IST PROJECT 2001-35399

A Governmental Knowledge-based Platform for Public Sector Online Services

Project Number:	IST-2001-35399
Project Title:	A Governmental Knowledge-based Platform for Public Sector Online Services
Deliverable Type:	Public

Deliverable Number:	D31
Contractual Date of Delivery:	31 May 2002
Actual Date of Delivery:	
Title of Deliverable:	State-of-the-Art and Current Situation at Public Authorities
WP contributing to the Deliverable:	WP3
Nature of the Deliverable:	Report
Editor(s):	Archetypon
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Abstract: This Deliverable provides the results of a research aiming to determine and present the relevant state-of-the-art. It includes a presentation of e-forms products and solutions, process models, best practices and knowledge management aspects all related to the public sector. Furthermore the current situation at the participating public authorities is presented in terms of services provided, policies and infrastructure and technologies used.

Keyword List: SmartGov, e-Forms, public services, knowledge management

Project funded by the European Community under the "Information Society Technologies" Programme (1998-2002)

The SmartGov Consortium consists of:

Partner's Name	Acronym	Role	Country
University of Athens	UoA	Project Coordinator	Greece
T-Systems Nova	TNB	Partner	Germany
Indra Sistemas S.A.	Indra	Partner	Spain
Archetypon S.A.	ARC	Partner	Greece
Napier University	NU	Partner	United Kingdom
General Secretariat for Information Systems	GSIS	Partner	Greece
City of Edinburgh Council	CEC	Partner	United Kingdom

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Executive Summary

The SmartGov project fully entitled as “A Governmental Knowledge-based Platform for Public Sector Online Services” commenced on the 1st of February 2002. One of its primary and most important tasks was the investigation of relevant state of the art and the recording of the current situation in the participating Public Authorities.

The state of the art review consisted of technical and non-technical work. More specifically the areas reported here include knowledge management platforms for e-services, development environments solutions for e-services, process models for e-services and finally best practises for e-services, all in relation to the public sector.

The main outcome of this review is that although significant advances in all these areas have been realised, there is a clear need for an integrated platform that is based on existing developments and open standards to address the needs of the public sector and that will combine knowledge management aspects with e-services development deployment and operation.

Furthermore the recording of the current situation at the participating Public Authorities indicated that GSIS and CEC have made significant steps towards the realization of e-services and have a commitment to invest heavily in reengineering their organizations for adopting new practices and technologies.

1 Introduction

According to the European Commission [1] transactions services (such as e-forms) although perceived as the future of e-government have not yet realized their full potential. E-forms have a significant role in e-government, as they are the basis for realizing most of the public services that governments should provide to their citizens.

SmartGov will deliver an intelligent e-forms environment and an associated knowledge management methodology specific to the public sector. The SmartGov approach suggests that the development of a platform for transaction services should be based on the integration of diverse technological areas such as knowledge based systems, Internet, XML, user-centred interfaces etc. Furthermore, the deployment of that platform should be supported by knowledge management and process models that would enable process improvement and overcome organisational and cultural barriers.

To achieve this goal the SmartGov project undertook as one of its first tasks the review of relevant state of the art and the investigation of current situation at the participating Public Authorities. Thus the deliverable begins with a survey in knowledge management platforms for e-services in the public sector. It continues with a survey of development environment solutions for e-services in the public sector. This survey focuses on off-the-self products for developing managing and deploying e-forms and on related technologies that are considered as candidates for developing the SmartGov components. After that process models for e-services in the public sector are reviewed and presented in section 4. In section 5 an investigation of best practices for e-services in the public sector is presented that concludes the review of relevant state of the art for the SmartGov project.

Finally the last section of the Deliverable is concerned with the current situation in the participating Public Authorities. In this context and with the use of questionnaires information was extracted related to their infrastructure, software technologies that are used, policies and process models.

2 Knowledge Management platforms for e-services in the public sector

2.1 Introduction

Early successful adopters of knowledge management were industries interested and long experienced in the exploitation of intellectual capital for competitive advantage, namely information resources such as patents or human resources in the form of engineers or IT consultants. Manufacturing, pharmaceuticals, chemicals, management consultancy and the oil industry where among the early advocates of knowledge management. However the finance and telecommunications industries usually concerned about innovation, were less advanced mainly due to differences in culture and philosophy [2][3]. Public administration has not been isolated and separated from transformations due to the development of advanced technology and communications. Society is evolving, knowledge and skills increase, and the time to incorporate innovations in the public sector is decreasing. The strategy for integrating public administration into the information and knowledge society needs to be implemented by taking the following measures:

- Adapting the technology infrastructure by increasing and modernising computer equipment in administration and improving the Internet and communications for serving citizens.
- Promoting the incorporation of all citizens and public servants into the information and knowledge society by guaranteeing a secure exchange of information between citizens and the administration.
- And promoting the management of knowledge within public administration by optimising the processes for acquiring, sharing, learning and exploiting the available knowledge.

The first software products to adopt the knowledge management label were information retrieval and search tools. Nowadays search technology continues to play an important role in many knowledge management initiatives. Adding an advanced search and retrieval capability is a typical improvement made to many corporate portals. But additional benefits beyond document search and retrieval can be obtained in innovative areas such as [2]:

Text mining and automatic content categorisation techniques which automatically allow the scanning of large amount of contents (text based) and the identification of patterns of similarity. The use of clustering algorithms makes possible the generation of taxonomies and knowledge maps

User profiling and personalisation techniques (mainly based on the use of tracking information) which allow the refinement of the knowledge delivery process to meet the specific individuals needs and interests. Furthermore it extends the ability to identify and characterise individuals as experts on particular knowledge areas and experienced in problem solving issues providing easy ways to locate experts.

The rise of knowledge management has opened many opportunities for information system integrators and software manufacturers that offer solutions addressing the barriers to knowledge sharing within organisations. Looking further ahead the knowledge management software market may provide the following [2]:

Tools that can help users classify, filter, store and manage huge amounts of structured and unstructured information

Tools that can help with the construction and management of corporate content delivery solutions

Portal technology frameworks that provide a unified access point to information and knowledge assets

Search and retrieval tools that can provide a uniform point of access to diverse internal and external sources of unstructured information

Collaboration tools that can promote the development of network-based virtual communities by providing shared spaces and improving people's ability to make connections to knowledge assets and experts

The vast majority of knowledge management programmes in organisations are adopting a number of relevant technologies purposes, making use of Internet to access external knowledge and intranets to retrieve corporate knowledge assets, and combining data warehousing or mining technologies, document management systems, decision support, and groupware. However they were failing to exploit its full power [3].

Hereafter this section reviews the state of the art of knowledge management for e-services in the public sector. It is based on the research that is being made in the area of e-government, focused on three main issues: knowledge management projects in course, software technologies and tools, and best practices across Europe. Thus the content has been divided into two main part.

- The first part contains a short description of EC and non-EC funded projects that deal with the management of knowledge in the context of the public administration.
- The second part provides an overview of technologies and tools that enable the integration and deployment of knowledge management solutions. Tools and technology help and support knowledge management activities, namely the creation, acquisition, organization, sharing and use of knowledge. It is common to find these knowledge functions grouped in a single product or toolset (knowledge management framework products), or isolated in specialized products. (categorization tools, search engines, taxonomy builders,). Because of the great deal and variety of tools currently available on the market, we propose in this document to review a representative list of general commercial available tools, which has been categorized according to the functionalities provided.

2.2 State-of-the-Art

2.2.1 Introduction

The aim of this section is to identify and address work which can be studied and used in support of activities to be carried out during *SmartGov.* Each reference contains the name of the project, and an abstract including the aim and scope. More detailed information can be obtained navigating through their specific web sites [4-14].

An investigation through different sources of information (the majority of them accesible via Internet) has been carried out in order to discover other research projects that have to do with knowledge management and public administration, key issues in the *SmartGov* project. Having this in mind the first place to look was the EU projects that deal with aspects of knowledge management in e-government. A number of projects were reviewed and a short description of the ones that were considered to be useful to investigate is presented here. Furthermore other relevant EU and non-EU research projects are also presented in this section.

2.2.2 Knowledge Management projects

PUMA (Public Management and Governance)

This project is developed into the framework of the *OECD (Organization for economic co-operation and development)* program. Under the *OECD*, there is a key action named *Public Management Service (PUMA)*[1] that specifically focuses on the study of how member countries are implementing e-government and introducing knowledge management techniques in the public sector, and the impact that these developments will have on the shape of government in the future.

Knowledge management can provide an opportunity for improved governance, with increased transparency and more informed decision making. To take advantage of this opportunity, governments will have to give a special attention to the governance of knowledge, so that the following matters of interest are addressed:

- *Getting the right information*: reviewing the governance arrangements of agencies or institutes providing data and statistics, and reviewing processes driving the gathering of data and statistics.
- *Providing the right information*: reviewing the arrangements protecting privacy; and ensuring that institutional arrangements prevent, as much as possible, the misuse of this information for political purposes.

Furthermore, the public sector has a crucial role to play in promoting the production, use and transfer of knowledge at a social level, and therefore this program also embraces the following subjects:

- Setting the basic rules of knowledge production, transfer and use in order to find the right balance between the necessity of promoting both innovation and equal access to knowledge (intellectual property rights).

[1] http://www.oecd.org Consulted 6th May 2002

- Providing knowledge unlikely to be provided by private firms, e.g. research on rare diseases, basic research, research on long term environmental trends, etc.
- Constructing information highways.

And finally, the content and structure of education provided in public organizations or within the framework set by the public sector will be of increasing importance.

HYPERKNOWLEDGE (Hypermedia and Pattern Based Knowledge Management for Smart Organizations)[2]

"*Hyperknowledge*" aims at two kinds of objectives: the improvement of work practices through participatory business modeling, as well as exploiting knowledge in support of organizational activities, in the spirit of "smart" organizations. It should be noticed that knowledge representation, exchange and distribution issues, and business process modeling aspects may be relevant or useful for different *SmartGov* activities. All the knowledge will be represented in the form of *hypermedia* (hypertext and multimedia), and will be exchange and distributed as corporate knowledge through the intranet. Therefore the proposed tool supports modeling and representing this kind of knowledge actively and allows to the knowledge to be easily "published" through web technology in the respective intranets. Moreover one of the major goals is the customization and validation of *Hyperknowledge* technologies in the real-world environment prior to commercialization, so that the *city of Riga, Latvia*, will test use it for improving its management processes.

LORE (Leveraging Operational Resource Expertise)[3]

The project proposes to deliver an *Integratde Knowledge Management Technology* and *Human Resource Management System* to exploit Human and Knowledge Capital Value. The system will integrate people competencies, processes, projects, document information and financial data in a common Knowledge portal in order to enhance the team work inside the enterprise. It recommends a revision of the complete knowledge framework. Furthermore, it will facilitate automated corporate knowledge sharing through a dynamic taxonomy and a linguistic analysis of the documents and the people competencies. The LORE project also proposes an interesting integrated architecture at four levels: K-Base, K-Portal, K-Map supported by linguistic tools and information retrieval system.

[2] http://www.hyperknowledge.com ; Project IST-2000-28401 Consulted 6th May 2002

[3] http://lore.cezannesw.com ; Project IST-1999-12345 Consulted 6th May 2002

MILK (Multimedia Interaction for Learning and Knowing)[4]

The goal of the MILK project is to develop a knowledge management solution for web-oriented multimedia companies and e-commerce service providers, which integrates technological, organizational and business aspects for typical work situations of knowledge workers distributed over space and time. Thus many issues concerning the empowerment of knowledge workers can be found, including methods, processes and transaction services which can be valid and applicable for Public Administration services. MILK will provide users with a smooth flow of knowledge through different work-situations: the MILK system will be accessible from PCs, social spaces and remote working spaces (mobile phones, PDAs...), supporting mobile work situations. MILK will also develop methods and tools fostering KM processes within organizations, in particular for those organizations that are introducing e-business working models.

ASSIST (Knowledge Management for Help Desk Operators)[5]

The ASSIST project focuses on the needs of large organizations operating help desks for providing their operators, especially remote workers, with knowledge management facilities. Like *SmartGov*, this project combines innovative technologies such as XML-based knowledge representation, advanced user interfaces and integration of knowledge management with operations performance measurement. Moreover the ASSIST solution will be validated in Telecommunication and Postal services.

RIMSAT (Remote Intelligent Management Support and Training)[6]

Our principal interest in this project is the inclusion of a process to measure the impact of knowledge management on the effectiveness of the decisions taken by an organization in dealing with safety-critical situations.

[4] Project IST-2001-33165

[5] http://www.assistknowledge.com; Project IST-1999-10934 Consulted 6th May 2002

[6] http://www.kaidara.com; Project IST-2000-2865 Consulted 6th May 2002

E-COGNOS (Methodology, tools and architectures for electronic consistent knowledge management across projects and between enterprises in the construction domain)[7].

This project aims at specifying and developing an open model-based infrastructure and a set of tools that promote consistent knowledge management within collaborative construction environments. The analysis of the semantics within and across documents will lead onto the development of ontologies and adaptive mechanisms that can organize documents according to their contents and interdependencies. The web-based infrastructure will provide services to create, capture, index, retrieve and disseminate knowledge. These latter issues can be considered for the design and implementation of knowledge base repository transaction base services in *SmartGov*.

THINKCREATIVE (Thinking network of experts on emerging smart organizations)[8]

"Think Creative" aims at establishing a working group to act as European advisory group in the area of smart and emerging organizations in the framework of the "knowledge and skills economy". The general goal is to identify and characterize the emerging organizational forms, the required infrastructures, modeling and application tools, and socio-organizational needs for the next years. Several issues can have to do with *SmartGov,* such as the new relationships between people and organizations, and the identification of training requirements and social needs related to public transaction services.

ACKNOWNET (Active Knowledge Manager using Dynamic Self-Modifying Knowledge Models)[9]

This project proposes an innovative and notable solution for the capture, integration, management and deployment of knowledge. The solution will support cooperation, workflow management and coordinated planning across extended and virtual organizations enabling pieces of knowledge arriving form different domains and expressed in different forms to interact with and enrich each other.

KM FORUM (European Knowledge Management Forum)[10]

[7] http://www.e-cognos.org ; Project IST-2000-28671 Consulted 6th May 2002

[8] http://www.thinkcreative.org; Project IST-2000-29478 Consulted 6th May 2002

[9] http://www.acknownet.co.il/; Project IST-2001-32533 Consulted 6th May 2002

The European KM Forum strives to build up a KM community in Europe to support and identify commonality in KM terminology, application and implementation. There is one main focus on standardization of KM application and implementation approaches and to create wide acceptance for these approaches by the community that can be applied or at least taken into account in *SmartGov*.

2.3 Off-the-Shelf Products

2.3.1 Introduction

This section will focus on the study of off-the-shelf products that have to do with knowledge management in the context of the Public Administrations. Knowledge management is a discipline that integrates business processes and strategy, cultural values, and technologies. Any existing business or administrative function becomes a knowledge intensive activity, and the components of a knowledge solution will be a key enabler of the line of business operation or function [15-17].

A wide range of technologies supports knowledge workers' functions and activities and vendors are entering knowledge management from many directions. Functionality can be provided by standalone products or components (such as taxonomy builders or categorization tools), or embedded into product suites as extended functional modules. Therefore according to different views from knowledge management experts [18-22], we can state that software manufacturers are adopting different approaches to knowledge management aligned with their business strategies and policies:

- The strategy of large scale portal, application and development software vendors such as *IBM-Lotus, Microsoft* and *Oracle* is to acquire, integrate and build knowledge management functions and tools on their standard application suites and development environments. As Gartner predicts, the strategy of portal vendors (such as *iPlanet, IBM Websphere, SAP Portals, or Plumtree*) is to offer a "unification platform in which all constituent users of the enterprise will be able to access information and knowledge assets of the enterprise from whatever device they choose". The first products conforming to Gartner's third generation portal technology is planned for introduction to the market in 2002.
- On the other hand the specialists providing EDM (*Electronic Document Management*), CM (*Content Management*), HRM (*Human Resource Management*), CRM (*Customer Relationship Management*), and ERP (*Enterprise Resource Planning*) solutions have recognized the opportunity to extend their product functionality with embedded modules to manage the knowledge around the core processes and functions. *SAP, PeopleSoft, Siebel, Documentum,* and *Filenet* belong to this category of products.

[10] http://www.knowledgeboard.com/; Project IST-2000-26393 Consulted 6th May 2002

- A third group of knowledge software providers is composed of vendors focused on specialized tools oriented to support specific knowledge activities. For instance, search engines and internet robots to facilitates the acquisition of knowledge from internal and external web sources, or synchronous communication tools to enable the exchange of tacit knowledge between experts. *Convera, Verity, Autonomy*, and *Semio* belongs to this group.
- And finally there is a fourth group of vendors which provides knowledge management frameworks aimed to integrate a set of tools that support the complete knowledge life cycle, thus covering the whole process of knowledge from its production up to its use. As an example, to this category belongs *Meta4 Knownet*[11] and *Knownet*[12]

Hereafter this section provides an overview of outstanding products concerning the latter groups of vendors. Instead of using the above classification criteria by vendor strategy, we have preferred to organize and present the analyzed products based on functional criteria. The majority of experts (*Gartner, Ovum, Doculabs or Delphi*) and market players manage a list of common knowledge management tools, functionalities and capabilities so that we have proposed the following basic functional framework in which to group and characterize the products:

- Content management.
- Search and retrieval.
- Categorization.
- Collaboration and communication.
- Taxonomies, ontologies and knowledge maps.
- Learning management.
- Knowledge management frameworks and portal technology

It is necessary to refer to business intelligence when writing about knowledge management. There is a great deal of confusion in the marketplace about knowledge management and business intelligence. In some cases they are equated:

- Business intelligence enables end users to access primarily structured data.
- Knowledge management has to do primarily with unstructured content (codified knowledge).

They share the goals of enabling the timely delivery of information: ”the right information”, to “the right people” and “at the right time”. Over time, business intelligence will be extended to access unstructured (this can be seen happening in the enterprise information portal segment), and will enable information sharing and collaboration by tracking who access it and how.

The next sections will describe in detail the main features and functions that make up

[11] http://www.meta4.com Consulted 8th May 2002

[12] http://www.know-net.org Consulted 8th May 2002

each category. Additionally several outstanding products are presented as examples.

2.3.2 Content management

2.3.2.1 Definition and characteristics

The management of explicit (codified) knowledge has to provide easy and quick access to different sources of structured and unstructured corporate information (file servers, data and document repositories, Intranets, web servers,...), multiple types of formats (text files, multimedia files, web pages, e-mail, office documents, XML files,...). *Content Management* (CM) is a new market and product area focusing on the timely and personalized automated delivery of all media types to users from corporate distributed repositories, in a process-oriented way and integrating a lifecycle content model. CM embraces and competes with *Electronic Document Management (EDM)*, *Information Retrieval (IR)*, and *Enterprise Intranet Portals (EIPs)* technologies. Nevertheless CM address specific needs regarding content delivery issues, such as:

- The provision of timely knowledge and information avoiding the webmaster bottleneck.
- The need to manage the codified and archived experience and best practices of citizen and civil servants.
- The requirement for delivering knowledge contents to multiple output channels in a personalized way.
- And additionally e-government organizations want to leverage a common infrastructure to manage their corporate contents instead of deploying independent or separate content management systems for different applications.

The use of content management systems to manage the web-site publishing cycle [23] tend to avoid the "Webmaster bottleneck" by automating manual tasks and otherwise distributing workload. A web content management systems must include most or all of the following key additional features:

a) *Web-based publishing*. Documents and other forms of information can be disseminated by authorized users with the aid of page templates and wizards producing higher-quality information. Intranet, extranet, and Internet sites can also automatically be co-ordinated for multiple destinations.

b) *Rendition formats management*. Authoring formats (raster, vector, or office document formats) can automatically be converted into common rendition formats suitable for Web access such as HTML or PDF that are more easily used.

c) *Authoring and revision control*. Changes to published documents must be traced so that the system can guarantee access to the last updated version, and also the restoring of previous versions.

More generally [24-27] a CM system embraces the following functions and capabilities:

- **Library Services.** CM includes library services to support key document management functions, such as: check-in and check-out, version control, audit trails, document histories, composition of virtual documents (documents related with other documents), and rendition support. The latter is the ability to dynamically convert and view a document through a standard format like PDF, avoiding the use of the authoring tool not always available at the user desktop.
- **Process Management and Workflow.** Much of the content that government organizations need to provide to citizens, civil servants or business companies, is produced during a business process. CM systems must collaborate on the creation and reuse of knowledge and provide some workflow functionality (ad-hoc, and administrative or production routing) to streamline editing, authoring and publishing processes.
- **Publishing**: This is the ability to deliver a document copy, rendered or in original format, to a unique repository location. All items published must be managed by the CM system. Advanced integration should support web content management capabilities, such as personalization, subscription and advanced searches across heterogeneous repositories.
- **Replication Services.** Replication facilities are usually used to balance the access to one single document in several replicated repositories managed by the CM system. This practice speeds the retrieval of the document as if it was stored locally. This must be completely transparent to the end-user.
- **Security functions**. CM systems should also provide multiple levels of security for documents based on system user roles, access control list, etc.
- **System Administration services.** The management and maintenance of user roles, access control, content repositories, archive media, performance monitoring, etc, are critical as in any other type of information system and must be robust and scalable.
- **Industry Standards**. An open CM system must adhere to industry standards, such as hardware and operating system platforms, databases, connectivity, protocols, document formats, etc. and specific document management standards such as *ODMA* or *WebDAV*.

As with knowledge management, content management is only a means to an end. An effective content management system must support the knowledge life cycle activities relating to specific business processes The process of knowledge sharing becomes profitable for the business strategy when the "right content" is delivered to the "right people" at the "right time". But organisations have to cope with multiple difficulties for deploying their content strategy:

- Cultural boundaries and barriers may arise in large the organizations in terms of number of employees and organizational units, and many geographic locations.

Today critical content can also exist in a wide range of new formats such as graphics, audio, video, and engineering diagrams which are in general much more difficult to manage.

CM implies the integration of business process with many different types of content. In order to do this CM integrates imaging, electronic document management and workflow technologies. It is common that each of these functional components uses a relational database to store the metadata and process descriptors. To ensure a suitable system performance and scalability a CM system should provide robust solutions on the following requirements:

- The deployment of multiple servers, multiple services and multiple libraries.
- The multithreading of CPU activity.
- The ability to configure high availability servers.
- The support of standard access to databases (ODBC or similar).

2.3.2.2 Documentum

Documentum[13] [28] is a public company with a long history in the EDMS software market. Now it has transitioned its DM product to support CM. *Documentum* has four targeted solutions for content management and delivery accessing the same core architecture and services. They are oriented to support specific market sectors such as finance, automotive, health care, high tech manufacturing, and telecommunications. It provides a powerful workflow and life cycle management embedded tool and strong performance enhancement features, including load balancing and high reliability features including fault tolerance.

2.3.2.3 Vignette V/5

Vignette[14] is a rapidly growing company with excellent market perception. It provides components in an open framework around XCM (*eXtended Content Management*). Their workflow capabilities are limited to serial routing, not supporting complex rules. *Vignette* takes a horizontal approach to the market. It is a good solution to centralized content control and storage, with a robust API and high reliability features (load balancing and fault tolerance).

2.3.2.4 FileNet (Panagon 2000)

Panagon[15] is a comprehensive approach to CM, bringing together FileNET's market-leading image- and workflow-centric components, and its document-centric technology, enhanced by a new layer of Web-focused publication. The PWP

[13] http://www.documentum.com/ Consulted 8th May 2002

[14] http://www.vignette.com/ Consulted 8th May 2002

[15] http://www.filenet.com/ Consulted 8th May 2002

(*Panagon Web Publisher*) module helps in the creation and authoring process. The rendering process defines the appearance of the content on the Web pages. PWP does not provide facilities for designing Web pages beyond this.

2.3.2.5 BroadVision One-to-One Publisher

BroadVision[16] is a public company founded on Internet technologies adding content management through acquisition of *Interleaf*. *BroadVision* takes a business application approach – providing packaged solutions. This product is targeted to vertical sell-side applications, marketplace applications, and employee self-service. It provides a graphical workflow and strong auditing capabilities.

2.3.2.6 Open Market Content Server

Open Market is a publicly traded company. Its content server module is positioned as a product that drives content-centric eBusiness applications that manage interactions between visitors, customers, and partners[17]. *Open Market* is focused on the media and financial Services markets and has a complete suite with a mix of packaged and integrated applications, including robust personalization services, and workflow capabilities without graphical design support.

2.3.3 Search and retrieval

2.3.3.1 Definition and characteristics

Knowledge management implies a considerable amount of information in different formats. This growing volume of information has to be kept under control, and at the same time the storage and access to this information has to be completed in such a way that the end-users are able to work with it.

By using automated capturing, categorization and indexing, organizations can create measurable benefits on different levels (quality, time and cost). Indexing applies in retrieving unstructured data (text based documents), internal (corporate sources) and external (web sources) making use of internet robots or "*web spiders*".

Online information providers in any industry will benefit tremendously from the new class of search technologies available today. The premium nature of general-purpose, as well as specialized, paid-information services rapidly growing in popularity on the Internet today demands extended search capabilities. To meet customer demands, this new class of search technologies should meet the following requirements:

- **Concept Searching:** People think in terms of concepts, not keywords, and their searches are often exploratory in nature. When online users perform a

[16] http://www.broadvision.com/ Consulted 8th May 2002

[17] http://www.openmarket.com/ Consulted 8th May 2002

search, they do not want to have to predetermine what the "right" keywords will be or learn what the wrong ones are after numerous fruitless searches. Instead, they want to enter a concept that the search technology will intelligently recognize, make intelligent assumptions about, and return accurate results.

- **Pattern or "Fuzzy" Searching:** In the world of online customer searching, misspellings are a common occurrence. Making matters worse, there may be many ways to spell a customer query. There are words that can be spelled in more than one way. Hybrid, premium search technologies are inherently fault tolerant, compensating for misspellings, spelling variations and even OCR errors. Common boolean search engines cannot offer this kind of sophistication.

- **Natural Language Querying:** Online users today form a diverse population with varying skill levels and knowledge of content, and it is difficult, if not impossible, to provide any kind of online training. Most online users search the way they speak: in natural language. This can, however, lead to inconsistent results. Loosely structured queries can return thousands of hits that are impossible to sift through. Worse, queries that are structured too tightly can overlook important results. What's required is natural language querying: "*Taxes paid in June 2002*." This eliminates the need for operands like *AND, NOR, OR, EITHER, NOT*, slashes, quotes, or algebraic notation. Users can also use idioms like "war between the states" to find information pertaining to "Civil War." In other words, a first-time user can successfully get results right away, without instructions.

- **Support for Hundreds of Data Types:** While simple text on html-formatted pages is by far the most common data format in online databases and services, the amount of other data types is growing rapidly. Video files, pictures and images, relational database tables, sound, e-mail, formatted text, PDF files, presentations and hundreds of other data formats are in use today. Modern search tools need to be able to scour all types of data simultaneously. Although many searches are text-based, search and retrieval technology needs to filter and accommodate different asset formats. In the very near future, users will demand to be able to search all these file types in a single query.

- **Hit Highlighting:** Not all query results are self-explanatory. It can be confusing, frustrating and time-consuming trying to determine why a hit was returned and where the relevant material is located. "*Hit highlighting*" helps the user to simplify this process by highlighting keywords containing the intended topic in an accented color to take the user to the most relevant portions of the document. It's an overlooked but crucial detail.

