. The cases are projects where different agencies have been involved and interoperability was one main issue to face for project success.

Policy

*Cabinet Office and e-GIF*

The Cabinet Office explicitly states that the e-GIF covers the exchange of information between government systems and the interactions between UK government and citizens, intermediaries, businesses, and other governments, and the interactions between UK government organisations. By UK government, e-GIF means central government departments and their agencies, local government, and the wider public sector, e.g. non-departmental public bodies and the National Health Service. Thus, cross-agency interaction is fully and explicitly located within the scope of e-GIF.

Within the scope defined in paragraph above, the e-GIF are mandated on all new systems. Furthermore, legacy systems will need to comply with these specifications, in order to take advantage of the new services being provided through UK online⁹ and the Government Gateway.

*IDA Programme and AG*

The Decision 1720/1999 stated that the EU would define AG for the sectoral networks designed to ensure interoperability between the various physical infrastructures and services.

In order to understand to the furthest extent this commitment, the exact meaning of the term ‘sectoral network’ in the context of the European Commission should be first clarified. And first, the term ‘telematic network’ should be defined.

‘Telematic network’ is defined by the European Commission as a comprehensive data-communication system enabling the interchange of information electronically between organisations and individuals. With regard the telematic networks, the Decision states that “[…] in order to establish economic and monetary union, to implement
Community policies and activities and to support communication between Community institutions and bodies, there is a need to establish ‘telematic networks’ (European Parliament and Council, 1999, p. 1). That is, telematic networks are not established as a voluntarist endeavours but as a result of a juridical act.

From that basic definition, ‘sectoral network’ is defined as a trans-European telematic network for administrations. That means that the core characteristics of a sectoral network are that its scope is trans-European and that it belongs to the public sector. There are two special and important sets of sectoral networks: the generic services and the common tools.

Generic services are telematic networks functionalities which meet common user requirements, such as data collection, data dissemination, data exchange and security. With regard to generic services, the Decision states that the EU “shall adopt all necessary measures in order for a suitable choice of common generic services that meet sectoral user requirements to be made available to sectoral networks on a competitive basis in a multivendor environment” (European Parliament and Council, 1999, Art. 4). Examples of generic services are TESTA and PKICUG. TESTA is an IP-based backbone that provides telecommunications services at the transnational level. PKICUG ensures secure access to web repositories (i.e. authentication of clients and servers, and confidentiality of exchanged information).

With regard to common tools, the Decision states that the EU “shall identify and specify, within sectoral networks, fundamental and recurring functionalities which can form the basis of common tools and techniques or modules” (European Parliament and Council, 1999, Art. 5). Examples of common tools are the IDA Portal Toolkit and IPM. The IDA portal toolkit was initially developed by the European Environment Agency and it has been further developed by the Commission under the IDA programme. The portal toolkit relies on Open Source software. The Interactive Policy Making (IPM) initiative aims at improving governance by using the Internet for collecting and analysing reactions in the marketplace for use in the European Union's policy-making process. It is implemented as a web-based tool available for EU institutions and public administrations at local, regional and national level.

Thus, the main goal of AG is fostering trans-European cross-agency interoperability.

**OMB and FEA**

Both the interoperability policy in the context of federal egovernment initiatives and the use of FEA as a tool for fostering cross-agency interoperability, are defined by the Egovernment Act of 2002.

Section 212 of Egovernment Act states that “the purposes of its section are to:

1. enhance the interoperability of Federal Information Systems
2. assist the public in electronically submitting information to agencies under Federal requirements, by reducing the burden of duplicate collection and ensuring the accuracy of submitted information enabling citizens to integrate information from different agencies” (HR, 2002, Section 212)
As a way to implement the provisions of section 212, the OMB set out two initiatives with high impact: the Presidential Initiatives and the Lines of Business.

Firstly, OMB, through Memo 01-28, required the Egovernment Task Force to start a “process to gather and identify strategic egovernment opportunities” (OMB, 2001). Since egovernment opportunities affect how agencies do their work and employ technology, the Task Force found necessary to evaluate the projects identified against the current enterprise architecture. The Task Force’s major finding was that there was significant redundancy and overlap, with multiple agencies performing each of 30 major functions and business lines in the Executive Branch of government. As the Task Force evaluated potential projects relative to the business architecture, the assessment focused on the opportunities to integrate operations and simplify processes within a lines of business across agencies. As a result of the Task Force’s effort, the 24 E-Government Presidential Initiatives were identified.