- **Document Summarization:** Like hit highlighting, a quick synopsis before retrieving the entire hit (and perhaps before paying for that hit, if there is an additional fee) helps searchers to locate the requested and targeted information. Although some simpler search tools use simple document summaries, the results can still be lost in virtual "haystacks", high performance search and retrieval technology lists the specific information a user has requested based on the concept search, not the keyword, for instant, easy scanning.

- **Scalability:** One of the barriers that have intimidated many information providers is a concern about scalability. Scalability is more than just fast searching. Rather, it is the ability to maintain search performance even when the demands on the system rise by orders of magnitude. Online services typically have unpredictable numbers of users searching large, heterogeneous document collections, so that the search engine must continue to perform as the number of users and repositories, and the size of the databases increase. Even the growth of multi-media repositories, such as video and image archives, simply ensures that the scale will grow ever larger.

Meeting all of these new online search requirements can be a difficult challenge for currently available search and retrieval technology providers, even the ones claiming to offer premium features such as these.

The future of search and retrieval technology will continue to mature to keep pace with the rapid growth of new content and new formats. Customers will demand not only greater access to new online content, but at increasingly faster speeds and with more accurate results. If their answers are not found within the first half dozen returns, then the user will be lost.

Online knowledge sharing will dominate the corporate, utility, governmental and nonprofit industries into the new millenium. As a critical component of knowledge activities, those public administration institutions which can more quickly and effectively offer their resources to their employees and citizens will have greater chances at success and increased profits.

2.3.3.2 Convera RetrievalWare

Convera[18] (old-named *Excalibur*) is a provider of software products that access, organize and utilize enterprise data, whether it be text based, or even video, audio and image files. The *RetrievalWare* architecture is web based and provides a development API toolkit to integrate search functions. *Convera RetrievalWare* has not only powerful indexing and searching capabilities, but categorization and experts directory tools. Its engine is very reliable and powerful to achieve complex, semantic and pattern (*fuzzy*) searches.

2.3.3.3 Verity Search

Verity[19] is a mature technology company that has evolved over 12 years. *Verity* is more advanced in fuzzy search and effective concept extraction facilities. It includes indexing and filtering tools, and the *Verity Query Language (VQL)* which is used to adapt and deliver fuzzy search and concept extraction. It provides intelligent classification facilities to support a business rules-based approach to information retrieval. Like Convera, the best use of Verity Search is in complex, semantic and pattern (*fuzzy*) searches.

[18] http://www.convera.com/ Consulted 8th May 2002

[19] http://www.verity.com Consulted 8th May 2002

2.3.4 Automatic categorization

2.3.4.1 Definition and characteristics

The model that has been working for most web sites consist of a nice and practical design of the home page including a list of static topic links to help people find the information. But as organizations publish more and more information through their web sites, people require new ways to retrieve information accurately and precisely. Many sites have added search engines to provide people with the opportunity to enter keywords and operands to retrieve more specific information. And recently automatic indexing and categorization methods and tools are making use of analysis techniques based on algorithms and statistics to extract the meaning from any source of text document. These technologies overcome the limitations of conventional full-text indexing and retrieval systems, but create a new logical extension for storage and retrieval.

There are a variety of methods of indexing and categorization of contents: manual indexing, semi-automatic indexing and automatic indexing and categorization. The importance of manual and semi-automatic methods has decreased over the last years because of the growth of unstructured information and the use of multiple channels of access. Automatic categorization and indexing has been designed to cover the entire process of classification. Yet it does not avoid the need for people to work on the tasks of correction, completion and confirmation of all those topics and document items which have not reach the required quality level at the end of the automatic process.

Several methods have been successfully implemented in market products based on the application of "learning" algorithms that make use of neural networks, or the analysis of single words and phrases.

As the amount of online information grows, searching and browsing models of navigating the information through repositories and directories are requested. But the distinction between searching and browsing is significant: while searching is adequate for smaller, well defined collections, browsing is superior for exploring large amounts of information, particularly when you are not exactly sure of what is available.

- When you search, you must know the terms you want to use in advance; you cannot easily see what is in the collection before you start the search.
- When you browse, you can navigate through a directory that represents the content of the collection. You can use a search to locate a specific part of the directory, and then navigate up or down through the links.

Browsing is becoming increasingly important for online sites. The Yahoo! site itself is a browseable directory. Excite added browsing to its search engine capabilities, and now 60% of its traffic browses its directories instead of searching.

To enable browsing on a site, it is necessary to create and maintain a directory of topics and content. This is where the esoteric skills of knowledge classification come

into play. Creating a good site directory is more difficult than just thinking up a few key categories. A good site topic directory has the following requirements:

- An adequate coverage of topics in the collection.
- Documents linked to the directory structure.
- Adequate cross-referencing or linking to help people find what they need.
- Integrated content from multiple sources.
- Maintenance that is not cost prohibitive in either time or people resources.

Indexing and categorization methods and tools needs at least the following common characteristics:

- Aggregate and organize all internal (documents, emails, presentations…) and external (news feeds, websites) sources of information into easy-to-navigate directories or other structured repositories.
- Index, categorize and tag all documents (presentations, articles, web pages,...).
- Insert hypertext links to other relevant material.
- Access relevant information based upon natural language queries.
- Profile users based on their knowledge or competences or behaviour.
- Route information to those most likely to be interested.

2.3.4.2 Autonomy Knowledge Server

Autonomy Knowledge Server[20] provides a fully automated and precise means of categorizing, cross-referencing and presenting information, eliminating or reducing the need for any manual processing. The *Query Engine* module provides the capability for searching in natural language. The best feature is its easy-to-use categorizing capabilities. It is no longer necessary to manually categorize or tag documents. All that is required is to identify examples of documents within specified categories and *Autonomy Server* will determine automatically how and where new documents will best fit, and then categorize them accordingly.

2.3.4.3 Semio Taxonomy

Semio Taxonomy[21] creates browseable, searchable directories of text-based information from a wide variety of sources. It automates the process of directory creation and maintenance by using the source text itself to drive directory creation. A taxonomy directory gives users fast access to the information they need and reduces the costs of site development and maintenance.

Semio builds a taxonomy based on the content itself, not on predefined notions of what the documents may contain. This ensures that the directory adequately covers

[20] http://www.autonomy.com/ Consulted 8th May 2002

[21] http://www.semio.com/ Consulted 8th May 2002

the topics in the source documents. *Semio* builds a database of the interrelationships of the taxonomy concepts, which can be used by the client software to display a map or taxonomy, or by other applications through an XML interface.

2.3.5 Collaboration and communication tools (groupware)

Habitually members of a single work team may not be located in the same building. The Internet is creating more and more opportunities for spread-out organizations to link employees together to share and meet common goals. Collaboration and communication tools incorporate a wide range of emerging digital technologies such as instant messaging and real-time conferencing.

Groupware is an umbrella term describing the electronic technologies that support person to person collaboration. *Groupware* includes facilities such as e-mail, electronic meeting systems, video conferencing, ad-hoc workflow, non real-time data conferences, group calendaring and scheduling, and collaborative applications.

2.3.5.1 Lotus Domino

Domino integrated application services provide a platform for rapid delivery of collaborative applications. Built-in connection services provide live access to leading relational databases, transaction systems and ERP applications. And it is possible to use leading third party Web development tools along with the Domino integrated development environment.

Lotus[22] brings web applications capabilities such as real-time collaboration with instant messaging and application sharing, threaded discussions, document libraries, virtual meeting rooms, and ad-hoc workflow management. It can be extended with some other *Lotus/IBM* products in order to improve its collaborative capabilities (*Sametime, QuickPlace, LearningSpace, Domino.Doc, Workflow, Mobile Services*,...). And it offers one of the industry's most comprehensive support for internet messaging standards, with internet addressing (SMTP, MIME, SSL, POP3, LDAP, HTTP, HTML, etc).

2.3.5.2 Microsoft Exchange

Exchange[23] *2000* is a messaging tool, but at the same time is a powerful infrastructure for creating, storing, and sharing knowledge and information, as well as tools for acting on that information with speed and intelligence. For rapid application development, *Exchange 2000* delivers built-in services such as calendaring, contact and task management, discussion groups, and document-centric workflow as well as support for web-standard protocols, including XML and HTTP.

Exchange has *Instant Messaging*, *Presence Information* and *Chat Services* capabilities. It can be extended with *Real-time Conferencing* capabilities (video, voice

[22] http://www.lotus.com Consulted 8th May 2002

[23] http://www.microsoft.com/exchange Consulted 8th May 2002

and data conferencing, conferencing management and conferencing multi-client support) using the Exchange Real Time Conference Server.

2.3.6 Ontologies, taxonomies, and k-maps

An **ontology** could be defined as "an explicit formal specification of how to represent the objects, concepts and other entities that are assumed to exist in some area of interest and the relationships that hold among them". This notion has been first introduced by philosophers to define "a systematic account of Existence". In knowledge management, the term ontology is used to point out a structuring of knowledge about things by categorizing them according to their essential (or at least relevant and/or cognitive) qualities. These entities could be represented by a hierarchy or by a graph (semantic network).

Retrieval techniques rely on ontologies to support the document searching process. A specific engine tries to match a query formulated by a user to specific annotations linked to archived documents, in order to establish the most relevant list of documents. On one side, it supposes that documents have been annotated using the reference ontology. On the other side the user needs to refer to the same ontological terms to formulate his query; this difficulty could be avoided by using specific translating mechanisms that enable a user to refer to concept through a list of terms.

A **taxonomy** is defined as a set of ordered groups or categories. Taxonomies were developed initially in biology and other sciences to classify plants, animals, and other organisms into consistent groupings for study.

The enterprise taxonomy - called the **K-map -** includes comprehensive categorizations of information and associated expertise within an organization. Taxonomies offer clear benefits to businesses, government agencies, and academic institutions. They can define a common vocabulary and serve as a navigational aid to finding important information and expertise. They can unify legacy and new information systems by providing a navigational and hierarchical method of browsing and locating all relevant content. And they can make information available to everyone within an organization who needs it. However, in the past the manual creation of taxonomies was a time-consuming, expensive, labor-intensive, and often frustrating challenge.

There are a wide range of products that enable the creation and maintenance of ontologies and taxonomies. Most of these products have been recently developed and consequently they are in the first stages of use in the market:

2.3.6.1 Ontobuilder

Corporum Ontobuilder[24] is a knowledge management tool that serves for the creation and maintenance of ontologies and taxonomies providing a powerful graphical user interface to help domain experts in the knowledge map building process. One of the major advantages of *Ontobuilder* is its ability to provide a collaborative framework for user groups in the process of generation and maintenance of ontologies. The

[24] http://ontoserver.cognit.no/ Consulted 8th May 2002

product is also based on the XOL (*XML based Ontology Exchange Language*) specification.

2.3.7 Learning management

E-learning is essentially the delivery of training or education via some electronic medium: CD-ROM, web-based or others. Although e-learning has been around for decades, it has been in the last years that this fledgling industry has seen exponential growth, mainly because of the commercialization of the Internet.

Recently, e-learning industry analysts and professionals have come to categorize the market into three component groups: technology, content, and services. Each of these categories is as critical and vital for an organization wishing to implement e-learning across its enterprise.

- *Technology* is the engine that is driving much of the e-learning revolution and is constantly evolving. There are two core e-learning product families:

- *Learning Management Systems* act as libraries that house and control books, delivering electronic web-based courses to the learner, tracking student interactions with the courses, and providing reporting and evaluation.
- *Courseware authoring applications* are intended for developing courses that are accessed and taken by learners. The most important features include ease of use, template-driven development for rapid courseware design, and components that allow for, and encourage sound elements of instructional design to be built into the final product.

- *Contents* of the courses, that can be purchased from companies that create off-the-shelf courseware or created by the organization.
- And *services*. This is the most critical aspect that has to do with the success of integrating and deploying a successful *e-learning* initiative.

2.3.7.1 Lotus Learning Space

Lotus LearningSpace, the key technology of *IBM Mindspan Solutions*, delivers a flexible enterprise-wide learning platform capable of achieving significant business results. The family includes two separate products[25]:

- *Lotus LearningSpace Forum* is a *Lotus Domino*-based e-learning solution with database replication for an easy deployment. The environment allows disconnected use, threaded discussion, and document sharing to provide user flexibility and collaboration.
- *Lotus LearningSpace* is a flexible, standards-based platform for the delivery of all types of e-learning, from generic standards-based training materials to customized courses. *LearningSpace* is a comprehensive learning solution that supports the creation, management, and delivery of all modes of online learning using a variety

[25] http://www.lotus.com Consulted 8th May 2002

of tools or integrating existing materials from a variety of sources. It also makes it possible to administer course catalogs and learner populations, track student activity, and report on and evaluate student progress and the effectiveness of learning programs.

2.3.7.2 Interwise

Interwise[26] ECP is a single platform solution to accelerate knowledge transfer, facilitate skill building, and capture, share and manage information for continuous workforce development. The product allows for getting the right skills to the right people (employees, partners, and suppliers) to quickly solve problems and deploy critical business applications. It is composed for five main modules comprising live interaction, collaboration and learning:

- *iMentoring*, tutoring and consulting. It is ideal for one-on-one, or small group tutoring and counseling sessions, previously scheduled or set on-demand.
- *iMeeting* for small group meetings and videoconferences. Easily set up ad-hoc one-to-one-on-small group meetings.
- *iClass* provides for conceptual or skills-building classes. These moderator-led *eLearning* events are live and highly interactive. It is perfect for facilitating skills and knowledge transfer.
- *iSeminar* for online seminars to hundreds. This mode enables seminar-style delivery and interaction online. It is an excellent medium for disseminating media-rich content to large groups when minimal levels of interaction are needed.
- *iCast* live or on-demand broadcasts to thousands. This online "broadcast" mode enables consistent, simultaneous communications and information sharing with thousands of participants where little or no participant response is required. Ideal for product launches and updates, competitive updates, "town hall" broadcasts, etc.

2.3.7.3 Blackboard

Blackboard[27] offers a complete suite of enterprise software products and services that power a total “e-Education Infrastructure” for business schools, colleges, universities, and other education providers. Blackboard solutions deliver online teaching and learning, campus communities, auxiliary services, and integration of Web-enabled student services and back office systems. The family includes three separate products.

[26] http://www.interwise.com/europe/solutions/elearningsolutions.asp Consulted 5th Ago 2002

[27] http://www.blackboard.com Consulted 5th Ago 2002

- The *Blackboard Learning System* is a Web-based server software platform that offers industry-leading course management, an open architecture for customization and interoperability, and a scalable design that allows for integration with student information systems and authentication protocols.
- *Blackboard Community Portal System* features a highly customizable community portal environment that unifies academics, commerce, communities, and administrative services online through one integrated interface. This advanced functionality is backed by a sophisticated product architecture that runs on relational databases and can be scaled to support tens of thousands of users utilizing a multi-server configuration.
- *Blackboard Transaction System* supplies Web-enabled operation of student identification, dining services, campus commerce, building access, as well as increases in business with off-campus merchants.

2.3.7.4 Luvit

LUVIT[28] offers a product portfolio including all four steps for e-Learning:

Create: makes it possible to create and import web-based education. The system is flexible and follows international standards.

Manage: makes it possible to administrate the education in an effective way.

Run: the Learners and the Teacher interact and communicates. This increases the quality of the education and takes learning to a higher level.

Evaluate. This module provides for a pedagogical support and quality assurance.

Luvit has a full range of education offerings in a variety of formats available for groups and individual learners. You can choose in between different delivery methods; instructor-led (synchronous) on-line courses, workshops or a combination of the two. A series of tracks are available such as teachers/mentors, course developers, administrators, technical support etc to gain the knowledge needed to successfully implement your organisation's solution. Courses and workshops can also be customised to meet your individual business needs.

2.3.7.5 Saba

Saba Learning, Enterprise Edition[29] is an Internet-based LMS that empowers an organisation to manage and deliver all forms of learning. Saba is aimed to:

[28] http://www.luvit.com Consulted 5th Ago 2002

- Assign and track personalised learning plans and certification programs.
- Deliver and manage blended learning experiences.
- Partition the learning catalogue for multiple audiences.
- Optimise use of learning resources such as instructors and classrooms.

The main benefits to affect over the reduce of costs, the optimising of the learning management processes, the efficiently measuring, the competency and certification gaps. It ensures compliance and proof of compliance with regulatory requirements, and align learning with critical business objectives.

2.3.7.6 Docent Enterprise

Docent Enterprise[30] is an integrated suite of business performance management applications enabling companies to embrace change and align people across the extended enterprise. By embedding learning activities and relevant content into every day business processes, individuals can effectively achieve critical results that drive profitability. The family includes the follows separate products.

- *Docent LMS* is a platform that revolutionises the way companies leverage learning and knowledge management to enhance business performance. It delivers robust capabilities in the areas of competency management, global commerce, student registration and tracking, records management, and reporting. It also provides levels of support for any blend of delivery environment: self-paced web, live interactive web, traditional instructor-led courses and documentation.
- *Docent Live*! is an add-on module to *Docent LMS* that provides a web-based environment for real-time communication and collaboration among geographically dispersed individuals and groups. Multiple modes of interaction are supported, including one-to-one mentoring, small group meetings, virtual classrooms, online seminars, and live or on-demand broadcasts to thousands of participants.
- *Docent LCMS* provides a complete environment for creating, managing, assembling, and delivering learning content. Learners access and retain the personalized information they need, when they need it, in the context of their critical business objectives.
- *Docent Exchange* lets subject matter experts create, manage and deliver compelling learning content to the web. Using workflow tailored to the organisation's needs, content is published to a self-service web environment to provide context-driven, personalised delivery. The delivery environment closes the learning loop by enabling learner feedback, assessments and contributions.

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[29] http://www.saba.com Consulted 5th Ago 2002

[30] http://www.docent.com Consulted 5th Ago 2002

- *Docent Peak Performance* is an application module of Docent Enterprise. This enables businesses to establish and communicate critical corporate goals, measure performance, and ensure that individuals and groups at all levels are aligned and working together toward their target business objectives.

2.3.7.7 TopClass e-learning suite

TopClass e-Learning Suite[31] is a powerful web-based training platform that enables easy conversion of existing content, and manages everything from the most basic level of Learning Objects to the highest level of organisational competency. The body of the product is composed for the following modules:

- *TopClass LCMS* is a powerful e-Learning platform that delivers personalised learning, assessment and testing, and built-in asynchronous collaboration.
- *TopClass LMS* provides complete Catalogue and ILT Management functionality. The ability to list any online learning, ILT event and any offline type (Books, CDs, DVDs etc.) enables a one stop shop for all learning in the organisation. Approval workflow processing and waitlist management for streamlines training administration processes.
- *TopClass Competencies* manages an organisations skills and competencies inventory, while users themselves can identify skill gaps and map training programs specific to their competency shortfalls.
- *TopClass Mobile* enables offline delivery for users without a network connection to access learning materials exactly as they would with TopClass, with the same interface, personalized learning, and assessments.
- *TopClass Publisher* enables fast conversion of existing content and powerful course assembly. It allows to create courses using content that can come in the form of Word, PowerPoint, Macromedia Dreamweaver, text, SCORM-compliant content and any HTML documents.
- *TopClass Virtual Classrooms* provides seamless integration with leading live e-Learning providers such as *Centra*, *Interwise*, and *WebEx*, enabling flexibility to choose the virtual classroom solution that best suits the needs.
- *TopClass XML Toolkit* provides everything you need to integrate TopClass with your existing business systems such as Peoplesoft or SAP. Through this integration, state of the art e-learning can become an intrinsic part of your business processes.

[31] http://www.wbtsystems.com Consulted 5th Ago 2002

2.3.7.8 SUN LearnTone

LearnTone[32] helps to manage the critical training processes effectively and efficiently and deliver the most value for the investment. The main functionality, is based on functions of the participants (student, administrator) and the system architecture and others:

- *Students* access *LearnTone* through a simple browser. The student interface can customised for a client's specific needs concerning both functional criteria and look-and-feel. It allows students to create personal learning profiles, enrol in online and classroom courses, take self-paced and live interactive courses and pay for courses using a variety of on-line methods, including credit cards.
- *The administrative* structure of *LearnTone* can adapt to any existing management hierarchy within an organisation's training operation. The software enables administrators to manage course offerings, catalogues and curricula and to track and report student usage across all training modes.
- *Delivery Functions. LearnTone* can deliver courses directly to students on multiple platforms. Students can choose how to approach course material to optimise their learning styles through the asynchronous delivery function or follow along with a more structured, synchronous virtual classroom course.

LearnTone supports a strong XML engine and can interface with existing ERP systems and features JDBC Compliant Databases. These allow for easy integration into any existing IT structure.

2.3.8 Knowledge management frameworks and portal technology

Knowledge management frameworks encompasses and integrates a set of technologies which can increase the speed at which a company can acquire, share and use knowledge to learn what it needs to compete, while reducing time spent on inefficient or unproductive tasks. In order to achieve this goal these environments must be adapted ideally to those business cases and processes that are critical for the success of the organization. In the Knowledge Era, the best-positioned organization is the one that learns faster and more efficiently than its competitors. As individuals interact with their organization, they offer a series of skills, aptitudes, and knowledge that can be collected, indexed and stored, and in particular reused by the rest of the organization

Many of the functions that have been presented separately in the previous section of this document are usually grouped as part of the same product. This is due to the need to combine different types of tools in an integrated environment to provide a complete toolset that supports the different stage of knowledge activities. The level of the integration can vary depending on functional and technical aspects of each component, and the consequences for the end-user are not always visible.

[32] http://suned.sun.com/GB/elearning/lms/ Consulted 5th Ago 2002

Portals are a hot trend in corporate knowledge management because they provide a unique and easy access to enter a broad array of unified resources such as information management services, virtual collaboration workspaces, communication tools and knowledge searching and discovery services. Lower support costs, and increased productivity and effectiveness are the key benefits from a portal implementation[33].

2.3.8.1 Meta4 Knownet

KnowNet is a people and knowledge management environment, comprising a software solution and its associated strategic consulting services[34]. Meta4´s software is designed to capitalize on the knowledge generated around business processes, to facilitate its distribution and reuse, to increase speed of learning and to provide practical management of knowledge in the company. It can identify the knowledge required for a given task and where or from whom it can be obtained. It provides the localization of experts, creates user communities and helps plan for future training or know-how acquisition on detected needs.

KnowNet provides a complete knowledge management infrastructure that is highly scaleable and extensible for customization and integration with e-business applications. The tool helps companies to collect and categorize internal and external information; reuse "*knowledge items*" stored using flexible and customizable *"knowledge Navigators"*, advanced search capabilities (integrating the *Verity* search engine technology), and collaboration facilities via on-line workspaces that allow people to work together from different locations.

2.3.8.2 Siebel ERM

Siebel ERM (Employee Relationship Management) is a part of *Siebel*[35] Universal Application Network, a web-based solution that meets the key objectives of enabling organizations to deploy end-to-end business processes while reducing the cost, complexity, and time of cross-application integration. The Universal Application Network transforms application integration from a complex and expensive technical challenge into the strategic ability to implement customer-facing business processes across and beyond the enterprise.

Siebel ERM supports every stage of the employee life cycle, from date of hire through training, performance management, and retention. From a single application, it provides employees with secured and real-time internal and external information in support of their specific function. Moreover it provides an innovative solution to track and measure individual job performance; to manage online training; to provide a comprehensive employee help desk; to enable employees to conduct self-service activities; and to provide convenient access to any other corporate application and service.

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[33] *List of KM portals*: http://www.kikm.org/portal/KM_portals.html

[34] http://www.meta4.com/ Consulted 8th May 2002

[35] http://www.siebel.com/ Consulted 8th May 2002

Unlike homegrown intranets or disparate toolkit approaches, *Siebel ERM* is a packaged application built on the web-based *Siebel eBusiness Architecture*. Its unified data model, business rules, and single repository enable organizations to provide rich information to employees, partners, customers, and prospects across multiple platforms, languages, and communication vehicles. Finally *Siebel ERM* includes capabilities of personalization, Workflow, Dynamic Page Layout, real-time wireless and disconnected access, and automated application upgrades.

2.3.8.3 Microsoft SharePoint

SharePoint[36] is a portal solution that provides capabilities to find, share, and publish information integrating some of the functions previously presented: searchinge, indexing and categorization, and content management (versioning control, check-in and check-out, document profiling, life cycle management, full integration with Microsoft Office). The *Microsoft* knowledge management strategy also comprises the adoption of the digital dashboard user interface as the standard knowledge desktop. These products support standards like HTML, XML, WebDAV, etc.

2.3.8.4 Lotus Discovery and K-station

Both *Lotus Discovery* and *K-station* have been designed to operate as stand-alone products or as an integrated solution, depending on the needs of an organization. However, the two solutions can combine to provide a common and unique knowledge environment.

Lotus Discovery Server[37] is a solution that probes how an organization can share knowledge and discover the relationships between *people, places*, and *things*. It provides expertise profiling and location; sophisticated content cataloging and retrieval; and comprehensive search and knowledge audits. In other words, it is possible to create a unique knowledge map, of an organization; the "*K-map*" is created through a graphical user interface that presents the catalogued knowledge in an organization providing robust functionality. *Discovery* crawls through structured and unstructured content to extract, organize, and store relevant data, and also can track relevant end user activity.

Lotus K-station[38] is a knowledge portal that organizes content, applications, and people for both individuals and communities:

- Individuals can create *Personal Places* unique to each user. These multi-page places feature customizable "portlets" or windows into users' web sites, applications, back-end systems, search tools, news sources, mail, calendar, and other portals.

[36] http://www.microsoft.com/sharepoint Consulted 8th May 2002

[37] http://www.lotus.com/products/discserver.nsf Consulted 8th May 2002

[38] http://www.lotus.com/products/kstation.nsf Consulted 8th May 2002

- Communities can create *Community Places* or reusable knowledge objects that retain relationships among people, content, activities, and processes relative to a specific task or project.

Individuals and groups can acquire, share and transfer business knowledge. Users and developers can create and personalize web workspaces, increasing their collaboration an communication capabilities.

2.4 Conclusions

This section attempts to sketch out the current situation regarding knowledge management for realizing e-services in the public sector. In this context a number of EU and non-EU funded projects that are relevant to the e-government area and others were presented. Furthermore, research was conducted in order to discover what solutions are commercially available for developing and deploying knowledge management solutions. This research concluded that currently there is a great deal of effort invested by private companies in environments for knowledge management. As a result there are several off-the-shelf products that provide holistic solutions and cover a wide range of features and functionality. These products will be further investigated and evaluated in order for SmartGov to have a good view of the market and thus try to contribute something new and innovative and not “reinvent the wheel”.

3 Development Environment solutions for e-services in the public sector

This chapter presents the review of development environments for e-services in the public sector. It is divided into three sections. The first section focuses on research that is being made in the area of e-government and contains a short description of research projects, EC and non-EC funded, that deal with e-government issues. The second section includes a presentation of commercially available solutions for e-forms development and deployment. A number of them were reviewed and their features and functionality are presented in this section. Finally the chapter finishes with a short presentation of technologies that need to be investigated and evaluated since it was judged that they could be the enablers for implementing the SmartGov development environment.

3.1 State-of-the-Art research

3.1.1 Introduction

An investigation was carried out in order to discover other research projects that are related thematically to the SmartGov project. With this in mind the first place to look was the Smart Government cluster that encompasses all the EU projects that deal with aspects of e-government. A number of projects were reviewed and a short description of the ones that were considered to be useful to investigate is presented here. Furthermore other relevant EU and non-EU research projects are also presented in this section.

3.1.2 Smart Government Cluster projects

FASME (Facilitating administrative services for mobile Europeans): The project aims at facilitating administrative services throughout Europe. Especially administrative processes between different EU countries will be supported as European Citizens and the employees of local administrations have to cope with many different documents in several different national forms. To reach this aim the technology of JavaCards will be used. A JavaCard prototype will be produced which will support the administrative services for one of the scenarios 'change of workplace', 'change of place of living', and 'registration/ cancellation of cards'. The functions of the JavaCard will be based on the user requirements analysed during several workshops to be held with real-life users and citizens from different European countries. Furthermore social and legal aspects of this new technology will be examined.

PACE (Public administration and electronic commerce in Europe): PACE aims to contribute to the growth of the European e-commerce market in the Public Administrations (PA) sector. For this purpose, PACE implements a programme of Integrated Accompanying Measures benefiting PAs, 5FP Projects, Suppliers, and Policy Strategists. PACE seeks to facilitate rapid take-up, implementation and transfer of technologies and know-how gained in the execution of RTD projects as a way to enhance adoption of e-commerce solutions by PAs. PACE’s approach will structure a learning environment that integrates knowledge on trends in technology, the market,

work and business practices, and legal, ethical and socio-economic issues, with training, awareness raising, conferences and other dissemination activities.

AIDA (Advanced interactive digital administrations): AIDA will integrate a technical platform and use this to demonstrate the feasibility of using e-documents within a flexible and secure e-administration environment. E-documents are defined as machine-readable data structures for authentic and legal electronic documents, which can be used nationally and internationally. A general framework for such mutually acceptable e-documents, for administrative purposes will be developed. Trustworthy digital signatures will be fundamental for various next generation services in the digital era. AIDA's WYSIWYS technologies will provide for this need of trust. Acting as an "e-Administration Service Provider", AIDA will contribute to establishing the fundamentals for new models of public service provision.

EUSLAND (European system for local authorities' networking domains): The project will create a flexible and open system for the use of Local and Regional governments, based on a shared knowledge management model. The research system will enable deployment and integration of existing information at local and regional government level, through intelligent supports favouring their provision, semantic classification and exchange. To demonstrate and prepare the exploitation of the system, making use of actual trans-national experiences in need of ICT tools to increment the number and range of participants, the project will create knowledge thematic networks on key European areas for these authorities: financial opportunities through EU programmes; implementation of European legislation at regional level; benchmarking of urban transport solutions among larger cities; employment policies by Local and Regional Authorities; local and regional innovation based on ICT; technology watching. Each information provider or user of the EUSLAND services will become a EUSLAND node.

SAMPLE (Single administrative message for postal services): SAMPLE will specify and develop open-standard procedures and supporting systems for the efficient customs clearance of letter mails and parcels imported into or exported from Europe. The project will also implement and demonstrate these systems during the lifetime of the project, using both conventional (EDIFACT) and emerging technologies such as XML that could, at reasonable cost, facilitate widespread use of the system.

EMPLOY (New employment through innovative tools and services for an efficient/effective European structural funds management): The main aim of EMPLOY is to develop innovative, multimedia and integrated Tools and Services designed to support the Management of the European Structural Funds (EUSF) process, involving local, regional, national and EU administrations as well as SMEs and citizens as the final recipients. Indeed, a more efficient/effective EUSF process is considered essential to create new job opportunities and reduce unemployment. As a consequence, the entire process will be revised (from proposal/funding, to funds provision and monitoring of funds usage) with the involvement of all relevant actors, to achieve the main objectives of producing a cost reduction in the targeted public services.

IMPULSE (Improving public services): The main objective of the project is to facilitate the implantation of new models for provision of general interest services for the citizens, through the `virtual citizens guide´. The chosen approach of the project is a mix of methodological and development tasks:

- to develop a methodology of analysis of the `as is´ situation, internal analysis and external analysis, as well as for the implantation of a `virtual citizens guide´ that is EFQM (European Foundation for Quality Management) compliant
- to develop a set of tools (a “definition module” to define a new model of services for the citizens and a runtime server to implement the defined models)
- to provide a Single Interface for Public Administration: The “virtual citizen guide (VCG)”. VCG furthermore will be a tool to handle the feedback, to supply information, to ease access, to improve contact among the administration and third parties (citizens, institutions, business, etc). All this will be developed on the highest technology, to integrate basic services, located in different Agencies (departments or organisations), in cross-agency common services. Inclusion and mapping of these sub-processes or basic services can be designed dynamically thanks to an innovative solution using a services catalogue.

PRISMA (Providing innovative service models and assessment): PRISMA will contribute directly to the objectives of Key Action I by providing for the first time a comprehensive and systematic analysis of the impact of IST on all aspects of the provision of citizen services, both in relation to each service field covered by Key Action I as well as to important cross-cutting themes. The project will examine fundamental and critical issues and developments, including those which cross between service fields, and put these in the context of socio-economic and technical developments, long-term visions and scenarios, an understanding of how these services are likely to change, and the challenges and opportunities this presents. PRISMA's work will assist Key Action I RTD projects, service providers, policy makers and other stakeholders in exploiting present and future trends. PRISMA will develop into a commercially sustainable set of tools and services covering methods and best practice guidance, scenario and modelling techniques, metrics and evaluation criteria, and socio-economic benchmarking techniques for assessing impacts.

CITATION (Citizen information in smart administrations): The project aims at providing citizens with an intelligent ambience for the provision of governmental services in the administration sector, meeting their needs for customised information delivery and flexible access. CITATION will create an innovative information platform that addresses the needs of both national and non-national citizens for direct access to essential public data (administration, legislation, available services). The CITATION system will provide several innovative features, such as convenience and flexibility in access, intelligent information categorisation, user profiling, customisation of information, multi-functionality and multilinguality. The project draws upon the vast pool of information in healthcare administration and integrates a great variety of services concerning medical and social insurance, specific reimbursement requirements, patient intake procedures, government policies and initiatives on health, family planning etc. Thus it will create "smart" governmental structures.

INFO-CITIZEN (Agent based negotiation for inter- and intra- enterprise coordination employing a European information architecture for public administration) The InfoCITIZEN project aims at establishing a common Enterprise Architecture among the participating EU countries, tested in representative public administration segments; and deploying a distributed, Internet-based information system that supports the above for all actors involved (citizens, administrations,

private sector), building on emerging technologies (e.g. mobile agents, middleware, XML) and solving incompatibilities and complexities that exist today. To achieve this, InfoCITIZEN employs concepts from the fields of public administration, enterprise architectures and systems integration, generic process and data modelling and metadata standards (e.g. XML) in order to classify and organize information regarding a citizen/business oriented process in all participating countries.

3.1.3 Other relevant Research projects

EU Project Information Cities

The Information Cities project models the aggregation and segregation patterns in a virtual world of info-habitants (humans, virtual firms, on-line communities and software agents acting on their behalf). The objective is to capture aggregate patterns of virtual organisation, emerging from the interaction over the emerging information infrastructure, a virtual place where millions (or billions) of info-habitants meet, co-operate and trade: a stable and scalable micro-environment that supports the efficient provision of many e-commerce and personal services, and allows for the continuous creation of new activities and relationships. To investigate conditions of emergence and evolution of Information Cities, we will develop an open multi-agent environment, flexible and adaptive to the dynamic nature of the Information Society.

Project SMARTCITIES

Multi-application Smart cards in Cities. SmartCities will design a dynamic smart card and multi application management architecture to allow targeted markets (mainly middle size European cities) to benefit from the numerous advantages of a smart card environment without being tied to a unique, proprietary application model. SmartCities also aims to prove that the technical and commercial exploitation of multi-owner data sources, gathered from the use of the smart card scheme, is feasible. To achieve these objectives SmartCities will demonstrate the technical feasibility of a plug and play management platform by defining an architecture that can support multi-industry standard interfaces. Associated to this standard architecture, SmartCities will also demonstrate the technical feasibility of dynamic management of application at the card and scheme level. As proof of concept, the solutions will be validated by two demonstrators including all the elements of a full scheme (smart cards, terminals, software tools, data analysis servers).

3.2 Off-the-shelf Products

3.2.1 Introduction

This section deals with the investigation of off-the-shelf products that have to do with e-forms development and deployment. Therefore this section includes a description of features and functionality of five popular solutions for e-forms development. Before presenting the different products found, we introduce here the main features, which characterised each application:

Security Issues

i. Optional Authentication

ii. Verification of e-Forms submission

iii. Digital Signature

iv. TimeStamping

Management of e-Forms

i. Different formats handling (paper-based, html, xml, xsl, pdf, doc…)

ii. Determination of eligible participants (Target Group)

iii. Statistics Generation

iv. e-Forms Tracking

e-Forms Service

i. Possibility to download the form for later submission

ii. Web/e-mail submission

iii. Verification of the submission status

List Of Modules

Administration:

i. e-Forms Designer Tool

ii. e-Forms Process Manager

iii. e-Forms Tracking Tool

iv. e-Forms Statistics Manager

Service:

i. e-Forms Service

3.2.2 eForms Portal Solution from Shana[39]

The Informed eForms Portal solution is designed to solve the eForms management problem. It automates all functional components of eForms management, including the design, deployment and processing of large volumes of forms throughout and beyond the enterprise.

For designing and maintaining forms, the Informed eForms Portal solution includes:

- Informed Designer, Informed's powerful easy-to-use form design application
- Template development services to implement eForms

For deployment of forms throughout and beyond the enterprise, the Informed eForms Portal solution includes:

- Informed Deployment Server, Informed's Internet-based deployment server that offers a single place where form users can search for any form

[39] http://www.shana.com

For forms processing, the Informed eForms Portal solution includes:

- Informed Filler for the desktop (Windows and Macintosh)
- Informed Filler (Web), Informed's 100% thin client, zero administration form client
- Informed training services

3.2.2.1 Informed Designer

Informed Designer is the form design application of the Informed E-Forms Portal solution. It is available for Windows (95, 98, 2000, NT) and Macintosh (PPC). Forms created with Informed Designer work with either Informed's desktop or browser filler. Informed Filler for the desktop runs on Windows (95, 98, 2000, NT) and Macintosh (PPC). Informed Filler for the browser is a Java applet that functions exclusively within the Web browser environment.

Informed form templates are platform neutral and, therefore, can be easily exchanged between platforms without the need to convert or translate.

While creating the visual appearance of the forms, Informed Designer automatically makes them fillable: no database mapping is necessary. Informed Designer allows you to easily add intelligent fill-assistance and configure the integration of forms with other systems in order to prepare them for electronic filling.

As a final step in the design process, forms are "authorized." Form template authorization enables the form designer to "approve" a form template for official use and can virtually eliminate bootlegged forms and their associated costs.

Once a form template is complete, and has been authorized for use, it is deployed to the form users. As a part of the Informed E-Forms Portal solution, the Informed Deployment Server consolidates all forms to a single place. This greatly simplifies the ongoing "deployment" process for the designer and the process of finding particular forms for form users.

Some of the main specifications of the tool are listed below:

- Document Control: platform neutral documents, save form templates in TIFF and PDF file formats, set document privacy classification, create Web form templates.
- Page Control: multiple page form templates, multipart form templates, customizable Page Tabs, precise positioning of drawing area on the page.
- Drawing Environment: complete set of standard and advanced tools for drawing objects.
- Object Appearance: complete set of tools for designing objects appearance: fonts, text, buttons, etc.
- Manipulating Objects: duplicating, aligning, resizing, grouping, drag & drop, etc.
- Data Entry tools.

- Data Intelligence: signature cells, different data type cells, any kind of form objects (radio button, checkbox, etc.), set cells as optional, recommended or required; configure buttons to trigger direct jumps to specific cells
- Cross-Platform Scripting: JavaScript scripting language.
- Importing Artwork & Text.
- Printing.
- E-Mail / Routing.
- Digital Signatures: Plug-in support for signing services, configure data signature cells to sign one or more cells on the form, supported across multiple platforms, etc.
- Database Access.
- Content Management: store and retrieve form template documents in the Panagon library.
- Number Serving.
- Revision Control: store distributed templates at multiple distribution centres, etc.
- Tracking: track the sender, recipient, date and time that the form was mailed
- Internet: create forms for use with the Informed Filler (Web) applet, so your forms can be filled out within any Java capable browser, HTTPS support, etc.

3.2.2.2 Informed Deployment Server

Designed exclusively for the modern Web platform, the Informed Deployment Server provides a scalable solution that automates form deployment in the large enterprise. It acts as a central point of contact for all forms and enables easy browsing, searching and initiating of forms. Both Informed Designer and Informed Filler are tightly integrated with the Informed Deployment Server, thereby streamlining the deployment process for form designers as well as the form user experience for finding and initiating forms.

The Informed Deployment Server works with Microsoft IIS (Web server) on Windows NT 4. It can share the Web services of your existing Web server or you can install it on an independent server that is dedicated to the forms portal function. Included with the Informed Deployment Server are several professional service components to help you with the customization and implementation of the solution.

The Informed Deployment Server appears to the form user as the Informed E-Forms Portal. Accessed exclusively through the standard Web browser, it provides easy navigation and access to the browse, search, and initiate functions. It also provides for deployment of e-forms based on both Informed and non-Informed form clients in a vendor-neutral platform that has essentially unlimited reach. The form user's view is based on XML and is customized using XSL style sheets, and accessing a specific form is a single click step. Forms configured to use Informed's browser filler will invoke a new browser window, whereas forms that work with Informed Filler for the desktop (or another desktop application) will invoke the browser helper application.

Detailed specifications are summarized below:

Product Components: Deployment Server based on Microsoft ISAPI architecture, built-in database for storage of template properties.

- Customizable Service Components.
- Design & Deployment: automatic or manual deployment, direct distribution between Informed Designer and Deployment Server via the HTTP protocol.
- Catalog Services: single central point of contact for all form-centric processes throughout the enterprise, users view and search all catalog services through a standard Web browser.
- Processing: On-line forms can be provided for use with desktop application software and/or with thin in-browser form software.
- Revision Control: automatically propagates new template revisions to local end-user template caches
- Server Utilities: regeneration of damaged catalogs, purging of incomplete documents.

3.2.2.3 Informed Filler (web)

The Web version of Informed Filler brings the benefits of Informed e-forms to the modern Web platform, offering in-the-browser filling of highly intelligent, highly interactive, visually appealing e-forms. Like Informed's desktop filler, Informed Filler (Web) provides a robust feature set, including the ability to fill, sign, send, submit and print forms, all from within the Web browser environment.

Based on Sun Microsystems' Java technology, Informed's Web Filler is a truly "thin," or zero-administration, form client that requires only a Java-capable Web browser on the form user's computer. With no additional software installation, configuration or maintenance necessary, client maintenance costs are virtually zero.

Informed's Web Filler includes built-in integration with FileNET's content management software via Panagon Web Services. Utilize Panagon's enterprise-strength document services to store and retrieve forms and gain the benefits of strong document lifecycle management — no Active Server Page (ASP) or other server side scripting required. Informed and Panagon, together, merge fully functional e-forms with enterprise-strength content management, all delivered to the form user via the standard Web browser.

Informed's Web Filler is a pre-compiled Java applet (no Java programming or Java compiler required) that allows the Web browser user to fill out any form created with Informed Designer. Once you have designed a form with Informed Designer, you have the option to deploy it for use with either the desktop or Web version of Informed Filler (or both), making it easy to support a broad variety of users with different profiles and requirements.

This ubiquitous support makes Informed's Web Filler the ideal means of deploying forms internally, and to business partners, customers and the general public. Form users around the world can fill out and process forms without the need to install or configure any software other than a standard Java-capable Web browser.

Detailed Specifications:

- XML
- Drawing Environment through Informed Designer.
- Page Control.
- Data Formatting: cell types including text, character masks, date, time, number, Boolean (checkbox and radio button), picture and signature.
- Data Intelligence and Data Entry.
- Action and Triggers.
- Deployment.
- Printing.
- E-Mail.
- Digital Signatures: support for Entrust digital signatures using the Entrust Java Toolkit v5.0 (v3.0 Informed Filler does not support older versions of the Entrust Java Toolkit).
- Security: support for proxy settings as set in the browser and HTTPS.
- Database and Web Server Access.
- Content Management: add, check-in, check-out and cancel check-out of data documents in a Panagon library from within Informed Filler (Web).
- Prefill Web Forms

3.2.3 OneForm Designer Plus[40]

Windows-based software for the creation of electronic and Internet forms. Includes business forms composition features from MECCA III for the design of multi-part, multi-color paper business forms. New Stationery Option simplifies the development of Online Internet Order Forms.

- Capabilities to Produce Paper, Electronic, and Internet Forms
- Convert the Paper Forms to Electronic and/or Internet Forms
- Powerful desktop PC's are widely deployed, color graphical displays are standard, and the Internet is rapidly expanding. Because of this information infrastructure, the paperless office is a goal of many information professionals.
- Paper business forms, especially internal forms, are prime candidates for replacement with electronic and/or Internet forms. Using Amgraf OneForm Designer Plus, these paper forms can quickly be converted to e-forms and I-forms with the following benefits:

[40] http://www.amgraf.com

1. The look and feel of the paper form is preserved. This reduces design and training costs, and allows users to gracefully migrate to electronic and Internet forms as needed.

2. OneForm e-forms are compatible with all Microsoft Windows PC's. OneForm I-forms work well with Microsoft's Internet Explorer Browsers.

3. Existing form designs can be imported from almost any desktop publishing or forms drawing system.

4. E-forms and I-forms can be linked together, connected to databases, e-mailed, and electronically signed and secured.

5. When needed, a paper form can be printed on-demand.

6. No filler-license software or license fees are ever required to use electronic and Internet forms created with Amgraf OneForm Designer Plus.

Amgraf, Inc. is a world leader in pre-press software technology for manufactured paper business forms. They understand paper forms and believe they will be needed for a long time to come. The advantages of paper forms are obvious. They can be filled-in by anyone at any time, with a simple writing pen or pencil. Paper forms are highly portable, and they act as a permanent record for legal transactions. Despite the explosion of computer technology, many business processes still involve a substantial use of paper forms.

OneForm Designer Plus provides the forms professional with all of the necessary layout and make-up functions to compose multi-color/multi-part business forms in either Spot Color or Process Color (CMYK). Powerful MECCA drawing tools along with a comprehensive library of templates, fonts, borders, and pantographs, enable the efficient creation of high quality cut-sheet, continuous, unit set, mailer, and other business forms.

3.2.3.1 Features for Paper Business Forms Design

- Drawing tools include Line, Box, Circle/Arc, Spline, Rectangle, Filled Area, and Logo. Text tools include Typeset Text, Import Text, Place Text into Box, and Spell Check. Layout tools include Grid, Snap, Select, Move, Copy, Rotate, Scale, Measure, Ruler, and the Position Assistant for placement accuracy to 1/5,000th of an inch.
- Flat, Graduated, and Radial Screens. Screens can be placed within boxes or any defined area. The density can be from 0% to 100% in 1% increments, while the screen lineage can be as coarse as 20 lines per inch or as fine as 200 lines per inch. The user can specify either a flat screen, a graduated directional screen, or a graduation radiating from a center point.
- Snap-to-Grid Background Reference. Business forms can be accurately designed using the Snap-to-Grid and Window Zoom features. Printable grid lines can be displayed on the screen to insure alignment of items in the form. The operator can define the horizontal and vertical spacing of the grid to one five-thousandth of an inch. Business forms with exact typewriter or computer-printer spacing in tenths and sixths are easily and accurately created with this feature.

- Borders and Pantographs. Amgraf's library of industry-standard borders, pantographs, and blockouts is included in the package.
- Color Separations and Layers. Thirty-two layers (overlays) are supported for color separation and multiple-part forms. Text and graphics can be assigned to a particular layer, and the user can choose to display or hide individual layers and/or parts during composition and printing. The Output Specification panel makes it simple to image up to 32 color separations in perfect registration on any PostScript device.

3.2.3.2 Product Specifications - Key Features of OneFormTM Designer Plus

- Import Filters: Import Pre-Designed Business Forms in the following formats:
  - Encapsulated PostScript (.eps)
  - Portable Document Format (.pdf)
  - Rich Text Format (.rtf)
  - MECCA Graphic (.g)
- Forms Design Tools
  - Draw Functions: Line, Multi-Lines, Set/Change Line Style, Box, Circle/Arc, Spline, Rectangle, Area, Barcode, Import Logo
  - Text Functions: Set/Change Font/Style/Spacing, Justify/Typeset Text, Automatic Hyphenation, Flow Text from Clipboard, Place Text into Box, Immediate Spacing/Leadering Commands, Insert Pi Character, Spell Check
  - Layout Functions: Select, Move, Copy, Rotate, Scale, Measure, Cut, Paste, Change Depth Order, Grid, Ruler, Undo/Redo, Position Assistant
  - View Functions: Spot Color, Process Color, Zoom, Scroll, Set Page Background Color, Show/Hide E-Form Fields
- Forms Fielding Tools
  - Automatic Field Placement
  - Interactive Field Placement
  - Fill-Field Types: Text, Numeric, Date, Time, Check Box, Drop-Down List, Signature,Button, Graphic, Variable Text, Layout, Focus
  - Fill-Field Properties: Read-Only, Upper Case Only, Numeric Only, Text Color, Tab Order, Database Access, Help Message, Custom Calculation
- Electronic/Internet Form Display Properties
  - E-Form/I-Form looks like a paper business form on the computer screen
  - Print Form Only, Print Filled Form, Print Fill Data Only
  - Scrollable Display Window, Zoom

  - Show/Hide Fill-Fields
- Forms Automation
  - Most web server databases supported (Oracle, MySQL, SQL Server 2000, etc.)
  - Open Database Connectivity (ODBC) Compliant
  - XML Data Exchange for E-Commerce Applications
  - Linkable Multiple Page/Multiple Part Forms
  - Conditional Display of Forms
  - Workflow Branching and Routing
  - E-Forms are Compliant with most E-mail systems (Lotus CCmail, MAPI, Microsoft Exchange)
  - Supports Digital Signature with Password Control
  - E-Forms compatible with Windows 95, Windows NT 4.0, Windows 98, Windows 2000
  - I-Forms compatible with Microsoft Internet Explorer 4.0 or higher
- Box Attributes Features
  - Individual Settings for Line Weights of Box Edges and Corners
  - Individual Corners can be Square, Rounded, Inverted-Rounded, or Tapered
  - Fill Box with Flat Screens, Linear Graduated Screens, Logarithmic or
  - Reverse Log Graduated Screens, Radial Graduated Screens
  - Fill Box with Bars or Stripes
  - Divide Box into Rows/Columns
  - Choice of 67 Standard Borders
  - Choice of 73 Standard Pantographs
  - Add User-Defined Borders and Pantographs
- Units of Measure
  - Inches, Points, Deci-Points, Picas, Mils, Centimeters, Millimeters
- Barcode Symbologies
  - Codabar, Code 39, Interleaved 2 of 5, Code 128, UPC-A, UPC-E, Postal Zip & FIM
- Form Templates Library
  - Continuous Forms, Unit Sets, Mailers, Heat-Seals, Custom
- Output Control
  - PostScript Level I/II Compatibility
  - 32 Layers/32 Registered Separations per File

- Up to 16-Part Forms Saved as a Single File
- Automatic Step-and-Repeat on Output
- Output Specifications Saved with Drawing

- Bonus Features
  - Includes a library of over 100 pre-designed business forms for general office use
  - Includes Web Server Software for UNIX and Microsoft platforms to simplify getting
  - started with Internet Business Forms
  - Complete On-Line Documentation
- Other Important Features
  - Year 2000 (Y2K) Compliant
  - Includes 330 PostScript Type 1 Typefaces
  - Includes One-Year Warranty: No Charge for Software Updates or Help Line

Support for One Year after Purchase

3.2.4 GroupLink Siris[41]

GroupLink's Siris is a suite of integrated applications that runs on Windows 95, Windows 98, Windows 2000, or Windows NT. Siris™ makes web form publishing, data collection, and simple workflow routing easy--even for non-programmers.

Siris comes with seven different modules, including Help Desk, Timecard or Project Tracker, Threaded Discussions, E-business Routing, and ODBC XML Reporting

- Siris Designer for WYSIWYG (What-You-See-Is-What-You-Get) HTML form design. It makes pure HTML form creation as easy as word processing. Siris™ Designer allows you to open existing HTML forms on your computer for modification, browse the web for forms, or create new forms from scratch.
- Siris Server acts like any other web server, Siris™ Server allows you to put your own web pages and forms on the network. It can be installed as a stand-alone Intranet server, or as an add-on forms server on your corporate network.
- Siris Emailer is responsible for routing messages to users on your network via your existing email system. It supports SMTP (Internet), Exchange (MAPI) and Novell GroupWise E-mail systems. Siris Emailer silently directs email messages to users, alerting them for participation in the workflow process.
- Siris Client (optional), built on Internet Explorer technology, is an easy way to deploy Siris on your corporate network. When Siris Client is started on a user's machine, it automatically connects to Siris Server, retrieves a list of available forms, and allows the user to open multiple forms simultaneously for review.

[41] http://www.grouplink.net

Although the Siris product supports both Internet Explorer 4.x and Netscape 4.x or greater, Siris Client can be an easy to use alternative for form deployment.

The secret behind the simplicity of Siris, is WorkFlow Center. Installed with Siris Server, this web application has three main functions: form publishing, form management, and workflow administration. WorkFlow Center simplifies issues such as database creation, form security, workflow routing, and administration.

3.2.4.1 Siris Designer

Traditionally creating a Webform involved learning a myriad of HTML "codes", a text editor and a lot of patience. Now, Siris Designer can make the same task as easy as creating a document with a word processor. You do not have to enter or know a single HTML code. Simply drag form "elements" from the toolbar and format them like you would format text in a document.

Siris Designer can be utilized to enhance workflow processes in many applications, such as:

- Change Requests / Notices
- Work Orders
- Purchase Orders
- HR Benefit Changes
- Expense Reports
- Project Data Sheets
- Other Business Processes

Siris Designer also allows you to open existing HTML documents to edit. You can even enter the URL of an existing form to use as a template for the form you want to create.

A built in link to the Publishing Wizard provides a direct connection to the Siris Server allowing you to quickly publish your form to the Siris Server.

Features:

- Drag & Drop WYSIWYG Design
- Pure HTML Output
- Unlimited Un-do & Re-do
- Context Sensitive Menus
- Full Font Color Size Control
- Element Justification
- Easy Table Manipulation

3.2.4.2 Siris Server

Siris Server is a fully capable Web server, complete with HTTP 1.0 compatibility, a built in scripting platform, COM integration, and the ability to reuse the corporate security model, through integrated NT Domain, NDS, and local database authentication.
Siris Server runs as a service behind the scenes on any Windows 95, 98 or NT machine. Siris Manager is used to control and configure the Server.

The settings you choose during Siris installation can all be modified through Siris™ Manager. If you want to change the database Siris uses, the security system, the e-mail client, or an other setting, it is all done here.

WorkFlow Center, installed with Siris Server, has three main functions: form publishing, form management, and workflow administration. This Web application simplifies issues such as database creation, form security, workflow routing, and administration.

The server system requirements are: Windows 95, 98 or Windows NT. TCP/IP stack. Email routing requires an existing email system. Pentium 200 MHz or greater (Pentium II 233Mhz or greater recommended). A minimum of 32MB RAM required for Windows 95 or Windows 98, 64MB RAM or greater recommended for Windows NT.