Secondly, OMB required all agencies to link their IT investments to the FEA in order to help OMB and agencies identify programs providing similar capabilities and using similar information. As a result of using FEA during 2003, OMB identified and targeted redundancies across five federal functions, which have been identified as lines of business (LoBs). Examples of LoB are Financial Management and Human Resources Information. From 2004 the LoB initiatives have been underway as pilot projects and have enabled agencies to implement common business practices and technology solutions.

The LoB initiatives will ultimately require agencies to do one of two things:
(1) become a “service centre” by providing a common solution for other agencies
(2) migrate their own redundant capability to a service centre

Through this process, agencies will consolidate their business processes and data sources, and standardise the data they use. This consolidation and standardisation will improve the interoperability of information systems across government.

Practical cases

In this subsection, each one of the three initiatives under study in the chapter is exemplified by means of one deployment project. In each project different departments and agencies have been involved. The projects will be concrete examples of the policies presented in the previous subsection, and it will provide an illustration of the role that egovernment frameworks play indeed as enablers and catalyst of cross-agency interoperability.

*e-GIF: The DWP/DOH road traffic accident automation project*10

The Compensation Recovery Unit (CRU) is part of the Department of Work and Pensions (DWP) in Great Britain. CRU is tasked with recovering amounts of Social Security benefits paid as the result of and accident, injure or disease, where a compensation payment has been made.
The scheme applies where recoverable benefits have been paid, or are likely to be paid to an injured party, and where a compensator (usually an insurance company) who is liable, makes a compensation payment.

In addition, CRU also recovers from the Compensator, National Health Service (NHS) Hospital charges arising from road traffic accidents, where a compensation payment has been made. These charges are recovered on behalf of the Department of Health (DoH) and they amount to some 117 million pounds annually.

The full recovery process was originally a high volume clerical processing operation, dealing annually with 350,000 forms issued between CRU and NHS Hospitals. The process has been automated over the UK Government Secure Intranet (GSI). The data previously issued in paper format from the CRU system is transferred to NHS Hospitals as an XML schema and displayed on their web server. The required enquiry data is input by the Hospital administration staff via a web browser and the response is transferred back to CRU for automated update of its system.

It was essential that these two diverse Government Departments, DWP and DoH, were able to reach an agreement on the technical terms that would guide the design, development and integration of this automated electronic link. The agreement was made possible through the alignment of both Departments with e-GIF.

The project has been a success within both operational environments, and DWP and DoH secured joint annual efficiencies for Government of one million pounds in return of initial DWP development costs of 320,000 pounds.

IDA AG: Ploteus – The European Portal on Learning Opportunities

The current portal,11 launched in March 2003, was developed and funded with the support of the IDA programme for a total amount of 849,000 Euros.

Ploteus is a portal that provides an answer to whoever wishes to study abroad. Students, job seekers, workers, parents, teachers and guidance counsellors can find in Ploteus available information on learning opportunities in Europe at European, national and regional level.

In its present form, Ploteus provides links to websites or databases to be browsed in order to find the final information. In its second phase, due to completion in 2008, Ploteus II envisages to interconnect all national databases allowing their users to directly retrieve the national data through the Ploteus interface. To achieve the retrieval of comparable data from different data sources, a common protocol was approved by the Commission and the Member States.

Ploteus has been designed taking into account the general principles of interoperability standards laid out in the IDA AG. The statement implies that the common protocol should be aligned to the AG.

FEA: Human Resources LoB

The OMB launched the HR LoB effort in April 2004 to build interagency enterprise architecture, in compliance with the FEA, for the human resources business function. The Office of Personnel Management (OPM) was chosen to be the managing partner
and 22 agencies collaborated in the effort. As of October 2006, Business, Service Component, Data and Performance Reference Models were delivered, while the development of the Technical Reference Model is scheduled for FY2007, which spans from October 2006 to September 2007.  

In order to realize the benefits expected through the HR LoB, the OMB asked agencies with the skills and capabilities to function as government-wide service providers in the areas of HR management to submit business cases for doing so as part of the FY2006 budget process. The business cases were evaluated using a due diligence checklist, which assessed potential service providers’ abilities in terms of past performance, current capabilities, and ability to operate in a customer focused organisation. The due diligence checklist required that candidate agencies should be aligned with the FEA.