3.2.4.3 Siris Emailer

Siris Emailer is a mail processing engine which facilitates workflow messaging through either MS Exchange, SMTP, or GroupWise. Messages are queued in the Siris system database where Siris Emailer periodically checks for new messages. Configuration options include the ability to set the time between database checks, whether to leave sent messages in the database (to provide a history of sent messages), and location of log files.

Siris Emailer, like Siris Server, runs as a service behind the scenes. Service control and configurations are all accessible through Siris Manager.

Emailer System Requirements: Windows 95, 98 or Windows NT. TCP/IP stack. Pentium 200 MHz or greater (Pentium II 233Mhz or greater recommended). A minimum of 32MB RAM required for Windows 95 or Windows 98, 64MB RAM or greater recommended for Windows NT. An existing SMTP, Exchange or GroupWise system is required for mail routing

3.2.4.4 Siris Client

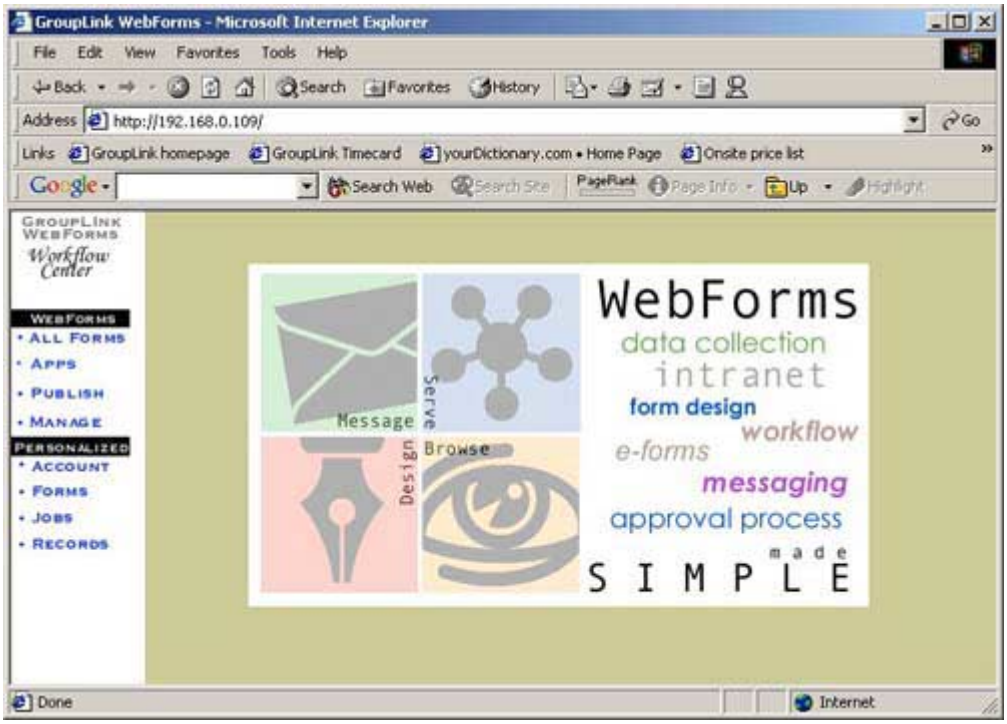
Siris Client is an optional web browser with functions included specifically to make finding and using Siris easy. Client does not require the user to know where the forms are published on the Net. It automatically navigates to Siris Server and retrieves a list of available forms. Each form on the server can be opened individually through WorkFlow Center which is automatically opened, or from a convenient drop-down list in the navigation bar.

Because Client automatically retrieves a list of available forms from your servers, new forms are automatically available to all Siris users.

Siris Client uses Internet Explorer 5.0, supports the latest internet technology, and forms will appear exactly as they did when designed in Siris Designer. However, Siris Client is not required, any recent browser can be used to fill out forms.

3.2.4.5 Siris WorkFlow Center

Installed with Siris Server, provides immediate access to all of the central features of Siris. Initially, only the 'All Forms' link is available. A user must log in before additional options are made available, and only options that a user has authority to use will be provided. WorkFlow Center also remembers who you are and will not ask you to enter a username and password again until the browser is closed and reopened.



- All Forms provides all users a list of forms that are published on Siris Server and a link to each form.
- Publish invokes Publishing Wizard which accepts any HTML form and walks the user through the process of publishing the form on the server. Publishing Wizard creates underlying data structures to hold data for the form and allow the user to password protect the form, set workflow settings, etc. This link requires a user to authenticate and receive "publishing privileges" by an administrator.
- Manage the current Named Users in your Siris system. You can manually add, delete and modify users. Each user can use a different context and different authentication method if you wish.
- Account allows a user to set their user account properties.
- Forms allows users to see forms they have published, view individual records, progress of those records, etc.

- Jobs shows all records awaiting approval and gives the user point and click access to approve and review screens.
- Records provides a list of all the records a user has created by filling out password protected forms.

3.2.5 OfficeForms[42]

OfficeForms provides intelligent e-forms software and specialised solutions to admin-intensive organisations such as government, insurance and banks. E-forms can be published on LANs, Intranets, Extranets and the Internet or distributed using Toplevel's innovative Super ExeForms. Super ExeForms allows you to distribute electronic forms without the recipient requiring any OfficeForms software. OfficeForms enables organisations to capitalise on the e-commerce revolution by radically improving their existing business processes and reducing costs. The OfficeForms range comprises several components, not all of which are required for all solutions

OfficeForms replaces forms based on paper with a modern electronic equivalent. Users select a form from a computer screen and fill it in directly from the keyboard. In-built intelligence performs calculations, displays on-screen guidance and checks information to ensure that it is both correct and complete. OfficeForms e-forms are principally aimed at data collection.

An OfficeForms form is a computer document representing the original paper form. It is created as a file on disk, just like other computer documents such as letters and spreadsheets.

A form author creates the form by drawing it on to a computer screen using the OfficeForms Form Designer program. This is the kind of drag-and-drop activity familiar to most computer users. Static elements of the form such as text and graphics are placed alongside the interactive components that allow the form to be filled in. These include fields, tables, electronic signatures, bar codes, help messages and lookup lists.

Once the blank form has been created, it is published to the wider user community. Users of the form are able to complete the form but cannot alter its design. Consequently the form layout, and the intelligence behind the form, is entirely pre-determined by the form author. They cannot be changed while the form is being completed.

Forms are typically published on a file server or a web server. When published on a web server, users open a form by activating a hypertext link on a web page. If on a file server, a link can be placed on the Windows desktop or start menu.

An OfficeForms form can also be compiled into a stand-alone program called a "SuperExe Form". These are excellent portable tools for data collection. They fit on a single floppy disk and are completely self-sufficient, requiring no other software to be installed on the PC. Data collected in this way may be returned on floppy disk or by email.

[42] http://www.toplev.com Consulted 28th June 2002

All OfficeForms formats provide guided data entry with comprehensive validation checks and help messages and all allow off-line use - particularly necessary for complex forms that take time to complete.

Intelligent e-forms

- Drag and drop Form Designer
- Validations, calculations and help are easy to build onto the forms.
- Offline form filling
- Separate Form Filling System ensures users cannot alter forms
- Option of on-screen representation of the original paper form
- Ability to print form looking like replica of original paper form

Data Linking

- Lookup data and populate forms automatically
- Capture form data electronically onto databases
- XML, ODBC and CSV data exchange

Process Management

- Point and click Process Design
- Built-in electronic signatures
- Roles based Routing
- User Profiles
- Audit Trail

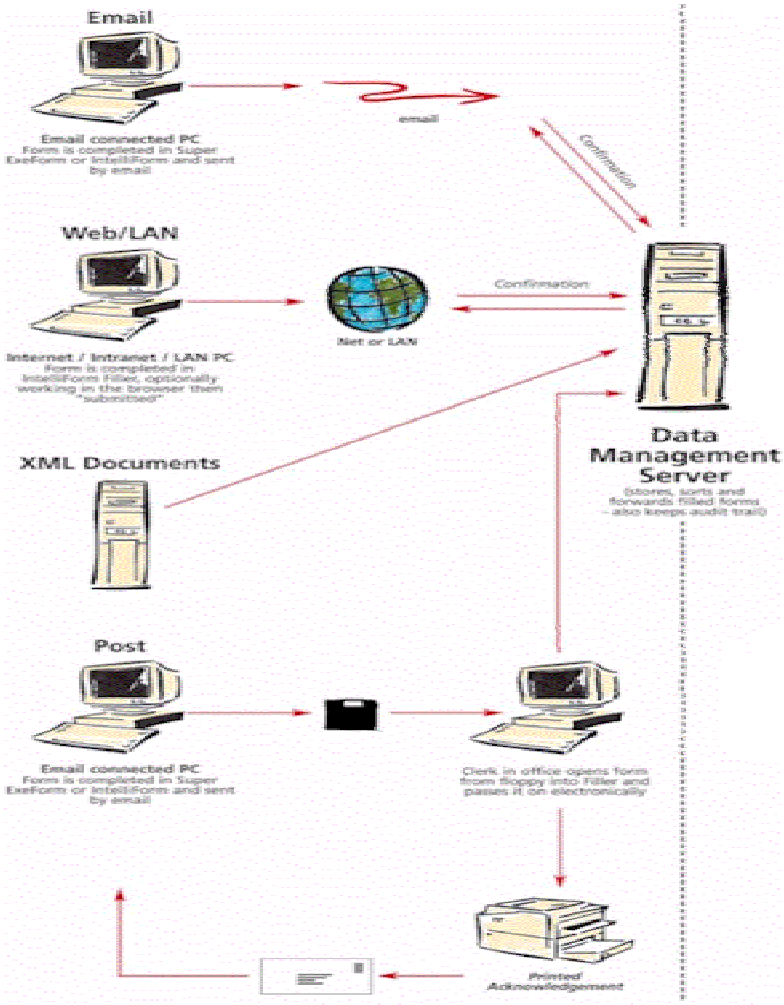


Figure 1 Form Data Collection

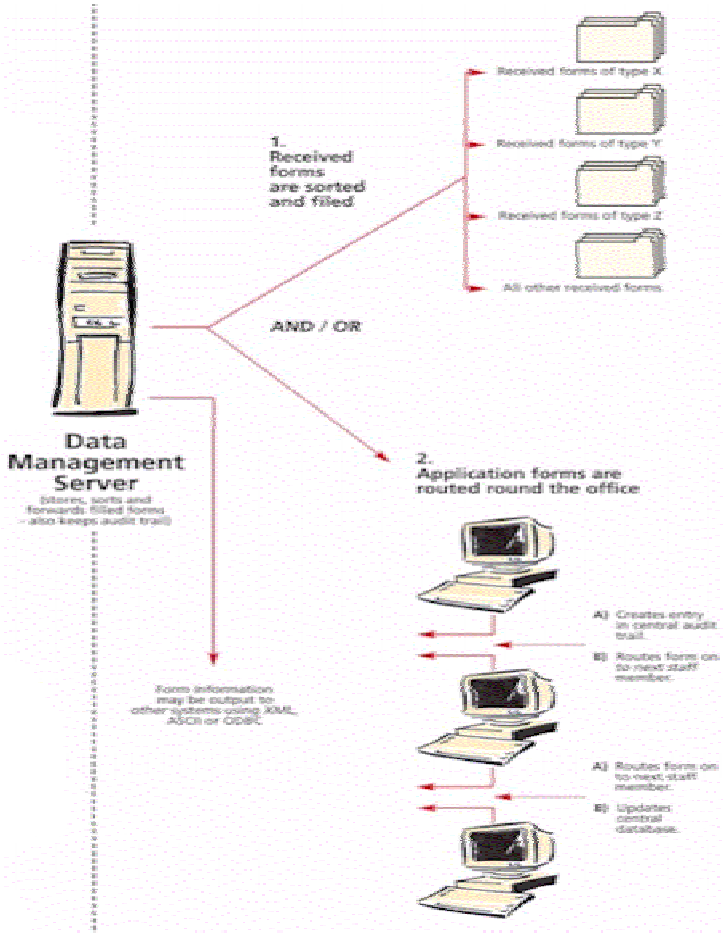


Figure 2 Form Data Processing

Key Benefits

- Intelligent forms can be developed by competent IT users (e.g. good Word or Excel users can be trained in Form Design and Process Design). Point and click - does NOT require highly skilled IT consultants.
- Meets requirement for on-screen representation of the original paper form. Preserving the look and feel of the original paper form may be required for statutory reasons or it may be required to reduce user resistance to change and lower training requirements.
- Likewise the ability to print the form, looking like the original paper form.
- Reduce costs of distributing forms. Save all the traditional print and distribution costs associated with paper forms.
- Comprehensive validations, calculations and help as form is filled, even spell checking, thesaurus and bar code support.
- 100% accurate data collection. Data is keyed onto the form by the originator.
- Offline form filling.

- System developed especially for e-forms.

Components in the OfficeForms Range

- **OfficeForms Form Designer** – drag and drop form drawing tool, creates .ofm intelligent electronic form files.
- **OfficeForms Filler** – opens e-forms (.ofm) created by the Form Designer for electronic completion. This thin-client filler can be used either as a freestanding program or as a browser plug-in distributed via a Web style download with automated installation. We chose the plug-in as the best approach because it is a proven successful technology – as used in Adobe Acrobat and Macromedia Shockwave. Lightweight but powerful
- **OfficeForms SuperExe Compiler** – converts .ofm electronic form files into self-executing .exe form files. These SuperExe Forms are an alternative method of distributing forms from the Filler /.ofm combination.
- **OfficeForms Process Designer** – process definition tool to set up the routes and rules acted on by OfficeForms Server.
- **OfficeForms Server** – provides central management of information from filled forms and server-side database links for data management. Also performs process management and tracking, keeps audit trails and manages electronic signatures.
- **OfficeForms User Administrator**, a tool supplied with OfficeForms Server for maintaining user and group profiles. Supports roles.

3.2.6 JetForm's e-Government Solution[43]

JetForm's e-process framework is an integrated e-process application builder and deployment framework. It enables government agencies to eliminate paper and convert their manual, paper-based processes into Web-based e-processes quickly and easily.

Based on XML it works together with standard Web site content-building tools and integrates easily with existing government applications without requiring changes.

The e-process framework eliminates much of the programming normally required to connect the data elements used in Web forms with the business rules that govern their validation and processing and with the workflow processes required to use that data in support of government operations.

With the e-process framework, a government agency can easily collect, validate and capture information using e-forms. It can then automatically pass that information to legacy transaction systems and record archives, route cases for proper handling and approval and generate printable document records consistent with those in equivalent paper processes. Its flexibility makes it easy to add servers, applications and users incrementally, as needed.

[43] http://www.jetform.com

The framework and any objects created, such as forms, roles, rules or data definitions, can be re-used in multiple applications.

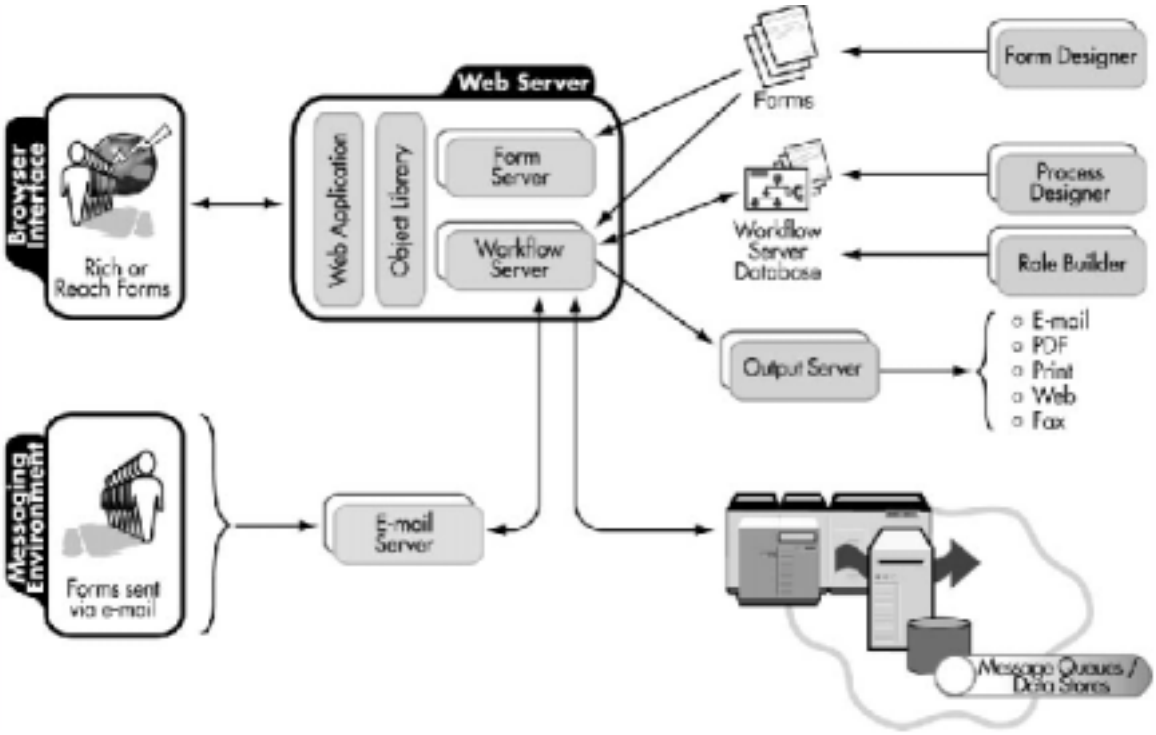


Figure 3 The Object Library

3.2.7 XML Forms Architecture (XFA)

The e-process framework's technical architecture is based on XML. XFA is an open, public specification that defines how a form will appear and act in an XML environment, separating its data elements from the details of its graphic presentation. Because it assumes no proprietary data schema, XFA provides a broadly-applicable foundation for the integration and interoperability of e-processes in government operations.

Every component of the e-process framework supports and uses XFA as a common interchange language. Using its design tools, application developers visually define the workflows, forms and output documents required for an e-process. Forms act as the user interface to capture, validate and present data. With XFA, a single form design can be served to users on a wide variety of desktop platforms and browser types, as well as to FormFlow® 99 clients. In addition, it provides integration hooks to connect the data to a wide variety of back-end databases and transaction systems. Using workflow, it moves the data in accordance with business rules, roles and routes defined by the organization. Finally, the output services convert the form and data into a wide variety of document formats for regulatory compliance and citizen service.

The e-process framework consists of a number of defining components and technologies.

- Forms Design Tools and Form Server
- Rich forms
- Reach forms
- Workflow Design Tools and Server Components
- Receipts for citizens and self-service tracking
- Accessing data in legacy systems
- Output Server
- Object Library
- Directory and Data Integration Services
- Security Services

3.2.7.1 Form Design Tools and Form Server

The e-process framework's Form Designer is used to design intelligent XFA form templates that offer a range of capabilities. The Form Server renders those form templates to the user's browser, by first detecting the browser type, to optimize the browser's capabilities. Together, these two technologies enable you to design a form only once and be assured that it will render accurately according to your user's environment.

JetForm's Form Server offers two models for rendering a form to suit the user's browser, rich and reach. This allows the hosting organization to select the most appropriate format to render a form to your users' browsers. The rich model renders the form to your user's browser using powerful forms software installed on their desktops to execute the intelligent calculations or database lookups, for instance, embedded in the form. The reach model renders the form to your user's browser, but, unlike the rich model, it interacts with the Form Server to execute the intelligence that is embedded in the form, with no client-installed software.

The advantage of designing and deploying forms in the rich environment, such as with JetForm's FormFlow 99, is that complex form design elements and form intelligence can be incorporated into the form because it relies on the powerful forms software on the users' desktops. Meaning, you can include form features such as validations, field-level calculations or database look-ups on your forms. The rich model is the more appropriate model when you are deploying a complex form and you have control over the software that your users are running —a government department that is posting forms on their intranet site for employees within the agency, for example.

The advantage of designing and deploying forms in the reach environment, such as within JetForm's e-process framework, is that a form can be rendered to any user, regardless of that person's browser or platform type because the server processes the form's intelligence rather than software on the desktop. The reach model is best used when your users' systems could be running any number of different browsers on any variety of platforms — a government agency that is posting forms on their Web site

for citizens, for example. This saves citizens long download times when using your forms.

Regardless of the model you choose to deploy forms to your users, the Form Designer lets you design one form and the Form Server lets you render that form to your audience in the most appropriate way for them and for the content.

3.2.7.2 Workflow Design Tools and Server Components

The e-process framework Process Designer and Role Builder are tools that allow application designers to create workflow processes. The Workflow Server relies on those pre-defined processes to move information throughout the agency. It executes business rules, based on roles within the agency, and maintains tracking and audit information.

Like the Form Server, the Workflow Server allows agencies to deploy their applications via the Internet throughout the agency and to businesses and citizens. That way, both “rich” and “reach” clients can participate in structured workflow processes.

Receipts for Citizens and Self-Service Tracking The Workflow Server also provides comprehensive work management via Web-based work lists and queues. Included in this is the ability to offer self-service tracking for citizens. Citizens can use the tracking number associated with the form they submitted to see where their request is within the approval process. The Workflow Server can also be used to automatically send an e-mail to citizens acknowledging their request, effectively time and date stamping their submission.

Accessing Data in Legacy Systems

The Workflow Server is the engine used for integrating e-processes with data stored in databases or legacy systems and automatically archiving the resulting data. The Process Designer can create custom rules, defined as steps, to execute custom script functions such as updating or retrieving data from databases or communicating with legacy systems. In this case, the Workflow Server provides the link to information residing in various repositories within the agency, a key requirement in automating internal processes.

Output Server The Output Server allows e-processes to produce the right document, in the right place, at the right time and in the right form. At a defined point in the e-process, the Workflow Server can deliver the data to the Output Server with instructions to perform a specific task. For instance, the Output Server can generate output documents; such as compliant forms including licenses and permits. Or, it can generate regulatory-compliant documents that maintain their fidelity regardless of the chosen output media, whether it be the Web, paper, fax or e-mail, for electronic or paper archival of the document.

Object Library

The Object Library exposes the e-process framework’s Application Programming Interface (API), which is a set of interfaces for developers to customize and modify the citizen view of an application. This component provides the function to connect the front-end, or user, view with the back-end processing power of the application.

With this API, applications can gain complete control over the e-process framework. Work-list tasks can be displayed within government portals as well as in forms to initiate a workflow or present data as part of a workflow task.

Directory and Data Integration Services

Directory integration supports the use of any directory connected by a data connector as well as the popular directory services LDAP, NDS, x.500, MAPI and VIM. Data-integration services handle the interconnection to outside storage and data services such as databases and ERP systems. Supported systems include ODBC-compliant databases, ADO-compliant databases and EDI (XML and ImpDef).

Security Services

The e-process framework supports a comprehensive security model giving organizations the freedom to choose based on their unique security requirements. Security options include user authentication at several levels, process permissions, network level encryption (SSL and S/HTTP), role-based security and policy enforcement (rules, reminders and deadlines). In addition, it includes support for a range of e-form security technologies including digital signatures from Entrust and Verisign as well as biometric technology from Silanis and PenOp.

3.3 Technologies

3.3.1 Introduction

In this section an overview is presented of technologies, solutions and standards that are relevant to the SmartGov project. The comprehension and deep knowledge of these technologies is considered essential in order for the project to fully develop its potential and at the same time avoid “reinventing the wheel”. However, the technological solutions will not be strictly limited to these and of course other technologies, solutions or standards will be investigated if necessary. The technologies that are covered in this report are: Java, XML, XForms, Web Services and ebXML.

3.3.2 JAVA

The J2EE platform of Java[44] provides a set of very attractive features and capabilities that can suit the needs of almost every sophisticated and advanced application like the ones that will be developed inside the SmartGov project. The J2EE platform provides the following features that could prove to be useful in the SmartGov project:

Enterprise Java Beans (EJBs): Architecture for building re-usable server-side components. Defines the rules governing EJB containers and the components that reside within them.

Java Database Connectivity (JDBC): Java technology-based relational database interface, allowing access to any relational resource that has a corresponding driver, such as Oracle, Informix and SQL Server.

[44] http://java.sun.com Consulted 28th June 2002

Java Naming and Directory Interface (JNDI): Used to locate resources over the network, such as EJB components, database drivers and security credentials.

Java Remote Method Invocation over the Internet Inter-ORB Protocol (RMI-IIOP): The RMI-IIOP interfaces enable method invocations across Java virtual machines. If an IIOP protocol is used, J2EE can integrate with non-Java code written to the CORBA standard, such as C++ or COBOL code.

Java Message Service (JMS): Enables asynchronous communications, including point-to-point and publish/subscribe messaging.

JavaServer Pages (JSP): Technology that allows Web pages to be dynamically generated. Enables Web designers without serious programming knowledge to leverage middleware.

Java Servlets: Similar to JSP technology, servlets are request/response oriented components that are typically deployed in a Web server. They require Java knowledge, and are typically used to manage session state and dynamically generate HTML.

XML: The Java XML API provides an interface to an XML parser and a set of commonly used methods for manipulating XML. Used to describe EJB components and as a file format for JSP scripts.

JavaBeans Activation Framework (JAF): Enables the automatic activation of the appropriate classes needed to manipulate various types of media that might be included in mail sent via JavaMail.

3.3.3 XML

XML[45], the Extensible Markup Language, is a universal syntax for describing and structuring data independent from the application logic. XML can be used to define unlimited languages for specific industries and applications. XML promises to simplify and lower the cost of data interchange and publishing in a Web environment. XML is a text-based syntax that is readable by both computer and humans. XML offers data portability and reusability across different platforms and devices. It is also flexible and extensible, allowing new tags to be added without breaking an existing document structure. Based on Unicode, XML provides global language support.

XML uses document type definitions (DTDs) or XML Schemas for providing a formal set of rules which define the logical structure for XML documents. They determine:

- the elements that are allowed in a document,
- the elements that are allowed inside other elements,
- the number and sequence of the elements,
- the attributes each element can have,
- and optionally, the values those attributes can have

[45] http://www.w3.org/XML/ Consulted 28th June 2002

XML documents can be transformed dynamically into different XML documents or any other kind of mark-up language document. For this purpose the XSL Transformation Language has been developed, which provides operators for:

- Selecting elements from an input XML document,
- Reordering the tree structure of the document and
- Exporting the new tree structure.

The XSL provides a styling sub-language as well. An XSL style sheet contains a number of rules that define how each element in an XML document should be formatted. XSL stylesheets can be applied to DTDs as well. Some applications of XML are:

- Data Interchange, business to business (B2B) workflows.
- Application integration.
- Document management.
- Distributed multimedia.
- Smart searching.
- Smart agents.

3.3.4 XForms

XForms[46] provide a new platform-independent markup language for online interaction between an XForms Processor and a remote user agent. XForms are the successor to HTML forms, and benefit from the lessons learned from HTML forms. They separate the presentation of a form from its purpose. Benefits of Xforms are:

Strong typing: Submitted data is strongly typed and can be checked using off-the-shelf tools. Type validation rules help client-side validation, and such validation code can be automatically generated.

Existing schema re-use: This obviates duplication, and ensures that updating the validation rules as a result of a change in the underlying business logic does not require re-authoring validation constraints within the XForms application.

External schema augmentation: This enables the XForms author to go beyond the basic set of constraints available from the back-end. Providing such additional constraints as part of the XForms Model enhances the overall usability of the resulting web application.

XML submission: This obviates the need for custom server-side logic to marshal the submitted data to the application back-end. The received XML instance document can be directly validated and processed by the application back-end.

Internationalization: Using for instance XML 1.0 data ensures that the submitted data is internationalization ready.

[46] http://www.w3.org/MarkUp/Forms Consulted 28th June 2002

Enhanced accessibility: XForms separates content and presentation. User interface controls encapsulate all relevant metadata such as labels, thereby enhancing accessibility of the application when using different modalities. XForms user interface controls are generic and suited for device-independence.

Multiple device support: The high-level nature of the user interface controls, and the consequent intent-based authoring of the user interface makes it possible to re-target the user interaction to different devices.

Declarative event handlers: By defining XML-based declarative event handlers such as setFocus, message, and setValue that cover common use cases, the majority of XForms documents can be statically analyzed; contrast this with the present practice of using imperative scripts for event handlers.

3.3.5 Web Services

Web Services are a standard way to expose applications or resources on a network. Web services are built over hypertext transfer protocol (HTTP) and XML. A client connects to a URL and retrieves an answer, that is a web service. The related technologies of web services are the following:

- Simple Object Access Protocol (SOAP)

  SOAP is an XML envelope for XML messaging and has headers as well as body. It also has an HTTP binding but is transport independent. In its essence it is an XML serialization format for structured data and can be described as a convention for doing remote procedure calls (RPC).

- Web Services Description Language (WSDL)

  WSDL is an extensible language and provides a functional interface definition language (IDL) description of network services. The description is platform independent and provides protocol as well as deployment details.

- Unified Description, Discovery and Integration (UDDI)

  UDDI defines the operation of a service registry and defines the data structures for registering services and services' endpoints. It has a SOAP Access API. UDDI is like the "yellow pages" but for web services. There are rules for the operation of a global registry but "private" UDDI nodes have also appeared.

3.3.6 ebXML

EbXML[47] is a set of specifications that together enable a modular electronic business framework. The vision of ebXML is to enable a global electronic marketplace where enterprises of any size and in any geographical location can meet and conduct business with each other through the exchange of XML-based messages. In other words, ebXML intends to succeed Electronic Data Interchange, more often known by its abbreviation, EDI. It is based on Internet technologies using proven, public standards such as: HTTP, TCP/IP, mime, smtp, ftp, UML and XML. ebXML can be

[47] http://www.ebxml.org/ Consulted 28th June 2002

implemented and deployed on just about any computing platform and programming language.

In order for the business to take place, ebXML provides a shared repository where businesses can discover each other's business offering by means of:

- partner profile information
- a process for establishing an agreement to do business (Collaboration Protocol Agreement, or CPA)
- a shared repository for company profiles, business-process-specifications and relevant business messages.

Data communication interoperability is ensured by a standard message transport mechanism with a well-defined interface, packaging rules and a predictable delivery model, as well as an interface to handle incoming and outgoing messages at either end. Commercial interoperability is provided by means of a specification schema for defining business processes and a core components and context model for defining Business Documents. All these high-level, and other identified ebXML requirements, are formalized as a technical architecture.

3.4 Conclusions

This document has sketched out the current situation regarding development environments for realizing e-services in the public sector. In this context a number of EU and non-EU funded projects that are relevant to the e-government area were presented. Furthermore a marker research was conducted in order to discover what solutions are commercially available for developing and deploying e-forms. This research concluded that currently there is a great deal of effort invested by private companies in environments for developing and deploying e-forms. As a result, there are several off-the-shelf products that provide holistic solutions and cover a wide range of features and functionality. These products will be further investigated and evaluated in order for SmartGov to have a good view of the market and thus try to contribute something new and innovative and not "reinvent the wheel". Finally in the last section of this document a number of technologies are presented which most probably will be the choice for implementing the software components of the SmartGov development environment. These technologies will be more extensively researched and evaluated in this Work Package as well as in Work Package 4 (User requirements and specifications) in order to determine the best suited technical solution for the development environment of the SmartGov project.

4 Process Models for e-services in the public sector

4.1 Introduction

The introduction of e-government services into a living governmental organization may cover a wide range of variants, which all have at least one thing in common: change in communication. More precisely, change in external communication is one of the main objectives for the switch to e-government. As a consequence, internal communication also has to be changed, otherwise the e-government service would result only in a new, additional interface with additional costs. To really benefit from the introduction of electronic information and communication technology, communication gaps have to be eliminated and support of the internal processes has to be introduced. This is a step towards automation that cannot be done without a precise definition of what is to be automated. In other words, one main requirement for automation is an analysis of the processes with respect to the flow of information, the workflow and the formats of data. If automation is done to get a higher level of efficiency, then optimization steps on the process level e.g.are likely to be performed, i.e. the processes are not only analyzed but also restructured.

Within the different approaches to introducing e-government, two disparate forms can be identified: the technique-driven approach and the process-driven approach. Both have typical advantages and disadvantages and are sub-optimal in their own way. Most projects seem to tend to one of these sides; this might be due to the background of the initiators of the project.

The technique-driven approach identifies a single service to be used as a candidate for introducing new communication and information technology, normally a service with a high level of visibility to the users or other (especially political) stakeholders. The processes within this service are then analyzed, optimized, partly automated, and implemented with a high level of technical effort. The main advantage of this approach is the fast production of results, which are visible to the stakeholders. The main disadvantages stem from the fact that the view on the process landscape is a very restricted one:

- the process analysis might be too task-specific
- the process analysis might be too specific to the techniques that are planned to be used for the implementation

As a consequence, problems with this approach arise after the first successes. The implementation is likely to be difficult to use as-is for other services and must be adapted, with the result of introducing more and more heterogeneity with each new service, so that the costs for adapting the implementation to other services increases with the number of services implemented, or, as the worst-case scenario, the complexity increases to an unbearable state.

The process-driven approach is the opposite of the technique-driven approach as it tends to address the whole process landscape within an organization. For this a typical way of proceeding is:

- select an analysis method

- perform an as-is analysis for all services
- perform a how-should-it-be analysis for all services
- define an optimization strategy for processes and start to optimize the processes
- select and implement an infrastructure
- implement first pilot service

The main disadvantages of this approach lie in the long time between project start and the first usable results, especially in connection with organization-specific political problems arising from business process re-engineering (BPR). This might harm the success of the project. An advantage of the approach is the top-down structure, which has the effect of uniformly structuring the process views and increasing the chance of the rapid re-usability of the implementation of one service for others.

The best of both worlds is therefore a reliable and approved method,

- which combines process analysis with implementation methodology
- which can be used out of the box to analyze most real-world services,
- which includes a procedure to build up the implementation platform,
- which produces implementations that can be re-used for other services.

The work towards this objective is on a more abstract level than the appliance of an analysis technique or implementation of a service. It has to compare the different approaches to find ways to integrate process analysis and implementation and will have results that serve as a framework for specific projects.

This document aims to be the first step in this direction, i.e. it starts with analyzing current projects, contributions from scientific areas and a survey on process modelling tools. The purpose of this investigation is to produce input for further work of the SmartGov project on process models, to omit elaboration of things that are already available, to learn from positive (or negative) examples and to determine areas where further detailed work is required. This is done in order to produce a reliable basis on which to build the integrated approach.

4.2 Survey on Projects and other Related Information

4.2.1 EU Projects

Among the IST-projects that focus on the public sector, almost none seem to have a workpackage included that investigates the analysis (on a theoretical level) of which process model fits the needs for describing or specifying an e-service. Some investigations on methodology are done by projects with emphasis on an implementation of one or more e-services: those projects need to specify the technical part of the project as one of the workpackages.

This stems from the fact that the majority of the projects either have a fixed subject within the application area (i.e. within the public sector) or focus on a specific technical issue (e.g. security). In all those cases, the emphasis of the projects is on the

analysis of the respective problems and not on a general approach to specifying processes in the public sector.

The following two sections give a brief overview of the activities concerning process models within IST projects [29].

The IST project InfoCITIZEN aims at establishing a common enterprise architecture for the exchange of information between public administration, citizens and the private business sector. It uses theoretical concepts from the field of business process analysis. Part of the project workplan is to consider “relevant methodologies” and “corresponding tools”. Among others these are e.g. the ARIS tool, the ARIS reference models and the Ptech Framework. These are part of the planned methodologies “to be considered” during the project.

The declared objectives of the IST Project CASENET are “to develop and implement a tool-supported framework for the systematic specification, design and analysis of e-commerce and e-government transactions to produce protocols with proven security properties, and to assist in code generation for these protocols”. So, this project focuses on the development of protocols for the secure exchange of information. The modelling of the processes of public administration are not the main scope of the project. However, as part of the project, an evaluation of existing methods and tools is planned to find output formats that are suitable as input for the design tools.

The IST project E-MERGE aims to create an “agreed technical, operational and business solution for the vehicle E-Call service chain via the creation of an extended E-Call ‘X-112’ and the enabling of pan-European service roaming between E-Call Service Centres”. Restricted to this special scenario “the project will identify needs and requirements of all actors in the emergency call chain”, and based on this analysis it will establish an organisational framework. Because of the restriction to only one process, this project does not investigate process modelling methodology aspects but focuses on solving the specifc problem only.

The IST project E-MuniS is “a best practice transfer and improvement project for European municipalities”. It works based on analyzing and improving existing IT based administrative work and services to citizens and transferring the results to other countries. The underlying processes are therefore not analyzed, but adapted by dissemination of the back- and front-office infrastructure.

E-POWER is an IST project that aims at designing components “for solving knowledge exchange between governments, citizens and enterprises”. As a first step a model will be established of the pension regulations and processes of two EC countries. From this model, appropriate decision and information support systems will be developed. However, the core of the project will be “the method for translating legislation into executable (formal) specifications.” So, the project tries to take “legislation” as the base model and will not investigate process modelling.

Within EU-PUBLI.COM – another IST project - it is aimed to implement a "secure Intranet” that can facilitate inter-European collaboration amongst public administration employees by interconnecting them at the application level. This will then serve as a base to “develop new and reengineer the existing global European administrative processes by making more effective use of the information available by each individual system”. However, this will be attained by using standards for the content e.g. for data integrity, planning and documentation of processes, and data

modifications. So, this projects focuses on the technical aspects of information exchange and will provide an infrastructure which can then support the modelling of processes. But this is not part of the project itself.

4.2.2 Other Projects, Concepts and Reports

4.2.2.1 Business Process Analysis at the Computer Center of the Federal State of Hesse

4.2.2.1.1 Scope

Within this project the business process analysis started in spring 1999. The summary given here reflects the project status of January 2001, as reported in [30]. The objective is a general business process reengineering, covering both administrative processes (e.g.e.g. handling of information requests and complaints from customers) and production processes (e.g.e.g. software development). The results are planned to be used as the basis for a software development for process support. In-house training in business process analysis (BPA) was done prior to the project start.

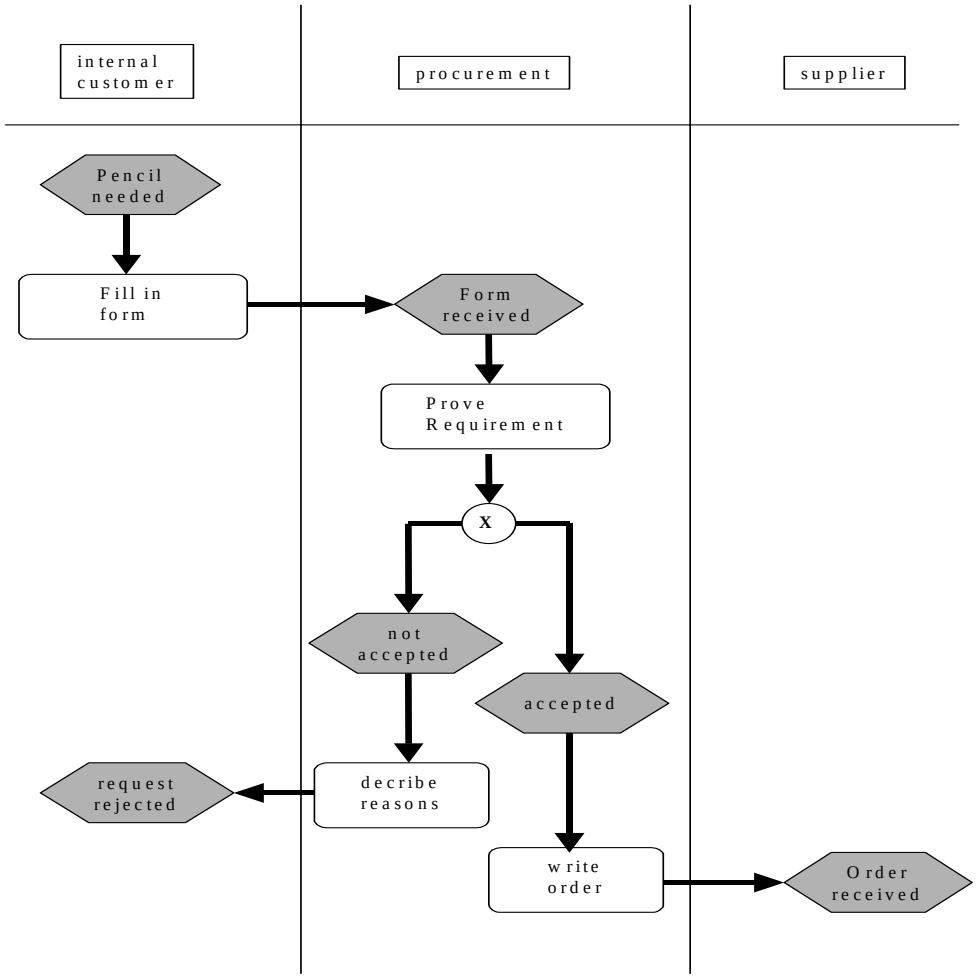
4.2.2.1.2 Method

The project started with the decision on the BPA tool to be used. This was done by choosing the tool of the market leader IDS-Scheer, i.e.i.e. ARIS. The results are published within the organization as a html-version of the ARIS-model. Using ARIS, the modelling is done based on extended event-driven process chains (eEPC). The basic visualization is done by using icons for

- functions (i.e.i.e. the jobs which are to be done by a person)
- events (i.e.i.e. the states which are reached by performing the actions given by the functions)
- organizational objects (i.e.i.e. roles or units within the organization)

The function and event icons are connected by lines into nets with alternating events and function steps on each path. Additionally the events can be combined by logical operators (e.g.e.g. “xor” if the function is a test for a condition) and the icons can be sorted into swim lanes which belong to organizational objects.

The following graphic is an example for an eEPC model. It visualizes the fictitious process of the attempt of an employee to get a new pencil.



The BPA is done by the employees in workshops with support from specialists in the analysis and the tool usage. The ARIS model is developed within the workshop. After the workshop, comments on the results are collected and discussed in a review workshop. Further workshops are then done to analyze the consolidated processes towards optimization. A third class of workshops is planned for the change management of processes.

4.2.2.1.3 Outcome

The tool support allows immediate documentation of the workshop results for a wide audience via html. This can also provide the basis for the training of employees and for descriptive documentation for other purposes.

The overall number of successive workshops needed to control the development of one process (is-analysis, should-analysis, change-control) is rather high so that the method is rather time consuming.

4.2.2.2 E-Government Process Modelling

4.2.2.2.1 Scope

Another example of the usage of ARIS for BPA in a governmental organization is a social welfare centre in Austria [31]. Long-term objectives here are the provisioning of all current services via all standard electronic communication channels. The process modelling is seen here as the key task.

4.2.2.2.2 Method

The process modelling steps are embedded in an overall project plan starting with strategic planning (e.g. definition of visions, long-term objectives, etc.) and proceeding in the classical waterfall style of project management. This includes the steps for:

- identification and selection of the processes to be inspected,
- high level process analysis using ARIS, including a first evaluation in qualitative terms like complexity, structuredness, cost-intensiveness, etc. This results in a preliminary process architecture.
- detailed analysis including optimization, standardization, etc.,
- design and implementation phase (including tests, training, etc.),
- performance management, based on quantitative (e.g.e.g. cost, time) measurements,
- post-implementation optimization.

4.2.2.2.3 Outcome

Due to the fact that the processes in social welfare were found to be largely based on individual decisions of the employees, the standardization aspects of the process reengineering are of great importance. Without clear and mostly uniform process structures, the work would stick to purely person-to-person-communication based working, which can hardly be used in eGov scenarios. However, it is not clear how ARIS based BPR could be helpful for the (crucial) decisions, to choose which of the communication scenarios of the daily work should or should not be changed.

4.2.2.3 Process Management As the Basis For Integrated E-Government

4.2.2.3.1 Scope

For the author of [32] the key to eGovernment is the change in integration, reorganization, and security with its impacts on the communication processes. The integrational aspects of communication affect different kinds of processesi.e.:

- already structured processes between organizations,
- already formally structured processes within an organization, e.g.e.g. between different functional parts
- informal processes within an organization, e.g.e.g. between persons in a workgroup

In all these cases the change to electronic communication might highly affect the processes. Therefore the reorganization of processes is a precondition for the usage of

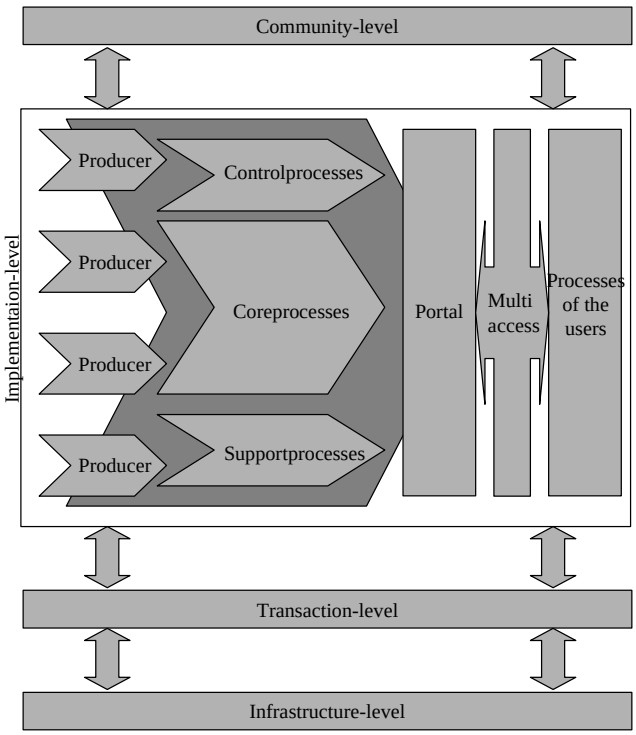
new communication methods. The security aspects are requirements that must not be changed by the process reorganization.

4.2.2.3.2 Method

The method is based on a 4-level-model, which was originally developed for ebusiness:

1. the community level, containing the rules for the usage of the electronic medium within the human community,
2. the implementation level, containing the detailed processes, which implement the transactions between the partners within the community,
3. the transaction level, containing the software modules needed for the support of the different phases of the transactions, e.g. a payment-service or a negotiation-service,
4. the infrastructure level, containing all the technical systems that are needed to build up the service.

Viewed from this perspective, the process-model is completely contained in the implementation level.



In the above picture, different process types within the implementation layer are used:

- There is a three-part model of the governmental processes: the control, core, and support processes:
  - The control processes embrace the democratic communication and participation processes.
  - The core processes embrace the communication of decisions, financial transfers, services for persons and objects, installation and management of infrastructure, general information, and general production.
  - The support processes embrace all the support needed for the core processes, like management of human and material resources, etc.
- The producers are used to provide resources external to the specific governmental organization (ee.g. another organization or a private company)
- The processes of the users contain the activities of citizens that they have to perform independently of communication with the governmental organization, e.g. provide the insurance for the car.
- The communication between the users / citizens and the governmental organization takes place through a portal which can be accessed in many different ways, e.g. by telephone, fax, internet, etc.

4.2.2.3.3 Outcome

The above process model allows enough abstraction to make the governmental process descriptions independent from the supporting technical platforms and the access methods used by the electronic communication. These advantages stem from the fact that similar models are already in use within ebusiness, and that it is possible to adapt them to governmental processes.

4.2.2.4 Report on Process Design Project in Swiss Statistical Administration

4.2.2.4.1 Scope

The Swiss Statistical Administration is the competence centre for official Swiss statistics. Some of its responsibilities are:

- provision of statistical information at the country level
- co-ordination of lower lever statistical units
- defining general principles for the official usage of statistics

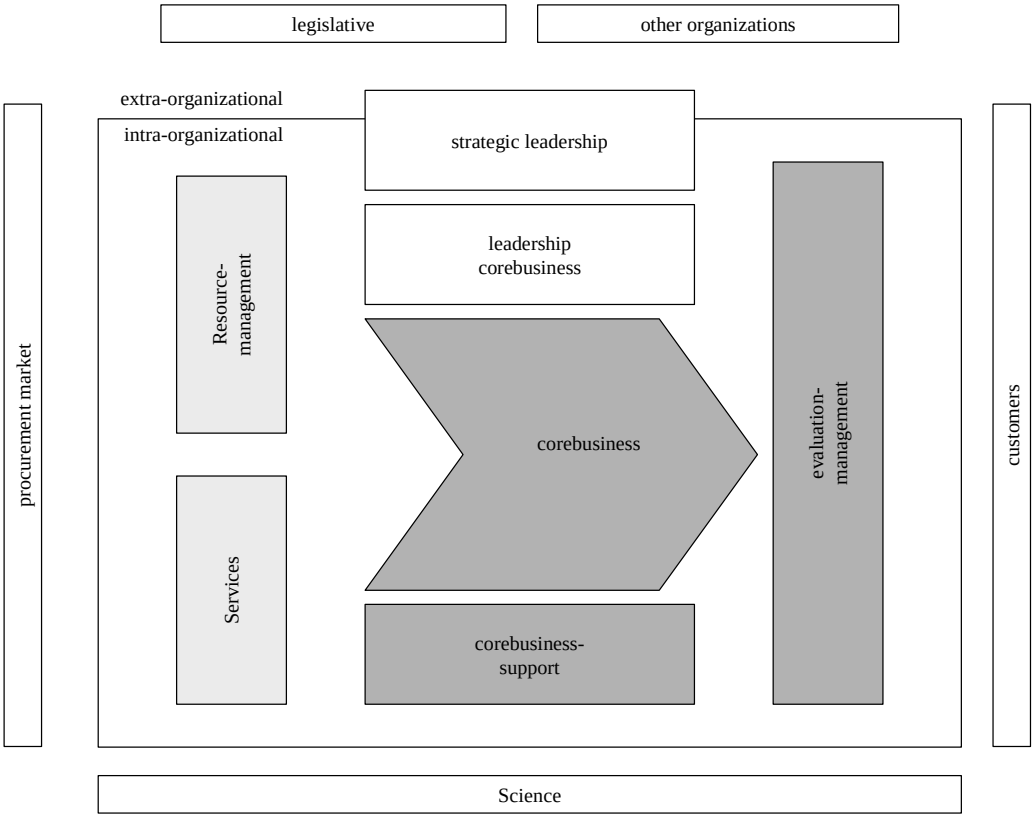
Objectives of their BPA embrace the usual motivation like increasing transparence, optimizing the processes, etc. [33].

4.2.2.4.2 Method

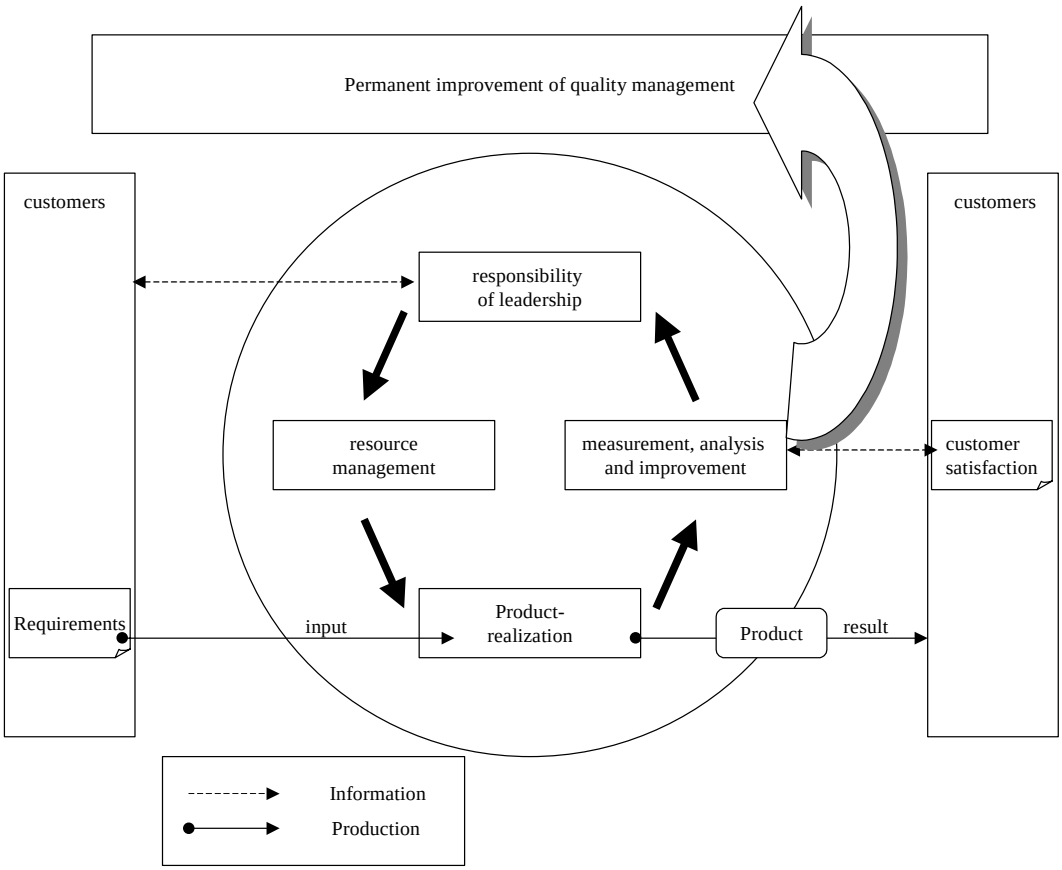
The approach to describing processes is quite similar to the one presented in 2.2.3.2:

- There is also the distinction between core processes, support processes and control processes for the governmental organization.

- There is a network of producers, providing the governmental organization with external resources.
- Customers are modelled as external to the governmental processes.



However, there is a difference concerning change management. Here, the interface between customers and administration is used to establish a valuation management, which serves as the basis for a process of continuous improvement.



4.2.2.4.3 Outcome

The main message of this approach is that process analysis and restructuring methods, which have been run successfully within commercial companies, can be adopted to governmental processes. However, emphasis is put on the fact that the specific requirements of governmental work have to be more closely taken into consideration.

4.3 Literature survey

4.3.1 Introduction

A survey on the available scientific literature about suitable process models was performed. Mainly we made use of Online Public Access Catalogues of universities and scientific institutes in the Berlin area. This includes the libraries of 7 universities, 10 technical colleges or vocational colleges, 4 research institutes and the general public libraries of the region.

4.3.2 Literature Survey

What is presented here is a set of statements, summarizing the main results of the investigations and describing the general situation in the scientific literature.