On the basis of the review, five departments were designated as eligible to enter into competition to become cross-agency providers. Agencies would select, through a competitive process, a government-wide service provider for HR management. As an example, as of beginning of 2007, the Department of Transportation have migrated to Department of the Interior’s Shared Service Centre (SSC), and the Department of Housing and Urban Development has migrated to Treasury’s SSC. In all, twelve Departments and large agencies and 77 small entities (boards, commissions, etc.) are being serviced by SSCs. Upon migration, agencies will shut down existing systems.

To sum up, the FEA Reference Models have been used for two purposes within the frame of the HR LoB. In the prospective phase, the FEA was used to describe the HR management functions to be provided on a cross-agency basis. This use allowed to identify which functions and resources would be subject to cross-agency provision, so that the scope of this provision was precise enough. In the migration phase, the FEA has been used for enabling the cross-agency provision, since the functions, components, data sets and technologies under the control of the SSC are already clearly identified, and migration of SSC users is therefore streamlined.

**Conclusions**

In the chapter, a sample of the most active egovernment initiatives have been presented. The object of the study has been the interoperability in egovernment and the focus of the study has been the tools used to implement the interoperability policies in egovernment.

The tools have been classified in two groups, i.e., the interoperability frameworks and the enterprise architecture frameworks. The interoperability frameworks have been used by the UK government and by the EU in the IDABC programme. The enterprise architecture frameworks have been the basic tool that the US federal government have used and the one that the UK government is currently considering within its renewed egovernment strategy.
Among the different uses of egovernment frameworks by public administrations, the chapter has focused on illustrating, through the description of real cases, how egovernment frameworks have succeed in fostering cross-agency interoperability.

From the comparative analysis conducted in the chapter, one main conclusion may be drawn. The above discussion has showed that the choice between interoperability vs. enterprise architecture framework is a trade-off between the cost of managing the elaboration process and the interoperability degree that may be accomplished. The interoperability frameworks have an lower outreach than the enterprise architecture frameworks, but they are less complex to manage and govern, that is, require less effort from the organisation. This leads to the conclusion that the organisational aspects are the main factor that influences the choice interoperability vs. enterprise architecture frameworks, and therefore, the interoperability degree that the framework may deliver.

The above conclusion would explain the fact that the enterprise architecture frameworks have been elaborated by public administrations with a high degree of coordination – either voluntary or mandatory; that is the case of the agencies in the US federal government. On the other hand, when public administrations belong either to different government levels, such as the case of the UK government initiative, or to different countries, such as the case of the IDABC programme, the interoperability framework is the preferred choice.

References


**Notes**

1 ‘Joined-up government’ is a key theme of modern government. The Labour government, first elected in 1997, decided that intractable problems such as social exclusion, drug addiction and crime could not be resolved by any single department of government. Instead, such problems had to be made the object of a concerted attack using all the arms of government - central and local government and public agencies, as well as the private and voluntary sectors (Bogdanor, 2005)

2 Visit http://www.cio.gov.uk/

3 The institutions of the Community are the European Parliament, the Council, the Commission, the Court of Justice, the Court of Auditors, the Economic and Social Committee, the Committee of the Regions and the European Investment Bank.

4 More information on the IDABC Programme is available at: http://ec.europa.eu/idabc


6 The case under study refers to the federal government. Note, however, that an important role has been played by the “National Association of State Chief Information Officers” (NASCIO) within the state governments.

7 The Federal Chief Information Officer Council serves as the principal interagency forum for improving practices in the design, modernization, use, sharing, and performance of federal government agency information resources. More information is available at http://www.cio.gov.

8 The most popular initiatives of the US federal government in the area of egovernment were the Presidential Initiatives. In 2001, the OMB and federal agencies identified twenty-four initiatives that would be operated and supported by agencies and that would provide high-quality and well-managed solutions for areas such as tax filing, federal rulemaking and e-training.

9 Visit http://www.ukonline.gov.uk

10 Detailed information on this case (Cimander, 2006) may be found at the ‘MODINIS Study on interoperability and local and regional level’ website (http://www.egov-iop.ifib.de)


12 Detailed information on this case may be found at the OPM website (http://www.opm.gov/egov/HR_LOB).