- Literature that explicitly covers the issue of process models predominantly comes from the technical area, e.g. physical process engineering or chemical process engineering.
- Many books and articles deal with topics around business processes, but from a management perspective, explaining strategies and techniques for improved business management.
- Only a few titles can be found that really go into modelling business processes, either by explaining techniques and methods for elaborating process models or by presenting some models, either as mere examples or as reference models for a certain area under consideration.
- Many publications on business processes and process modelling are dissertations. No evidence could be found that these works attracted further interest in the scientific community or in practical business. Of course, this observation does say nothing about the actual value of the respective works.
- There was no finding at all in this research for literature about process models for the public sector.
- There is one modelling method, which has been scientifically approved and which has been used in many practical cases: the ARIS methodology, created by Prof. A.-W. Scheer, Saarbrücken.
- Another relevant modelling method is given by UML, where especially business use cases and activity diagrams refer to our target area. In general however, UML is designed for software engineering purposes, not for process models in an organisational sense.
- Some scientific books have been published that deal precisely with e-government. However, the aspect of process models has not been treated in depth.
- A significant number of findings applies to the area of Business Process Reengineering. Typically those books are from the middle of the 90s, while recent publications in this area are rare. Obviously attention has moved to other issues, e.g. Change Management.

During further work in the project we will make us of the found literature whenever suitable and provide the relevant references.

4.4 Software Tools for Process Modelling

4.4.1 Definition

In the area of process modelling there are various tools that might be used to model and visualize processes. Clearly any graphics application could be used to somehow draw process models and any word processor could be used for a textual description.

In fact, in many cases process modelling is done with the MS Office tools. This approach seems suitable if only small models are produced or where the effort for introducing a specific tool is not justified.

The following summary of available tools refers to applications that are somehow specialised for processing business process related information. The tools are designed for different purposes, like visualisation, optimisation, simulation or automation of business processes. We distinguish between the following categories of tools: visualisation, modelling, simulation, workflow management and CASE. Examples for the most important category, the modelling tools, are presented in the section after next (4.4.3).

4.4.2 Categories of Tools

4.4.2.1 Visualisation Tools

These tools are strong in graphically presenting business processes. They present adaptable graphical interfaces and make use of specialised libraries containing the graphical elements for process description according to different modelling methods. Most visualisation tools do not have their own repository for the modelling data. Instead the information is stored in the file system. The type of information is limited to describing the graphical properties of the model. The user can not enter any attributes and the tools offer only small processing capabilities. Therefore checks of consistency are hardly supported. The elaborated models are quite static and no evaluation of the models is supported by the tools.

Being limited to only a small number of functions, these tools are easy to learn and offer a simple approach to business process modelling. No deeper methodological knowledge is required and modelling can be done with almost no training. The value of the established models, however, is limited to presentation and communication purposes.

Typical examples for visualisation tools are RFFlow (RFF Electronics, www.rff.com), ViFlow 2000 (ViCon GmbH, www.vicon-gmbh.de) or Visio (Mircosoft, www.microsoft.com/office/visio).

4.4.2.2 Modelling Tools

These tools support textual and graphical representation of the elements of business processes. In particular the user can enter attributes of the different elements and of the relations between elements. Despite the visualisation tools, which go through the different levels of a hierarchical model only by zooming in and out of the levels, the modelling tools are capable of processing attribute information in order to produce new views of the model. In addition, the principle of processing attributes can be used to provide functionality for optimisation and simulation of business processes. Accordingly the area in which these tools are most often applied is analyzing and optimizing the business processes.

Based on a methodical framework the processes are separated into basic elements, to which the user supplies the according attributes, e.g. the required resources of activities. All data is kept in a repository. Consistency of models can be automatically

checked. Most tools supply standardized export interfaces towards other business process management tools. Especially important is the transmission of information into CASE tools, workflow management tools and simulation tools.

It is very important to communicate process models with other involved people. This can be done very smoothly over web-based information systems. To this end most tools provide an export interface towards web-enabled data formats or even contain web presentation components, i.e. the models are directly accessible via a standard browser.

4.4.2.3 Simulation Tools

Simulation of business processes is recommended for complex problems, e.g. where there is a great number interdependencies or if interdependencies are quite crucial and prohibit experimenting with the real processes. Simulation tools more or less assume an already modelled process and take this as their input. The tools support calculation e.g. of throughput time or workload, which can be done for the case of alternated process parameters. Typically simulation of processes requires very much detailed information e.g. about the processing time in each single activity or the likelihood of branching in the process flow. Examples of simulation tools are: ithink (High Performance Systems Inc., www.hps-inc.com), PACE (IBE Simulation Engineering, www.ibepace.com) or IvyFrame (IvyTeam AG, www.ivyteam.ch).

4.4.2.4 Workflow Management Tools

Workflow management tools are used to automate standardised business processes. The flow of activities is defined in the system and the tool ensures that it is executed correctly. It helps to keep available and consistent all information and documentsthat are related to the different activities. Employees involved in the workflow have an electronic inbox and outbox. Usually a database management system needs to be attached, where all static and dynamic data are stored.

Workflow management tools offer a high degree of process automation, but configuration of a workflow management system, including the single workflows, can be very elaborate. The application of a Workflow management system is profitable only if a high level of standardisation of the relevant processes is required.

Examples of Workflow management tools are: MQSeries Workflow (IBM, www.ibm.com), Staffware 2000 (Staffware plc, www.staffware.com) or COSA Workflow (LEY GmbH, www.ley.de).

4.4.2.5 CASE Tools

CASE tools are basically designed to support the elaboration of software models, according to standards like ERM or the object oriented UML. But as the target applications typically support the business processes of an organisation, CASE tools more and more integrate elements of business process modelling. This integrated approach offers the opportunity of consistent models in the area of business processes and software processes and supports the seamless usage of business process information during SW analysis and design.

Due to their engineering background CASE tools usually require higher skills. Some business process modelling features, like business use cases in UML, are a mere extension to the original software modelling features. Functionality is very limited and often they can not substitute for dedicated process modelling tools. Examples for UML tools are: Rational Rose (Rational Software Inc., www.rational.com) and Together (TogetherSoft, www.togethersoft.com).

4.4.3 Product Overview Modelling Tools

4.4.3.1 ARIS

Primarily, ARIS (Architecture of integrated Information Systems) is a method oriented framework, which covers analysis and (re-)design of business process, in order to support the business processes with suitable IT applications. ARIS was developed by Prof. A.-W. Scheer, University of Saarbrücken. First publication was 1991 [34], with the 4th edition in 2001 and in 2002 the publication was split into two volumes ([35][36]).

Following the ARIS framework a toolset was developed, which is distributed by IDS Scheer AG, Saarbrücken (http://www.ids-scheer.com). The latest version is called "ARIS 6 Collaborative Suite" (previously it was "ARIS E-Business Suite 5.01"). The suite comprises three versions for the modelling client: the ARIS Toolset, which offers a comprehensive functionality; the ARIS Easy Designer, which has a more intuitive graphical presentation compared to the toolset, and reduced functionality; and the ARIS Web Designer, which comes with further reduced functionality, but offers access over Intranet or Internet connections.

On the server side the ARIS suite comprises an application server, called ARIS Business Server, the ARIS Database Server and the ARIS Site Manager as a central administration application. Further components for web publishing, report definition or import of data from former versions are also included.

Furthermore, for the ARIS suite there are additional modules available, e.g. for interoperability with other standard software like SAP or Intershop, for simulation purposes or for controlling functions with the Balanced Scorecard method.

While the basic meta-models of the ARIS method and the ARIS tools still show the separation between data and function, which is typical for ERM modelling and functional programming, there are already some extensions in the tool suitethat support UML and programming with Java.

4.4.3.2 Bonapart

The origin of Bonapart – like ARIS – lies in the academic area. The tool was developed 1992 by pro ubis, a subsidiary of UBIS in Berlin, which was founded by Prof. Krallman. He developed the KSA (Kommunikationsstrukturanalyse – communication structure analysis) at the Berlin Technical University, which is the methodological basis for Bonapart. In 1999 pro ubis was sold to Intraware AG (www.intraware.de), which today does the distribution and further development of the toolset and also offers worklow applications in the OCTOsuite.

Bonapart is based on an object-oriented paradigm and hence supports the concepts of object-oriented software development with mechanisms like inheritance or aggregation. It is configurable to a large extent and not fixed to a special modelling method. Bonapart models can not only be exported into Web-pages, but modelling itself can be done over the Intranet or Internet.

4.4.3.3 ADONIS

ADONIS is developed and distributed by BOC GmbH - a company, which originated in Austria and which now has branches in several European countries. BOC has also participated in EU projects (http://www.boc-eu.com/eu-projects.htm), but not with regard to processes in the public sector.

The ADONIS tool supports process modelling and offers an extensive library for simulation purposes. A distinctive feature is the openness of the tool, as it can be adapted to various modelling methods and diagram types and as it includes comprehensive import/export functions. In particular, ADONIS models can also be transferred into HTML and thereby distributed over Intranet or Internet. The ADONIS web-site http://www.boc-eu.com/english/adonis.shtml offers more instructive information.

4.4.3.4 Others

- ATOSS Software AG (Germany): AENIS (www.atoss.com)

AENIS is a tool for modelling and analysis of business processes, organisational structures and information systems. Role-based selections from the AENIS process models can be extracted. The tool comes with its own specific notation, but also supports event-driven process chains, like they are used in ARIS. AENIS is based on the POET database, but support for other DBMS has been announced. Several export interfaces for Windows-based office applications are included. Web-export is also possible and navigation through the model via the Web-interface is possible.

- Infologistik GmbH (Germany): GRADE Modeler (www.infologistik.com)

GRADE (Graphical Re-engineering Analysis and Design Environment) is based on an object-oriented approach and focuses on issues close to Software Engineering. A light version is available, miniGRADE, with modelling UML and export interface to Rational Rose. Supported export formats include graphics (wmf, gif, bmp), rtf-text, uml-packages (ptl) and html. The repository of GRADE is called Model Dictionary and provides extensive search functions and consistency checks.

- Micrografx, Inc. (USA): iGrafx Process 2000 Professional (www.micrografx.com)

The tool has its origin and its emphasis in graphical notation. Besides visualisation, modelling, versioning and repository-based data management are supported. iGrafx is a completely Windows compatible application, offering full cut&paste and OLE functionality, in order to exchange information with other applications. In addition, diagrams can be stored in Java-applets. This Java-based exported model can be displayed and searched over the Intranet or Internet.

- PROMATIS AG (Germany): INCOME Process Designer 4.2 (www.get-income.com)

INCOME Process Designer includes visualisation and analysis of business processes. The tool especially supports quality management functions. Promatis also offers tools for data analysis and knowledge management. INCOME process models can be exported as graphic or text and as html. Moreover, INCOME allows users to access the whole functionality of the tool with a standard web-browser, without installing a special client. Only a Java VM is required.

- MEGA International (France): MEGA Process 5.1 (www.mega.com)

MEGA is a tool for business process analysis, which can be carried out at different levels of detail. With MEGA the IT infrastructure can also be modelled and the tool offers several mechanisms for optimization of business processes. Besides the standard elements of MEGA like “org-unit”, “operation” or “person”, the user can define his or her own elements. MEGA offers a variety of export interfaces, e.g. for spreadsheets, project management applications, Windows office and web-based presentation. MEGA has its own repository, into which external data can be imported. With the repository, access to different parts of the model is controlled.

- Computas AS (Norway): METIS (www.computas.com)

METIS is a process modelling tool that supports standard modelling methods as well as the definition of user specific methods and meta-models. METIS stores all information internally and has no separate repository. Models can be exported as html or xml. METIS offers no process analysis, but emphasizes ease of use and web-export, in order to discuss the models with the project participants.

- Proforma Corporation (USA): Provision Workbench 3.4.3 (www.proformacorp.com)

Provision is a method-independent tool and highly adaptable to user specific requirements. Standard methods like UML and OMT are already included. Functions for analyzing the models and for performing process simulation are provided. Provision offers good support of data export, including interfaces to CASE tools, to MS Excel and selective Web-export.

- Silverrun Technologies (Canada): Silverrun BPM (www.silverrun.com) – a simple, easy to use modelling tool.

- ibo Software GmbH (Germany): Prometheus (www.ibo.de) – a suite of tools for modelling, analysis and management of processes.

4.5 Conclusions

Our investigation of process models has included the search for reference projects, suitable literature and process modelling tools. Of course, this is far from absolute completeness, which could not be achieved within the given project situation. But we believe that our investigation has covered the area under consideration far enough to conclude some main tendencies.

There are plenty of applications and tools that can be used for business process modelling. But actual application in projects is rather rare. Only a few reports could be found where business process modelling is actually addressed. In the scientific area, work on business process modelling looks rather fragmented. Yet no mainstream for theoretical concepts could be discovered. In parallel, standards for business process modelling are missing, although the Business Process Management Intiative (www.bmpi.org) has defined a Business Process Modelling Language (BPML). But the BPMI approach goes towards XML-based descriptions, which are good for automated processing, but are not suitable for communication with the people in an organisation.

For the SmartGov project, this means that we have to take a pragmatic approach, which defines general requirements for process modelling as well as those specific to the user in the project and which includes the best elements from the available scientific concepts.

5 Best Practices for e-services in the public sector

5.1 Introduction

This section is a review of e-public services and the use of e-forms in the public sector, from which we draw a set of indicators of best practice.

5.1.1 e-Government public services

Currently citizens deal with organisations via multiple and often overly bureaucratic points of contact. E-government aims to encourage the joining up of departments as well as entire organisations in order to deliver a 'seamless experience' for the customer. *Better Public Services through e-government* (2002) [37] takes e-government to mean:

> *[…] providing public access via the internet to information about all the services offered by central government departments and their agencies; and enabling the public to conduct and conclude transactions for all those services, for example, by paying tax, claiming and receiving benefits, getting a passport. It is also about departments harnessing new technology to transform the internal efficiency of government departments.*

Besides easy 24 hour a day real time back up, specific benefits of e-government public services include: customer information services to answer enquiries from the public using an appropriate medium; application services for the purchase of permits, licences and other such documentation; multimedia payment services for taxes, fines, rentals and so on; complaints handling; storage of planning and other images in digital format; centralised data storage providing access to a variety of sites in the organisation; simultaneous access by public service employees and customers; and open broadcasting of meetings and debates over the internet.

Importantly, e-government is also about the role of government departments and citizens in managing and using electronic public services and the new electronic tools that are to support them to best effect. According to Schedler & Scharf (2001), [38]

> *[…] electronic public services (ePS) stands for the delivery of public services to benefit recipients, to private individuals, or to companies through local, regional, or national portals (p. 780).*

5.1.2 Perceived benefits of e-forms

Public sector spend on forms — including cost of designing, printing, data entry and paper handling — is massive. Cost savings could result for public authorities as a result of best practice implementation of e-forms. Benefits from best practice policies mean that access to e-forms becomes easier using different types of ICT. The power of new technology means that the tools can be designed to operate efficiently and effectively. Appropriate design of e-forms potentially increases effectiveness and efficiency. Moreover, well designed e-forms combined with best practice use can improve interaction between public sector organisations and its customers/citizens.

Wth electronic features of the Internet, for example, it is possible to fill in forms and submit to the appropriate public sector organisation non-stop throughout the day at times convenient to users.

It is possible to re-produce original paper-based forms and to improve their appearance, ease of use and efficiency. Data validation visible on the form reduces submission errors. The technological features of e-forms adds new customer interface possibilities, for example, images, drop down lists, radio buttons, check boxes as well as static text. In addition, logic can be incorporated into the design so that the format can be changed depending on responses to certain questions. Another benefit derives from direct communication between users and the back-office centralised computer. In addition, complex information is more easily traceable when clients make real-time queries about progress. The greatest challenge, however, is to create the right balance between openness, good service, efficiency and the protection of privacy,

5.1.3 e-Government Research and Reports

Web-based Survey on Electronic Public Services (October 2001) [39] reports the results of surveys which provided a benchmark exercise for the first 15 EU member states, plus Iceland and Norway, and evaluated the percentage of public services available on-line. The objectives of this benchmark were to enable member states to compare performance and to identify best practices in order to stimulate progress in the field of e-government (p. 3).

Two main conclusions were drawn from the results of the survey (p.9):

- The on-line development of public services is enhanced by co-ordinated service provision
- Complex administrative procedures require important back-office reorganisations

The report indicates that best results were achieved by public services with simple procedures and centrally co-ordinated service provision: for example, job searches, income tax, VAT, corporate tax and customs declarations. Lowest scores in the survey were found in services such as building permissions, environmental permits and enrolment in higher education. According to the report, one explanation is that these services are more complex administrative procedures coordinated by local service providers.

Finally, the report recommends (p.9) that on-line public services can be enhanced by:

1. Co-ordinated e-government solutions which allow local service providers to take advantage of centralised online initiatives offering a single point of contact in the form of e-portals or ASP-related solutions (Application Service providers), with a citizen/customer-oriented approach rather than a procedural approach.
2. Extensive back-office reorganisations to transform complex transactions into simple procedures. This is a long-term operation.

The first recommendation guarantees fast results, while the second ensures long term but more profound results.

5.1.3.1 IST Projects

Key Action 1 of the 5th Framework Information Society Technologies (IST) programme concerns Systems & Services for the Citizen. Under Key Action 1 there is an Administrations theme. Its goal, according to the IST website[48], is to:

> *realise by 2010 the goal of an 'Integrated European Government' enabling administrations, citizens, businesses, suppliers and other public sector bodies to seamlessly come together and interact in real time through a ubiquitous infrastructure that promotes trust and confidence.*

In the Administrations theme there is a Smart Government cluster, which in turn has sub-clusters in Single Point of Access, Service Integration and Internal Services:

IST

Key Action 1

Administrations

Smart Government

Single Point of Access

Service Integration

Internal Services

There are 19 projects in the Smart Government cluster. Those with most relevance to SmartGov are shown below. Of particular interest are eGov, IMPULSE, PRISMA and CITATION.

Single Point of Access

Centuri21 has created a "community empowerment network" to promote the widespread use of electronic services by citizens.[49]

eGov aims to provide a platform for developing one-stop online government services.[50] Archetypon, one of the SmartGov partners, is also a partner in eGov.

AVANTI is using embodied agents to make information universally more accessible.[51]

VISUAL ADMIN focuses on the needs of public administration services to offer more visibility on their activities to administered citizens and enterprises. This implies both offering a portal to information systems of the administration and supplying a customer — *i.e.* citizens and enterprises — oriented perspective.

[48] http://www.cordis.lu/ist/ka1/administrations/projects/clustering.htm Consulted 25th April 2002.

[49] http://www.centuri21.org/ Consulted 25th April 2002.

[50] http://www.egov-project.org Consulted 25th April 2002.

[51] http://www.avantiproject.org/ProjDesc.htm Consulted 25th April 2002.

Service Integration

IMPULSE aims to produce new models for services to the citizen and a knowledge base of best practice. SmartGov might well benefit from finding out more about the results of this project, which is due to finish at the end of May 2002.[52]

PACE[53] is an initiative to help European cities to

> *accelerate and expand the European e-commerce market in the arena of Public Administrations*

PACE works closely with the Telecities project. It achieves its aims through events, publications and direct support to its Working Groups, which meet regularly in person at the Telecities conferences held throughout the year, and continue their discussions online. The Working Groups address:

- Public Private Partnership
- Efficiency and Public Contracts
- Local Government Portals

The City of Edinburgh Council is an active member of the Telecities project. All partners in 5th Framework projects are encouraged to participate in the PACE online forum

PACE conducted a survey on e-Commerce and Public Administration in spring 2000. Because much has changed since then, its results have not been referred to in this document.

PRISMA aims to provide, for the first time, a systematic analysis and synthesis of the current and future impacts of new information and communication technologies on government services in Europe. One of the focal points of interest is eAdministration, in which they are investigating administrative workflows and ways in which citizens can understand the flows of services that affect them. SmartGov should take a close interest in the results of this project.[54]

CITATION is a project on which we have very little information. It is described on the IST website as "Citizen information tool in smart administrations"[55]. It may have some relevance to SmartGov.

Internal Services

AIDA aims to develop ways of ensuring secure electronic transactions nationally and internationally, by "trustworthy signatures".[56]

Other IST Projects

The **EURO-CITI** project aims to specify, develop and test a common architecture and related services targeting the public sector. The proposed services include tele-

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[5252] http://www.nivaria.com/impulse Consulted 25th April 2002.

[53] http://www.pace-eu.net/pace/about/index.html Consulted 26th April 2002

[54] http://www.prisma-eu.net Consulted 26th April 2002.

[55] http://www.cordis.lu/ist/ka1/administrations/projects/projects1.htm Consulted 26th April 2002

[56] http://aida.infonova.at/aida.htm Consulted 25th April 2002.

voting, electronic submission of forms and tele-consulting. The University of Athens, Archetypon and TNB are partners in EURO-CITI.

5.1.3.2 eEurope

The eEurope initiative was launched in December 1999 through a Communication of the European Commission. The eEurope Action Plan was adopted in June 2000 setting out aims to bring benefits of the Information Society within the reach of all Europeans. The aims are to ensure faster introduction of digital technology in Europe, to ensure all Europeans have appropriate IT skills and to support reform in the European economy. To support the goals of the eEurope initiative, the European Commission have launched several separate programmes and initiatives to stimulate econtent, elearning, SME use of digital technology and digital inclusion. The Commission recognised a need to develop a common policy strategy on the security of electronic networks. The focus is on a uniform warning and information system, new legislation, raising the security level of administrative information systems, support for standardisation and close international co-operation.

Benchmarking eEurope[57] is being used to

- evaluate net overall impact of eEurope and the Information Society
- show current levels of activity in key areas
- shape future policy, by informing policy-making

23 key benchmarking indicators were compiled from OECD, surveys, and a range of other studies. The first indicator is the percentage of basic public services online, covering twenty services (Table 1).

[57] http://europa.eu.int/information_society/eeurope/benchmarking/index_en.htm Consulted 24th April 2002

Table 1 eEurope Benchmarking for Basic Public Services On-Line

eEurope Benchmarking Areas for Basic Public Services On-line	
A2B services– Administration to business	Social contribution for employees Corporate tax VAT Registration of a new Company Submission of statistical data Custom declaration Environmental permits Public procurement
A2C Services – Administration to Citizens	Income Taxes Job Search Social Security benefits Personal Documents Car Registration Application for building permission Declaration to Police Public Libraries Birth and Marriage Certificates Enrolment in Higher Education Announcement of Moving Health-related Services
http://europa.eu.int/comm/enterprise/consultations/government_e-services/documents/consultation_document.pdf Consulted 24th April 2002	

To identify common trends, the benchmarking indicators were regrouped into four public service clusters:

- Income generating services
- Registration
- Returns
- Permits and Licences

ReachService,[58] the portal site for electronic forms, provides quick, secure access to public sector information and services. The development of interactive public services must be assisted by back office re-organisation. Examples of back office re-organisation provided by the *Consultation Document for a Future Policy Paper on Pan-European Government e-Services* (2002)[59] [40] are car registration,[60] cross-roads bank for social security,[61] automated generation of income tax returns and car registration by third parties, and EDIFACT systems for customs clearance (all countries).

[58] www.eforms.gov.ie Consulted 24th April 2002

[59] http://europa.eu.int/comm/enterprise/consultations/government_e-services/documents/consultation_document.pdf Consulted 24th April 2002

[60] www.vv.se and in English http://www.vv.se/for_lang/english/index.htm Consulted 24th April 2002

[61] www.ksz-bcss.fgov.be Consulted 24th April 2002

5.1.3.3 IDA

IDA (Interchange of Data between Administrations)[62] is a strategic initiative driven by the European Commission. Its goal is to use advances in information and communications technologies (ICT) to support rapid exchange of information between administrations. The result will be smoother decision making and the successful implementation of Community policies in the internal market.

The IDA Programme was launched in 1995. Initially, IDA helped administrations to set up infrastructure, establish common formats and adopt new ICT based business processes.

IDA was continued in 1999 as IDA II, which is now in its second phase. In the second phase, IDA has been re-oriented with much greater emphasis being placed on market-orientation and interoperability issues. It is focusing on improving network interoperability, services, tools and security, and promoting convergence towards a common telematic interface.

IDA II's rationale is not only to maximise flexibility and minimise the costs of information exchange, but also to increase efficiency in the provision of services by European administration to citizens and enterprises. This represents a new turn in the development of the programme that has traditionally concentrated on the back offices of European public administrations.

In this way, the IDA II Programme is contributing directly to the challenges identified under eEurope/ Government online, providing for a series of actions at the pan-European level to complement what the Member States are achieving nationally. The programme is opening up to more sectors and to the European Economic Area and EU applicant countries.

Among its contributions to the eEurope Action Plan are:

- analysis of mechanisms required to promote the sharing of Open Source solutions between public administrations.
- pilot projects on secure e-mail exchange between administrations
- advancing the interoperability of national and Community implementation of public key infrastructures
- a bridge certification authority pilot as a step towards promoting mutual recognition of public sector digital certificates
- collaboration with Member States' portal managers on establishing a portal for EU administrations.

There are currently 70 separate actions undertaken in the framework of IDA, including projects that address the interactions of citizens and enterprises with governments.

The largest number (6) of sectoral projects of common interest are in health and consumer protection, while data exchanges related to product access in the internal market (5) and to environmental policies (3) follow closely. IDA's projects of

[62] http://europa.eu.int/ispo/ida Consulted 7th August 2002

common interest have traditionally reflected the evolution of the Union's policy priorities, and this year is no exception, with a number of new projects having been launched in the field of public security.

Concerns about European interoperability of the growing list of national government services being made available online were raised at the Sandhamn conference of 2001, co-organised by the Swedish Presidency and IDA. This year's work programme addresses these concerns by providing for the establishment of an interoperability framework for pan-European e-services. Interoperability will also be addressed in specific IDA actions on electronic procurement, directory services, certification authority, and smart cards for e- government services.

A number of IDA actions will be of direct and visible benefit to citizens and enterprises. The Portal of the EU Administration is the most visible IDA project. The implications of providing millions of users all over Europe customised access to e-government services are substantial, and IDA's portal project will help identify new fields of activity in areas such as electronic identities and authentication where a European solution is needed.

The IDA communication platform (TESTA II) for data exchanges between European public authorities is being reinforced and a major emphasis is being placed on strengthening reliability and protecting the information that is passed across it. New actions are being undertaken to implement the kind of middleware required to organise access to information distributed across Europe's public administrations.

The IDA 2002 work programme also sees the establishment of the eGovernment Observatory to assess eGovernment initiatives and emerging trends in software, R&D technologies and commercial solutions. This will link activities at European level more closely to what is happening in national, regional or local governments.

5.1.3.4 Pan European Government Services

The publication, *Consultation Document for a Future Policy Paper on Pan-European Government e-Services* (2002),[63] [40] highlights the possibility of risk when the development of government e-services inadvertently results in the erection of barriers to the continued development of a single market and associated freedom of movement. While e-services have potential users across the Union and should be open to cross-border users, the consultation suggests, citizens may be prevented from interacting with a national public administration other than their own, so generating confusion and inevitably greater costs. Examples given include:

- central to enterprise: on-line applications for public procurement and company registration, central to enterprise
- for citizens: work study e-services that perhaps have social security consequences for citizens crossing borders for work or study

[63] http://europa.eu.int/comm/enterprise/consultations/government_e-services/documents/consultation_document.pdf Consulted 24th April 2002

A major policy objective therefore should be to ensure that e-services are open and accessible to citizens and enterprises in other member states. The consultation (4/04/02) aims to establish the needs of European enterprise and citizens for e-services provided by a state other than their own.

5.1.3.5 OECD

In OECD countries, e-public sector processes and structures are being designed to deliver more efficient and effective services and also to protect deeper constitutional values that can maintain public confidence in government. In pursuing the notion of e-government, these countries are using new technologies to provide more convenient access to public information, improve the quality of public services and make it easier for citizens to have a say in government.

Public policies and service delivery will need to adapt quickly and become increasingly customised. This will therefore have inevitable consequences on traditional hierarchies, which have been designed partly to keep service delivery and policies uniform. According to an OECD report *Knowledge Management: learning by comparing experiences from private firms and public organisations* (2001),[64] [41] governments will have to be more reactive and deliver services closer to the customer. However, with the globalisation of information and increased international people and capital mobility, traditional public service monopolies are increasingly in competition with foreign organisations delivering similar public services.

While all the OECD countries provide government information online, the quantity and range varies considerably. The first step to going on line involves digitising government information, the second stage is delivering interactive services to citizens. Tax collection is one of the areas in which countries have made the most progress in terms of web accessibility and citizens can pay their taxes online in a number of countries. Sweden, for example, has proposed criteria for providing central e-government services 24 hours a day, seven days a week. The Swedish Agency for Public Management helps to develop Swedish administrative policy and also ensures that electronic infrastructure in the public sector is open and secure.

Some countries are also increasing access to e-government information and services by making the Internet available in public libraries, schools and public spaces. Portugal and Spain have both installed public kiosks for e-government services and Internet terminals can now be found in some Paris metro stations.

According to the OECD document *The Hidden Threat to E-Government* (March 2001) [42], it is inevitable that government will experience some level of failure in the transformation to e-government. While large public IT projects can pose great political risks, ministers and governments must be held to account for their decisions in regard to e-government development. Not only are vast amounts of money lost when projects fail, opportunities to increase efficiency and effectiveness are also sacrificed.

Aiming to make the public sector smarter for the benefit of citizens, politicians and civil servants, most OECD countries have formulated ambitious plans for

[64] http://www.olis.oecd.org/olis/2001doc.nsf/c5ce8ffa41835d64c125685d005300b0/c1256985004c66e3c1256a5b00489d23/$FILE/JT00109192.DOC Consulted 24th April 2002

implementing e-government. Governments need to be able to manage the risks connected with these ambitious developments rather than ignore problems.

5.1.3.6 E-government: Benchmarking Electronic Service Delivery

The purpose of the UK report, *eGovernment: Benchmarking Electronic Service Delivery* (2001) [43], is to compare the UK Government's progress against G7 and other leading nations: Australia, Canada, China, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, The Netherlands, Spain, Sweden, and the USA. Key achievements in relation to demand, supply, change and capability are outlined and the study highlights particularly innovative and advanced e-government developments to 2001. In particular, the report displays key characteristics of joined-up, citizen-focused service delivery. For example:

- portals and advanced PKI developments in Australia
- Government of Canada portal
- the Service-public portal and associated PKI capability in France
- ESD scheme which is fully transactional in Hong Kong
- e-broker services in Ireland
- SHS e-link system which facilitates joined up government in Sweden
- UK OnLine portal and the Government authentication gateway in the UK
- Firstgov portal and the associated sub-portals in the USA.

In examining international developments, the report highlights where good progress is being made in plans for e-government.

5.2 Method

We viewed existing research, reports and a variety of websites available from national websites: these sources are listed as footnotes. Some additional material is drawn from personal communications and attendance at international conferences.

5.3 Findings: Best practice use of e-Forms in the Public Sector

Government makes the transition to e-government, according to *Europe's Readiness for e-Government* (2000) [44], when the public sector digitises its processes and interactions, whether internal or external, with business or with the public. This report suggests e-government can be divided into four different stages:

- Transmit — essential government information is made available on-line
- Interact — two-way communication between government and public is facilitated with a central focus on feedback. E-government will not work unless citizens and businesses adapt to new formats of service provision, or act on the information and feedback mechanisms offered.
- Transact — government makes binding transactions available on-line

- Integrate — information, feedback and on-line transactions are combined into a convenient format. The aim at this stage is for customer/citizens to be able to access all the information they need, fulfil all their obligations and receive all services to which they are entitled from one place, for example, a portal or series of services (p. 24). While government tends to see opportunity to centralise services, local authorities feel they are best placed to develop portals since they are closer to the citizen.

e-Forms come in during the transactions phase.

5.3.1 Issues of Particular Relevance to Government

5.3.1.1 Access

A key objective of e-government is to establish more open and inclusive structures. Thus the aim is to establish more open government and a general statutory right to access an expanse of official records and information. This open-ness combined with access to information underpins support for greater democratic participation. In addition, citizen access is a pre-requisite to e-public service delivery. Ease of access via one portal is less confusing and so more user friendly (see Bertelsmann Foundation Report *Balanced e-Government: E-Government — Connecting Efficient Administration and Responsive Democracy*, 2002) [45]. E-public services must ensure it is socially inclusive, increasing opportunities for able-bodied and disabled citizens to access a broad range of electronic services in the same way. Strategies to overcome the digital divide and ensure digital inclusion are paramount.

5.3.1.2 Privacy and Security

One of the key challenges of greater open-ness and freedom of information for the public sector is the need to ensure that the scope of access is appropriate and that confidentiality is never impaired. Data must be maintained and protected. The challenge is to develop appropriate infrastructure solutions that can ensure the greatest amount of open-ness while ensuring appropriate levels of security.

The principle of privacy is universally accepted. However, the interpretation and implementation of privacy is a sensitive issue and varies widely across different countries. According to the *Initiative for Privacy Standardization in Europe (IPSE) Final Report*[65]:

> *Privacy is recognised as a fundamental human right which is protected by various instruments within Europe, notably the European Convention on Human Rights. The protection of privacy is a matter of concern to individuals, consumer associations, civil libertarians and legislators. As we move forward with electronic commerce and government online, the issue of protection of personal information comes into sharper focus, both with respect to individuals' commercial transactions online, in their roles as*

[65] http://www.cenorm.be/isss/Projects/DataProtection/IPSE/IPSE-FinalReport.pdf Consulted 22nd April 2002

> *consumers, and as citizens relating to their governments. In both cases, the right of privacy, for example the right to be let alone and to freely browse the internet without fear of surveillance, and the need to have information well protected in this publicly accessible networked world, have sparked major consumer concerns.*

There is also a great deal of concern and interest, in the wake of the destruction of the World Trade Center, about the need for a new balance between privacy and public safety, data retention, and law enforcement and intelligence needs for data.

In Europe, regulation on the protection of privacy has been government-led, and driven by the European Data Protection Directive of 1998. Individual governments have passed their own data protection laws, such as the UK Data Protection Act that came into force in 2000. In effect, the Directive prohibits the transfer of personal data to non-European Union nations that do not meet the European "adequacy" standard for privacy protection. With an increasing potential for personal data to pass between countries, some degree of standardisation is desirable.

In contrast with Europe, the approach in the USA and other countries is self-regulatory, in which trade associations or professional bodies define their own codes of practice, often accompanied by a seal of compliance that is taken away from any organisation that breaks the code of practice. USA's approach is embodied in the Safe Harbor Privacy Network[66], which defines seven principles, with the intention of bridging the differences between the US and European approaches to data protection. It then provides a streamlined means for US organisations to comply with the Directive. The Safe Harbor was accepted by the European Union in 2000.

The Safe Harbor principles address Notice (to the individual), Choice (by the individual), Onward Transfer (of data), Security, Data Integrity (data must be relevant to its use), Access (by the individual) and Enforcement (of the principles).

Some countries believe that electronic ID cards will simplify e-government organisation and implementation (*Europe's readiness for e-government*, 2000 [44]). Italy, for example, has piloted electronic identity cards with around one million cards having been issued up until autumn 2001. France also has a citizen ID card that is free of charge and carries a magnetic strip. Belgium is interested in developing citizen ID cards. The UK and Ireland have not reached any consensus on the issue of ID cards; however, Ireland is considering a Public Services card that would not legally be an ID card.

5.3.1.3 Citizen-centred Vision and Citizen Involvement

e-Government must be customer driven as well as services oriented, according to a report titled *E-Government: A roadmap for e-government in the developing world* (2002)[67] [46]. Further, the report suggests, if e-government generally is in the

[66] http://www.export.gov/safeharbor/, US Dept of Commerce's Export Portal. Consulted 24th April 2002

[67] This report reflects the collective experiences that a group of knowledgeable officials from cities with outstanding e-government programmes in the developing world — including Brazil, Chile, China, Denmark, Egypt, India, Israel, Mexico, South Africa, Tanzania, Thailand, the United Arab Emirites,

business of serving customers, then citizens must be involved and may even be considered key e-government experts. It is critical, therefore, to assess citizen needs and solicit their input — especially with projects designed to serve the public directly. The fundamental theme of this report — which focuses primarily on the *uses* of the technology rather than the technology itself — is that:

> *e-Government is about transforming government to be more citizen-centred. Technology is a tool in this effort.* (Page 2).

All e-government services should be piloted, the report argues, with the full participation of citizens before a government invests in or embarks on a full-scale, nationwide version of the project, for without this pilot-and-citizen involvement scheme, any e-government project can be very risky both in terms of cost and success.

5.3.1.4 Trust

To ensure the public will be responsive partners in building successful e-government services, it is important to build trust in government. Quite clearly, lack of trust will lead to failure of service delivery or serious delays in e-government initiatives and public service delivery plans. The DIFFUSE project's Guide to Trust Services [68] defines a system of trust:

> *A System of Trust is an environment whereby entities (Administrations, Businesses, Consumers) may trade or transact with each other with the confidence that all entities are who they claim to be, conduct business in accordance with their functional obligations, and in which all exchanges between parties are secure.*

Media of all descriptions should be used to communicate the citizen-centred e-government vision. *E-Government: A roadmap for e-government in the developing world* (2002) [46] suggests emphasis should be placed on highlighting competence to increase transparency, accountability and predictability of rules and procedures, also offering a weapon against corruption. An example of protection against corruption offered is Mexico's Federal Government 'Compranet,' designed to curb corruption by automating procurement procedures (p.10).

The UK Office of the e-Envoy's *Trust Services Framework*[69] [47] uses the term Trust Services:

> *Trust Services are the means by which all e-government users (whether providers or clients) can have confidence in the services they use.*

Trust is ensured by sound principles of non-repudiation, evidence of receipt, commitment to payment and integrity of data.

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and the United States — wish to offer to others following the path to e-government. Available from: http://www.pacificcouncil.org/pdfs/e-gov.paper.f.pdf Consulted 24th April 2002

[68] http://www.diffuse.org/trust.html Consulted 22nd April 2002

[69] Summarised at http://www.e-envoy.gov.uk/publications/consultations/trustservices/summary.htm Consulted on 30th April 2002

This is rather a narrow view, however, based solely on the technology and the mechanics of the transaction. There are many "soft" factors that influence levels of trust, such as level of optimism; degree of control; sharing of values; quality of interaction; and the reputation of the other party.

According to *Better Public Services Through e-Government* (2002) [37], the public will only be prepared to interact with departments electronically if the service is easily accessible, if they can visualise benefits and, importantly, if they trust the system being developed by specific departments. The public's existing perceptions of departments may influence expectations and if suspicion and low expectations already exist, then low trust levels of electronic services and the use of e-forms are also likely. Departments may help to alleviate suspicion and build trust by using intermediaries such as banks and post offices, where people already have experience of electronic service transactions on a routine daily basis.

The European Group of Public Administration's Quality and Productivity Working Group acknowledges this, and hypothesise that the issues of quality, satisfaction and trust are closely linked. [70] They suggest that quality of service leads to greater satisfaction in services. Services are the main means by which people's attitudes to government are formed, and satisfaction in services is therefore likely to influence levels of trust.

Not only might better services increase trust, but also increased trust on the part of citizens is likely to lead to better morale in the public authority, and in turn to yet better services. Increased trust within and between public authority departments might well be influenced and, in turn, influence quality of service.

Such theories are neither universally accepted nor well validated, and SmartGov provides an ideal opportunity to explore the relationship between quality of service and trust.

5.3.2 Principles of Best Practice

Production of best practices is an organised attempt to learn from the successes and failures of others. The aim is to identify the best possible solutions to address a given situation or problem. While inevitably most cases will want to dwell on their successes rather than failures, it is hoped by this approach to highlight where things are problematic or may not have quite gone according to plan, and so minimise the possibility of repeating known mistakes. Reporting successful models will help identify components that can drive positive development in the future.

5.4 Findings: Examples of e-public services

5.4.1 Finland

Finland recently passed legislation on electronic transactions that provide guidance for the whole administrative process, from filing a request to getting a decision. The Citizen Network Form Service ensures that citizens are not only able to find and

[70] http://www.kuleuven.ac.be/facdep/social/pol/io/egpa/index2.htm Consulted on 30th April 2002.

complete forms on-line, they are also able to sign them and send them over the Internet. It is possible, for example, to file a change of address or apply for a TV viewing license. In addition, it is possible using data-sharing to offer pre-completed forms such as census forms and tax returns based on data shared from other organisations. Public and private companies operating in Finland are able to submit VAT returns in electronic form. A public-private partnership (PPP) allows the authorities to outsource the reporting function, reducing the requirement to make all the necessary facilities available. Companies operating in Finland who choose to do so can now submit a number of official returns in a completely electronic format. The smart ID card in Finland will make possible a range of additional e-services.

5.4.2 France

While take-up of the Internet is lagging behind the UK and Germany, administrations in France provided public access to most government services and documents by the end of 2000. Service-public,[71] the interministerial portal replacement for www.admifrance.gouv.fr, was designed to focus on answering users' needs and simplifying users' relations with Government agencies and services. From here, it is possible to access public sector information and a guide to practical services. In 2001, the government spending on public sector information systems rose to 5.5 billion francs.

The official gateway to the French civil service[72] provides access to French civil service information on-line. It is possible to download forms of choice from a subject list. These need to be read with Acrobat Reader software, printed out and sent back when completed to the relevant civil service. The logo "CERFA" and the number marked at the bottom confirm the authenticity of the form. The civil service is obliged to accept these forms under Decree no. 99-68 of 2nd February 1999 relating to making administrative forms available on-line, Art. 4.

Over 50% of the most requested forms have been made available on-line. By spring 2002, more than 650 forms could be accessed on-line, *e.g*. tender for public contracts. A system called Public Teleservices could be used to make certain announcements on-line, such as a declaration of property exchanges, declaration of employment, *etc*.

e-Government: Benchmarking Electronic Service Delivery (2001) [43] indicates one of the key lessons learned by the French Government is that it is necessary to frequently revise strategies and respective project goals to keep in line with customer expectations.

5.4.3 Germany

The Federal Government of Germany's *BundOnline 2005*[73] e-government initiative — a major element of the comprehensive modernisation of the administration — has pledged that on-line access will be available to internet-compatible services by 2005. The intention is for 100 federal authorities to offer 376 services in whole or in part

[71] www.service-public.fr Consulted 23rd April 2002

[72] service-public.fr Consulted 23rd April 2002

[73] www.bundonline2005.de Consulted 29th April 2002

over the Internet within the next four years, according to Otto Schily, the Minister of the Interior.[74] Further, *BundOnline 2005* would ensure that the citizen and industry would be able to use the services of the federal administration more simply, faster and cheaper. The intention would also be to increase satisfaction with the political and administrative spheres and improve the situation of Germany as an industrial location. Services of the federal administration have been analysed in detail and a joint Internet strategy set for the whole service portfolio. Tasks have been structured and centralised and a precise timetable set for the next four years.

On 14 November 2001, the Federal Government adopted a concrete implementation plan for the entire service spectrum of the federal administration as a framework target. The implementation plan has ascertained a funding requirement of Euro 1.65 billion. Up to 25 per cent of the funding will be needed for the re-organisation of administrations and changes to internal processes, whilst about 10 per cent will be spent on staff training. Basic components that can be used in many authorities, such as a payment platform, will be provided centrally. This includes for instance:

- Calling up 400,000 conscripts per year for a medical check
- 172,000 applications made by conscientious objectors
- 50 million customs declarations made
- 20 million applications for federal subsidies

According to the Minister of the Interior, the complete processing of these applications will be online by 2005. The date of online provision has been set for the whole service portfolio of the federation and for each individual service. A number of frameworks to be used by the entire federal administration will be built at central level, including forms on the Internet, the possibility of making payments online or data security by means of digital signature. The central service portal at *www.bund.de* will be routinely upgraded to provide central access to the Federal administration.

Common standards and central solutions will be implemented when appropriate. The structure and administration behind different forms are likely to be similar, be it for a police certificate of good conduct, a customs export declaration or the recognition of a conscientious objector. However, they will have different content and addresses, according to Otto Schily in a statement delivered at the Federal Press Conference on 11th December 2001.[75] Mr. Schily indicates that common features will be exploited and shared to prevent authorities developing the same IT applications simultaneously. The intention is to build up competence centres for central solutions. While central solutions will be sought, it is recognised that unless there is differentiation between local and central tasks, there will be simultaneous multiple developments, an uncontrolled approach and hence additional expenditure estimated at 500 million Euro. Mr. Schily outlines the reasons for central activities as a need to:

- avoid double work and parallel development

[74] http://www.bundonline2005.de/en/bilanz/umsetzung/data/pm12_11_01.html Consulted 29th April 2002

[75] http://www.bundonline2005.de/en/bilanz/umsetzung/data/statement.pdf Consulted 29th April 2002

- pool resources and expertise in light of continuing shortage of staff in IT/Internet field
- ensure sustainability over all authorities
- reduce coordination barriers between the federation, the Länder and the local authorities by focusing on one interface
- ensure rapid development of the overall plan coordinating the individual projects, *e.g*. by means of a monitoring office (p.5).

Pilot projects for repayment of student loans and digital application procedure for local authorities to produce passports and ID cards already indicate that on-line services will not only be simpler but also faster than their manual counterparts. Thus the considerable financial investment is a sound investment for the future. Mr Schily estimates savings in the region of Euro 400 million a year in the federal administration with application procedures, subsidies and public procurement promising the greatest savings potential.

5.4.4 The Netherlands

In the Netherlands, it is hoped that 25% of transactions will be on-line by 2002. Schonfeld (2001, p.15) in *E-services of municipalities dependent on the quality of document management* [48], states that 342 out of a total of 506 Dutch municipalities are currently present on the internet. The organisation and maintenance of websites is being stimulated by the Minister for Urban Policy and Integration of Ethnic Minorities, who has announced that 25% of local government services provided by local authorities need to be on-line by the end of 2002. Every municipality was offered a subsidy under the condition that they place at least 150 products on the website relating to services provided by the councils, to be ordered preferably from the livingroom.

The aforementioned article indicates that Dutch websites mainly provide information about council services or e-services, for example opening hours, addresses, requirements to get a passport or licences *etc*. It is also often possible to make enquiries about services using e-mails. In addition, it is possible to negotiate arrangements on an interactive website, for example, when obtaining a dog-licence. Citizens in The Hague are able to access 20 services electronically, *e.g.* ranging from ordering a garbage container to reporting street litter. In the Amsterdam borough of Zeeburg, it is possible to order a passport electronically but applicants need to prove identity and collect it in person.

Smaller municipalities are on par with large municipalities in providing e-services. A ranking list is being kept with councils, ministries and provinces to illustrate examples of good and bad practice.[76] Notably, citizens are being informed, through a ‘right to know’ principle, so that they gain better insight into how transactions, goods, and services in public and private arenas are being organised. The provision of this kind of electronic information is supportive of e-democracy.

[76] www.advies.overheid.nl Consulted 21st April 2002

The development of e-services on the internet can be divided into 5 phases (Schonfeld, 2001 [48], p.15):

Phase 1: *Informative*: the sheer provision of information. The VIAG has developed a toolkit to help design a portal for 'every question from society'.

Phase 2: *Interactive*: the provision of the possibility to exchange information. This is when electronic communication begins. In principle, incoming emails need to be treated in the same way as 'traditional' incoming snail mail. It needs to be recorded, registered, and stored.

Phase 3: *Pro-active/personalisation*: in this phase citizens receive personalised information (*e.g.* 'your passport will expire in a months time').

Phase 4: *Transaction*: The support of electronic services. Important in this phase are developments related to digital signatures. The PKI taskforce of the government is looking for a way to realise a secure infrastructure to provide the transactions between citizens and government.

Phase 5: *Integration*: The coupling of data. Important issues in this phase are the privacy aspects.

Schonfield further suggests that in The Netherlands, re-organisation of the 'back office' is to support the realisation of joined up e-services via the internet. Politicians have claimed that partition in the civil service detracts from citizen friendly service. Government is complex, supporting an enormous amount of processes. For example, in the municipality of Den Bosch, there are about 250 processes, all with their own dynamics. In relation to this, one could ask whether it is wise to let the municipalities develop the implementation of the phases listed above at their own pace. Too big a difference between councils could arise or they could start rushing each other.

Recent research [the article doesn't state which research] shows that many citizens do not have a lot of trust/confidence in electronic government and they would not easily trust their data to it (Schonfield, 2001 [48]). However, the current belief is that the internet provides a golden opportunity to give information to, and get information from citizens, to provide insight in the process of policymaking and to increase involvement.

Governmental information needs to be structured so that citizens don't have to search for it themselves. The quality of documentation at ministries is a point of concern. Governmental organisations need to redesign the backoffice so that digitalisation of services is possible. For this there is a new standard ISO 15489. Archiving of documents, for example, needs to be improved. The Clinton Government raised the budget to 300 million dollars a year to improve the archive of the American government (Nara). President Bush raised it another 20 million.

Finally, Schonfield (2001) suggests, true citizen-focused presentation of governmental information and documentation asks for a clear structure and organisation based upon rules and standards.

5.4.5 Scotland

The Scottish Executive (*i.e*. Scotland's government) *Vision For 21st Century Government In Scotland*[77] created a Modernising Government Fund, from which a range of public bodies can win financial awards to help them implement new forms of service delivery, particularly those involving information and communication technologies. The Executive aims to deliver public services and public information characterised by their citizen focus, by choice of means of access, by convenience, by effectiveness, and by continuous improvement. In addition, public service and delivery is to overcome barriers to better delivery and is to be driven by the needs of citizens, commitment to a customer service delivery culture, customer choice, ease of use, and accessibility of services to all. In this vision for 21st century Government, it is important to develop measurable improvement in accessibility and quality. Best practice is sought and exchanged freely, gains from joint delivery and joint procurement are exploited, and data sharing and convergence in technical standards to improve services is welcomed. Wherever possible new technology is being exploited where it delivers improved services.

Openscotland,[78] the overarching brand for a wide range of Scottish Executive initiatives and activities, is actively engaged in promoting social justice by providing better public services and better access for the people of Scotland.

According to the *First Electronic Service Delivery Progress Report*, (2002) [49] around 66% of services provided by the Executive, its agencies and non-departmental public bodies were now available online. However, the report adds, most of these services related solely to the provision of information. Some transactional services were on-line and work continues to ensure development of others.

5.4.6 Sweden

In Sweden there are three democratically elected levels of government: the Parliament at national level, the county council at regional level and the municipality at local level. They each have different areas of responsibility and different duties. Sverige Direkt[79] (SwedenDirect), the official Internet portal for information about Sweden's public sector, has over 3500 links including Parliament, Government and all authorities, councils and government agencies. It is accompanied by a Citizen's Guide and 'light law' section. Swesearch provides access to 8 million web resources and links to different portals, for example, schoolnet, environet, culturenet, and legal and business needs portals.

5.4.7 UK

Modernising Government (1999) [50], a White Paper produced by the Cabinet Office in the UK, placed information age government at the centre of service modernisation processes. The UK government have made it plain that public services are to be for

[77] http://www.scotland.gov.uk/government/c21g/vision_c21g.asp Consulted 23rd April 2002

[78] http://www.openscotland.gov.uk/ Consulted 23rd April 2002

[79] www.sverigedirekt.riksdagen.se Consulted 24th April 2002

the convenience of citizens and businesses and not the service provider. Organisations of the public, private and voluntary sectors are involved in supporting effective electronic service delivery. Targets were set at 25 per cent by 2002 and 100 per cent by 2005. UK On-Line was launched by the UK Prime Minister in September 2000 to ensure universal access to the Internet by this date. *open.gov.uk* was launched in 1994, and its integrated service portal operated by UK On-Line[80] provides a single point of entry to a wide range of government services and information.

The report *Better Public Services Through e-Government* (2002) [37] points out that 52% of government services are on-line, but despite high spending on government websites, few of the routine contacts that citizens have with state agencies are yet being carried out electronically. Most services provide on-line information for the general public, for example, how to apply for a passport. However, while more than half of the 524 services routinely provided by departments have on-line presence, only seven services actually provide grants and benefits on-line and none actually collect revenue. More active marketing is needed to highlight the existence of these services to the public, and users should be encouraged to use on-line services and e-forms by making them cheaper and quicker than filling out paper based forms.

Many departments are developing services that will allow the public to carry out transactions electronically, for example, getting a driving licence and receiving benefits. *Better Public Services Through e-Government* (2002) [37] suggests that significant improvements are possible in departments' operational efficiency. Benefits are that many of the labour intensive manual processes, for example, receiving and vetting claims for grants, can be provided electronically, and only more complex cases need to be dealt with manually. Private sector experience has indicated expectations up to 10 per cent savings in running costs from converting to electronic applications. However, one risk is that while services may meet delivery targets they may not in the end be accepted and used by citizens. Targets, therefore, may have to be refined to include measures of take-up of e-services and use of e-forms (*Better Public Services Through e-Government* (2002) [37].

5.4.7.1 e-GIF

The UK Government in 2001 defined an *e-Government Interoperability Framework* (e-Gif)[81] [51]. The main thrust of e-Gif is adopting internet and world wide web standards for all government systems. This approach is designed to be pragmatic and aims to reduce the costs and risk of operating information technology systems while keeping the public sector in step with the global internet revolution.

Adherence to e-GIF standards is mandatory for public sector bodies.

e-GIF utilises market driven open standards to enable the seamless flow of information from back end systems to citizen and business, and between government organisations.

[80] www.ukonline.gov.uk Consulted 23rd April 2002

[81] http://www.e-envoy.gov.uk/publications/consult_index.htm Consulted 29th April 2002

5.4.7.2 GovTalk

To support e-Gif, the UK Government has launched the UK GovTalk™ initiative. This is a Cabinet Office led, joint government and industry forum for generating and agreeing XML schemas[82] for use throughout the public sector. UK GovTalk™ is also now being used for wide consultation on a number of other e-government frameworks and documents. The site also provides best practice guidance, FAQs, advice on training and toolkits, and outlines the UK GovTalk™ management processes.

While Government in the UK has set the target that 100 per cent of services should be available on-line by the end of 2005, *Better Public Services through e-government* (2002) [37] points out that there is realisation that not everyone will have access or will want to use internet services. However, because of the high standard of choices set out in that report, i.e. "greater choice, convenience, speed, accessibility and efficiency," departments will be expected to encourage public use of e-government services and set the structures in place for the people to do this.

The first schema, "View Council Tax", and supporting documentation has been published on the GovTalk website[83] with the consultation period running until 6 April 2002. More information can be found at the idea-knowledge web-site.[84]

5.4.7.3 UK Guidelines

The UK Government has produced Guidelines for UK Government Websites [52]. They are accompanied by a Handbook for web management teams and provide simple, practical guidelines, motivation and advice on various aspects of making websites usable and accessible. However, they give little guidance on forms, stating only that

> *Older PDF forms cannot be filled in electronically even when downloaded. Simple webforms are still the preferred alternative for forms (Guidelines for UK government websites, p. 14).*

5.4.7.4 Tameside, England

By Spring 2002, Tameside Council[85] had just under 50% of identified administrative processes on-line. Using on-line forms[86], citizens in Tameside are able to pay council tax, poll tax, business rates, mortgages, car park fines and some types of general debt. Appointments may be made using on-line forms to discuss a range of civic processes, for example, use of the local market, local town halls and community centres, also to make appointments for birth registration, death registration, and marriages at registry offices. It is also possible to make appointments for pest control services and skip hire and to purchase a range of goods or services, for example, radar keys, scaffolding

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[82] Schemas can be found at: http://www.govtalk.gov.uk/interoperability/xmlschema.asp Consulted 18th April 2002.

[83] www.govtalk.gov.uk Consulted 10th April 2002

[84] http://www.idea-knowledge.gov.uk/ Consulted 10th April 2002

[85] www.tameside.gov.uk Consulted 22nd April 2002

[86] https://cfpub.tameside.gov.uk/creditcard/f109paymentparse.asp?func=0 Consulted 21st April 2002

permits and composters. By New Year 2003, it is expected the Citizen Portal will provide access to relevant information. A password is being sent after registration to each citizen's address to ensure that all transactions between Tameside local authorities and individual citizens remain private and secure.

5.4.7.5 Lewisham, England

Lewisham Council[87] set out its vision for a more connected community and a more connected Council in the paper *Where its @* (2000)[88] [53] This document was designed to generate change locally across all sectors; thus, the scale and pace of change for the community, local businesses and local people (as workers and as learners) was outlined. The Council has been actively engaged in establishing the architecture for change to happen using three dimensions: organisational, technical and cultural. Partnership between the Council and the private sector helped redesign business processes and web-enable service delivery. However, while the technical base of service management is being refashioned, it is recognised that organisational and technical changes will only deliver results to citizens if they are accompanied by cultural changes within the Council itself. Designing services with citizen involvement and systematic training and development of staff are essential elements of the Lewisham e-agenda.

Lewisham Council recognised that in the transition period prior to developing e-public services, local people would want to retain an element of choice, for example, call centres or face to face interaction. Without effective management and redirection of resources, it was recognised, the costs for public service delivery might increase over the interim period. Using Lewisham Online, local people are able to pay council tax, business rates, housing rents and leasehold charges. A range of Planning Service e-forms are available on-line. All on-line transactions are secure and backed by BT Trustwise.

5.4.7.6 Salford, England

In Salford[89], it is possible to use e-forms for Council Tax and Benefits Service transactions using the internet. On-line forms are available for: change of occupier notification; deceased estate exemption; single person discount; structural alteration; student discounts; and severely mentally impaired discount.

5.4.8 Australia

In 1997, the Prime Minister of Australia announced the Government's policy *Investing for Growth*, alongside a plan to establish the Commonwealth (*i.e.* the national government) as a leading-edge user of technology, including making all appropriate services internet-deliverable by 2001. Internet services were to complement — not replace — existing written, telephone, fax and counter services, and to greatly improve the quality, user-friendliness and consistency of those services.

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[87] www.lewisham.gov.uk Consulted 22nd April 2002

[88] https://digitalid.trustwise.com/globalServer/cgi-bin/haydn.exe Consulted 22nd April 2002

[89] www.salford.gov.uk Consulted 22nd April 2002

The Electronic Transactions Act (1999)[90] (Table 2) established the national legislative framework to ensure that electronic transactions were legally effective as off-line transactions (*e-Government: Benchmarking Electronic Service Delivery*, 2001 [43])

Table 2 Australia Electronic Transactions Act (1999)

Electronic Transactions Act (1999)

The Act creates a light handed regulatory regime for using electronic communications in transactions. It facilitates electronic commerce in Australia by removing existing legal impediments that may prevent a person using electronic communications to satisfy legal obligations under Commonwealth law. It also gives business and the community the option of using electronic communications when dealing with Government agencies.

The Act identifies four types of requirements under a law of the Commonwealth that can be met in electronic form:

(a) a requirement to **give information** in writing (section 9);
(b) a requirement to **provide a signature** (section 10);
(c) a requirement to **produce a document** (section 11); and
(d) a requirement to **record or retain information** (section 12).

A person must consent to receiving electronic communications. Consent can be inferred from a person's conduct. The consent provisions do not extend to Commonwealth entities. This would be inconsistent with Government's commitment to delivering all appropriate Commonwealth services electronically. Because the Commonwealth is excluded from the operation of the consent provisions, they **must** accept electronic communications. However the Commonwealth is given certain specific powers. The ability to satisfy a legal requirement electronically is conditional upon a person complying with any particular information technology requirements for communication with a particular Commonwealth agency, including any particular electronic signature technology that must be used, and any action a person must take to verify receipt of information. The Act provides that any other laws that deal specifically with the use of electronic communications to satisfy writing, signature, production or retention requirements will be preserved. It is not the intention of the Act to override any existing or future laws that deal specifically with these matters.

Extract from: http://www.law.gov.au/publications/ecommerce/Welcome.html. Consulted 22nd April 2002.

In April 2000, *Government On-line*, the Commonwealth Government's strategy, outlined priority areas. The Government also defined a set of minimum online requirements or Online Information Service Obligations.

By November 2000, a government online portals framework had been endorsed to provide a customer-focused, coordinated approach to the Commonwealth's online presence. This framework describes the staged implementation of a number of portals identified on the basis of customer groups or subject matter areas.

These portals are to improve the reach of services to the intended customer groups and facilitate linked transactions across agencies. They are intended to complement

[90] www.law.gov.au/publications/ecommerce/Welcome.html Consulted 29th April 2002

rather than replace existing and future agency and subject websites. The *Government On-line Progress Report* (2000) [54] indicated that 90% of services were on track to deliver services by December 2001. Progress is monitored every 6 months.

In 2001, the National Office for the Information Economy (NOIE)[91] in Australia published a *Better Practice Guide* to help improve Internet Delivery decisions. The guide contains a number of components, one of which aims to help managers decide whether, and how best, to use the internet to deliver government programs and services. The intentions are to provide information to support decision-making and point to other sources of helpful information and advice. Along with this information, pre-knowledge of government policy and legislation is vital to the development of public services.[92]

The Government Online Strategy[93] requires Commonwealth departments and agencies to implement the *Online Information Service Obligations* (OISOs).[94] This means that various types of information must be provided online, and that all forms for public use be provided online.

There are several possibilities. First, online provision might involve forms that can be printed out by clients, filled in by hand and submitted via the post. Second, online forms could be provided in formats that can be filled in online, then printed out and submitted via the post. Third, online forms can be provided that can be filled out and submitted online. Business cases, including costs and benefits, the nature of client groups and other factors will determine the types of online forms that agencies provide to their clients.

To further assist agencies in the online provision of forms, NOIE has produced a helpful *Better Practice Checklist* to providing forms on-line.[95]

FedLink is a Virtual Private Network using Internet Protocol Security standard protocols to provide secure communications between agencies across the Internet (*e-Government: Benchmarking Electronic Service Delivery, 2001* [43]). Public key infrastructure enables digital authentication and more secure transactions using digital signature certificates (*e-Government: Benchmarking Electronic Service Delivery, 2001* [43]). Lessons learnt in developing e-service delivery in Australia are listed in Table 3.

Table 3 Australia: Lessons learnt in developing e-service delivery

Australia: Lessons learnt in developing e-service delivery

[91] www.govonline.gov.au Consulted 8th April 2002

[92] http://www.anao.gov.au/4A2568E90082F19D/AutoFrame?OpenFrameSet&PageDb=4A2568E900832087&Unid=24207BE847D8C7CD4A256A3E0025D82A Consulted 22nd April 2002

[93] http://www.govonline.gov.au Consulted 9th April 2002

[94] http://www.dofa.gov.au/infoaccess/oiso.html Consulted 9th April 2002

[95] http://www.govonline.gov.au/projects/strategy/better_practice/checklists/1_forms.htm Consulted 9th April 2002

- Difficult to change service delivery models - need to strike better balance between collaboration and leadership
- On-line government services should be easy to find and easy to use
- Coherent investment strategy needed
- Flexibility to deal with uncertainty
- Skills and knowledge of management need to be increased
- On-line service delivery to be integral part of mainstream government activity
- Understanding client needs central
- Need to ensure those less likely to use internet are digitally included

Extracted from e-Government: Benchmarking Electronic Service Delivery, 2001: 27 [43]

5.4.9 Canada

The Government of Canada is considered one of the leaders in delivering citizen-focused e-services. Consultation with both citizens and business is central to developing the government on-line initiative. A redesigned Canada web-site[96] was launched in 2001, sectioned into three specific areas at the point of entry: Canadians, non-Canadians and Canadian Business.

It is possible to access e-forms in three ways: subjects[97] (Table 4); audiences[98] (Table 5); and other forms by A-Z index.[99] Table 4 indicates that the format for forms for categories organised under the 'subjects' heading are: 16 on-Line transmissions; 21 printable forms; 3 permitting choice of both; 1 (application for a health/care card) that varies by province; and 1 (how to apply for government ID cards) that permits various different transaction formats.

Table 4 Subjects

Subjects	
Category	**Transaction Format for Forms**
Consumer Information	3 On-line Transmissions; 2 Printable Forms
Culture, Heritage and Recreation	1 On-Line transmission; 5 Printable Forms
Economy	2 Printable Forms
Environment, Natural resources, Fisheries and Agriculture	3 On-Line Transmissions
Financial Assistance and Entitlements	4 Printable Forms
Health	Varies by province; 1 Printable Form
Jobs, Workers, Training and Careers	1 Printable Form
Justice and the Law	2 Printable forms
Life Events: Lost ID	Various Formats
Public Safety	2 On-Line Transmissions 2 choice OLT/PF

[96] www.canada.gc.ca Consulted 23rd April, 2002

[97] http://canada.gc.ca/form/eformssubjects_e.html Consulted 23rd April 2002

[98] http://canada.gc.ca/form/eformsaudiences_e.html Consulted 23rd April 2002

[99] http://canada.gc.ca/form/eformsatoz_e.html Consulted 23rd April 2002

Rural and Remote Services	1 On-Line Transmission; 2 Printable Forms
Science and Technology	4 On-Line Transmissions; 1 choice OLT/PF
Taxes	1 On-Line Transmission; 4 Printable Forms
Travel at home and abroad	1 On-Line Transmission; 2 Printable Forms
Extracted from: http://canada.gc.ca/form/eformssubjects_e.html	

Table 5 suggests it is necessary to consult both the business pages and the non-Canadians section to distinguish the format for eforms. However, it is noted that where it is possible to distinguish the format, there are 23 printable forms in use and 3 on-line transmission formats listed under the category of 'Audiences'.

Table 5 Audiences

Audiences	
Category	**Format for forms**
Aboriginal Peoples	3 Printable Forms
Canadian Business	Consult e-forms pages for 'Canadian Business'
Canadians Living Abroad	1 Printable Form; 1 On-Line Transmission
Children	4 Printable Forms
Newcomers to Canada	4 Printable Forms
Non-Canadians	Consult e-forms pages within 'non-Canadians'
Persons with Disabilities	2 On-line Transmissions; 2 Printable Forms
Seniors	5 Printable Forms
Youth	4 Printable Forms
Extracted from: http://canada.gc.ca/form/eformsaudiences_e.html	

The category 'Other Forms by A-Z Index contains a large variety of very well described easy to understand printable forms and On-Line Transmission Forms.

5.4.9.1 Ontario

The province of Ontario has developed a range of integrated on-line services and a sophisticated range of on-line forms.[100] These forms are available in various formats including HTML, Adobe Acrobat PDF, and also forms that can be completed entirely on-line. However, due to internet security and privacy issues, most completed forms have to be returned to government offices by fax, mail or in person. The government hope to concentrate attention in the future to developing wholly on-line transactions.

5.4.9.2 Ottawa

SmartCapital[101] is a multi-million dollar initiative boasting 20 online service projects, the engagement of over 50 development partners, and the ability to define, develop and deliver multiple services to online users. SmartCapital is accelerating the development of online services for all sectors of the City of Ottawa working in collaboration with numerous partners, to transform the way in which citizens interact with one another and with others, for example, in public and private institutions. The SmartCapital Portal is a gateway to all public online services in the community (Wilson & Huntley, 2001) [55]. The intention is to develop a one-stop shop for

[100] http://www.gov.on.ca/MBS/english/forms/index.html Consulted 22nd April 2002

[101] http://www.smartcapital.ca/ Consulted 22nd April 2002

citizens to access local information and transactional services provided by government, education, healthcare, business, tourism and community agencies.

5.4.10 Hong Kong

Billed as the world's first bilingual public and commercial services portal for the community, ESDlife[102] was launched in December 2000. The Electronic Service Delivery (ESD) Scheme is a key initiative of the "Digital 21" Information Technology Strategy of the Government of the Hong Kong Special Administrative Region (HKSAR).[103] The main aims of ESD are to deliver high quality public services to the community in an innovative manner; to improve the efficiency and reduce the cost of delivery of public services; and to foster the development of electronic commerce in the HKSAR. Table 6 outlines examples of ESD services.

Table 6: Hong Kong: Transactional ESD Services

Hong Kong: Transactional ESD Services
Filing tax returns Renewal of driving and vehicle licences Application for business registration Payment of Government bills Registration as voter Search for jobs Registration to become a volunteer Reporting change of address Booking of appointment for ID card registration
Extract from (*e-Government: Benchmarking Electronic Public Services,* 2001)

e-Government: Benchmarking Electronic Public Services (2001) indicates that services may be located via three mega-channels: People; Business and City; or by nine service types: Transport; Citizenship; Education; Employment; Finance; Household; Leisure; Business; and Tourism. There are over 3,000 public access computer facilities in district offices, community halls, post offices, public libraries and social centres.

Full services (including public information kiosks) were launched on 19 January 2001. Over 90 kiosks are available via a clickable location map[104] with up to a hundred to be available phase by phase.

Over 110 different types of electronic public services are covered by more than 40 government departments and agencies in the public sector.[105] Further options are envisaged to allow up to 6.8 million citizens to make bookings for sports and leisure facilities as well as marriage registration.

A new Law, *The Electronic Transactions Ordinance*, puts electronic transactions on the same legal footing as their paper based counterparts. Electronic authentication is

[102] www.esdlife.com and http://www.esdlife.com/home/eng/default.asp Consulted 29th April 2002

[103] http://www.info.gov.hk/itbb/english/it/esd.htm Consulted 29th April 2002

[104] http://map.esdlife.com/ESDmap/revamp.asp?lang=E Consulted 29th April 2002

[105] http://www.compaq.com/casestudies/pdfs/hongkong.pdf Consulted 29th April 2002

by use of digital certificates and data is automatically encrypted to transmit only to recipient departments. The ESD Scheme will accept a wide range of electronic payment methods, *e.g*. debits card, credit card and smart card. Advanced technologies such as SSL (Secure Socket Layer) and SET (Secure Electronic Transactions) will be used to provide secure electronic payment. The ESD system will adopt advanced network and system security technologies and policies. For some applications requiring authentication of identity, the users will have to use digital certificates issued by recognised certification authorities (such as Hongkong Post e-Cert) for making digital signature and for encryption of the data involved, so as to ensure the safety and security of the electronic transactions made.

5.4.11 Japan

Managed by the Ministry of Public Management, Home Affairs, Post and Telecommunications, the Japanese e-government portal[106] was launched in April 2001 as a one-stop access gateway for on-line services. Supported by a search engine, citizens may explore the portal for information contained in the sites of government agencies. Information about transactions with government is also available and some e-forms are downloadable. The intention is that by 2003, it will be possible to access online services and submit documents from the portal. Goals are that 4% of electronic filing should be available by 2001, 50% of all procedures by 2002 and 98% of all procedures by 2003. Infrastructure for electronic filing with Government Public Key Infrastructure is to be operational by 2002 with electronic tax declaration and payment to be available from January 2004. Web-based electronic tendering, which began in 2001, should be operational by 2003. The local government WAN should cover all local governments by 2003. An interconnection between Kadsumigaseiki WAN and the local government WAN to start in 2002. Another aim is that 57 types of internal administrative work will be digitised by 2002.

5.4.12 USA

America's Social Security Administration (SSA) are striving to improve interactions with the public using state-of-the art tools for electronic and automated services.[107] The aim is to ensure these services meet the broad range of needs of the public. It is hoped to expand the services offered electronically via the Internet, allowing customers to complete their business with SSA at the initial point of contact. They are pursuing an aggressive strategy that will provide on-line functionality while addressing resource issues and privacy and security safeguards. This will enable SSA to improve service and realise some administrative efficiencies by increasing access to public information and forms, while developing more complete on-line data collection and processing functions. SSA have already implemented 65 high-volume forms which can be downloaded on http://www.ssa.gov. In FY 2000, SSA implemented a service of benefit planners on SSA's website as well as a new electronic retirement benefit application. In FY 2001, SSA made additional services

[106] www.e-gov.go.jp Consulted 29th April 2002

107 http://www.ssa.gov/cgi-bin/cqcgi/@ssa.env?CQ_SESSION_KEY=CJNWJRDXLCWJ&CQ_CUR_DOCUMENT=1&CQ_RESULTS_DOC_TEXT=YES Consulted 2nd April 2002.

available to the public via the Internet, adding six new self-initiated actions that can be processed on the Internet. These new services are described in the Electronic Service Delivery narrative of the "Major Issues Facing SSA" section of their report. The intention is to continually adjust the overall Internet strategy based on public input and activity on the Internet.

While e-government is central to future developments, government employees can often be left out of discussions about the appropriate technology necessary to provide high-quality e-services to the public.[108] Among other issues, the FPE/AFT Digital Government Task Force, which met for the second time January 14-15, 2002, in Washington, D.C., is tackling this in an effort to fill the research gap on how e-government will affect government employees. The task force concentrated on four topics: adequate work force training; legal issues surrounding privacy and security; health and safety in the digital age; and the effects of technology on workload and workplace policies, such as telecommuting.

5.4.12.1 Seattle

The city of Seattle has a clear portal design,[109] which joins up 50,000 local authorities and office websites and additional external institutions. Information is available about specific services and a variety of on-line forms and services are available for both citizens and businesses.[110] The scope of use provides opportunity for citizens to interact with the Municipal Court, for example using on-line forms to reschedule jury duty. It is possible also to request a marriage ceremony, and volunteer to work at a city court or to interact with city utility services. Citizens may pay utility bills, report streetlight trouble and request tips for energy conservation. They may also report water pollution and make arrangements for garbage or recycling collections. The city library, community resources, consumer information and senior citizen resources are available on-line and it is possible to access information and interact with Transportation Services and the Fire and Police Departments. Application forms for funding public arts may be downloaded and completed on-line.

Citizens and businesses may gain information and utilise forms for city, county and state licenses, permits and taxes;[111] They may also gain information about a variety of issues surrounding income tax, and it is possible, for example, to search forms and services set up within the Internal Revenue System,[112] and/or e-file tax returns using e-forms.[113]

[108] http://www.aft.org/fpe/ Consulted 2nd April 2002.

[109] www.cityofSeattle.net Consulted 20th April 2002

[110] http://www.cityofseattle.net/html/business/online.htm Consulted 20th April 2002

[111] http://www.cityofseattle.net/html/business/permits.htm Consulted 20th April 2002

[112] http://www.irs.ustreas.gov/ Consulted 20th April 2002

[113] http://www.irs.ustreas.gov/individuals/display/0,,i1%3D1%26genericId%3D15035,00.html Consulted 20th April 2002.

5.4.12.2 Wisconsin

The State of Wisconsin Internet Forms Catalog offers an efficient means of storing electronic forms and provides a common interface for accessing State forms.[114] Regardless of their location, the catalog[115] offers possibilities for employees using their allocated user names and passwords to facilitate forms access and completion. The software used is JetFormFlow,[116] the stateside electronic forms standard. More forms are to be converted and added to the catalog. The forms were developed so that you can fill, save, print and/or e-mail the form. Users fill in the forms using graphical user interface (GUI) screens. All forms have a print option based on the current paper based form. When printed, this form looks like the paper form people fill out by hand.

5.4.12.3 Virginia

Virginia e-government[117] provides on-line resources and tools to connect citizens and government.[118] Citizen services[119] include helping people get a certified copy of a birth, death, marriage or divorce certificate within 2 to 5 days. It is possible for individuals who have a child support case to access data related to their child support payments, balances due, and case status. This private and confidential information is available only to the individual parties in the case. No name, address or other identifying information is returned. However, it is necessary to know your child support case number and PIN (last 4 digits of your Social Security number) to access the data.

Each citizen in the state can request a Personal Identification Number, My Virginia PIN,[120] which may then be used as a single secure access method to receive government services and conduct secure transactions with all participating agencies and organisations. The PIN is not necessary, however, for all online government services, which may be accessed without this level of security.

Among the range of on-line transactions offered are: insurance verification, driver's licence renewal, vehicle registration renewal and a consumer advice portal.[121] Business services[122] include a best practice searchable database to provide users with a range of solutions to improve mission or organizational performance. A Department of Health Professions Licensee Search facility is available, and job and employment related on-line services make it possible to view job listings, post resumes, and access

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[114] www.doa.state.wi.us/eforms/docs/user%5Fguide.doc Consulted 3rd April, 2002.

[115] www.wiscforms.com Consulted 3rd April 2002

[116] In 2001, the shareholders of JetForm Corporation approved a motion to change the name of the company to Accelio Corporation

[117] http://www.myvirginia.org/portal/government/index.htm Consulted 20th April 2002

[118] http://www.myvirginia.org/portal/government/tools.htm Consulted 20th April 2002

[119] http://www.myvirginia.org/portal/services/citizenservices.htm Consulted 20th April 2002

[120] http://www.technology.state.va.us/ecommpresskit/MyVAPIN.pdf and https://www.dmv.state.va.us/dmvnet/pin/pin_admin.asp Consulted 20th April 2002

[121] https://www.dmv.state.va.us/dmvnet/online.asp Consulted 20th April 2002

[122] http://www.myvirginia.org/portal/services/businessservices.htm Consulted 20th April 2002

employer services. A range of legislative and election information is also available along with lobbyist services and professional services. Ifile[123] is Virginia's tax filing service that allows citizens to file and pay Sales/Use and Employer Withholding taxes on-line, while iReg[124] allows citizens to register their businesses on-line with the Department of Taxation.

5.4.12.4 New York City

In 1997, the new York State Governor's Task Force on Information Resource Management Local Government Subcommittee commissioned a guide, *Tying a Sensible Knot: A Practical Guide to State-local Information Systems*[125] [56] to outline the forces that shape the state-local environment and best practices for conducting state-local information systems projects in an environment of devolution and boundary spanning policy and program initiatives. Underpinning future developments, project participants indicated, through surveys and interviews, that certain best practices should go into the design, development and operation of any state-local information system.

Nineteen best practices were outlined as areas of attention that need to be continually addressed throughout the project. These best practices included:

- define a shared purpose and scope
- choose a well-skilled and respected leader
- recruit the right project team
- sell the project to decision makers
- communicate often and clearly with stakeholders
- finance creatively
- adopt tools and techniques that can manage complexity
- look for existing models
- understand and improve processes before technology is applied
- match the technology to the job
- use industry standard technology
- integrate with related processes and practices.

Nine fundamental principles were also identified to guide state-local information system initiatives. All of the principles supported a shared vision among the stakeholders. Among major principles were to:

- understand the full range of local and state conditions
- commit to serious partnerships

[123] https://www.ifile.tax.state.va.us/BusinessLogin.jhtml Consulted 20th April 2002

[124] https://www.ireg.tax.state.va.us/Login.jhtml Consulted 20th April 2002

[125] http://www.ctg.albany.edu/resources/pdfrpwp/iis1.pdf Consulted 22nd April 2002

- communicate as if survival depended on it

NYC.gov is the city's main e-government portal. The ability to access information and conduct transactions online was extremely important after September 11 2001 when many New Yorkers found e-mail and Internet access to be their only reliable form of communication. The city's well-developed e-government portal allowed emergency information to be posted and updated regularly during the crisis.

The site has more than 30,000 pages of content and 100 online transactional services. Online transactions include paying parking tickets, viewing property statements, obtaining birth and death certificates, or finding out your recycling and garbage collection schedule. All forms appear to be in HTML.

5.5 Public Management Policy

The arrival of new ICTs and the internet in all spheres of life demand new and innovative visions of public service delivery. New public management policies are needed to achieve a balance between efficient and effective administration and opportunities for citizen input electronically. Scholl (2001) [57] argues that most public service organisations perform their tasks with an eye to the public interest rather than focusing wholly on profit. However, managerial decisions — particularly those in the current changing landscape of public service delivery — affect everyone pursuing the organisation's objective. In providing an alternative to corporate governance, Scholl argues, stakeholder theory suggests governance should include and balance a multitude of interests so that managers can develop balanced strategies to cope with changes inside organisations operating in a corporate landscape (Scholl, 2001, p.738) [57].

5.5.1 New Public Management

The OECD Public Management Policy Brief, *Government of the Future (*2001) [58], states that governments need reform to become more responsive to society's needs. In particular, better, faster and more government services are necessary to meet the public's requirements. To deal with more complex forces, governments need to seek greater co-operation with others involved in service delivery. Together, a more knowledgeable citizenry, closer collaborations with the public services sector, and a more proactive approach to find the most appropriate technological solutions, offers a range of new possibilities. However, governments need to re-establish trust in their ability to produce positive results by taking account of people's needs and by providing choice, democracy and transparency. Governments, *i.e.* government officials and political leaders, must interact with the public to familiarise them with the need for reform, the actions needed to actualise reform and what has been successfully achieved so far. Easy to understand, simple language is needed to explain the form of improved services. Hierarchical structures need to be replaced with more horizontal networks supportive of interaction rather than predominantly top-down one-way communication.

Negative internet culture, according to Schedler & Scharf (2001) [38], may be one of the biggest obstacles to optimising the benefits of e-government and the implementation of e-public services. Increasingly, decision-makers in the public sector realise that a positive internet culture plays a crucial part in new public

management. However, while organisational structures need to be underpinned by new cultures supportive of change, a more positive internet culture may take some time to establish. Schedler & Scharf (2001: 782) [38] point to specific features of a new e-government culture:

- Transparency: By allowing processes to be monitored and evaluated over the Internet, e-government suggests a transparent administration.
- Orientation to customer needs: Guidelines are that the public sector has customers and there is need to accept their requirements
- Culture of trust: A culture of co-operation is necessary between stakeholders and co-workers if departments and individuals are to share information.
- Disposition to technology: Technology disposed ambience is an essential pre-requisite for success of e-government.

In striving to establish fertile conditions for reform, governments must anticipate public needs rather than respond to crisis resulting from unmet needs. There is need also to consult and work with stakeholders through both formal and informal networks of communication to distinguish a public agenda. In essence, governments need to avoid reform fatigue while supporting flexible leadership and devising appropriate training programmes to proactively champion change.

Balanced e-Government (2002) [45] points out that knowledge and comparison of best practice is desirable, useful in identifying major challenges, and necessary in the reform of public administration. New public management procedures must be capable of recognising the needs of citizens as well as creating greater efficiency and transparency. It is recognised, however, that single strategies do not exist to achieve good e-governance. "Balanced" e-government, according to the Bertelsmann Foundation report (2002) [45] must combine e-administration, *i.e*. information based services for citizens, with e-democracy, defined as "the re-inforcement of participatory elements" (p. 3). Client oriented service provision goes hand in hand with the provision of better electronic opportunities for citizens to make their views known and so influence public life.

5.6 Conclusions and Future Directions

The power of IT and networked communication has the potential to improve service delivery and transform the business of government. The concept of 'open government' requires information that should be available to citizens and is more easily accessible by them, while at the same time taking account of the individual's right to privacy and the need for security. The projects reviewed here have demonstrated some of the effective ways of designing, developing and implementing e-forms and have also highlighted some of the key problems.

To broaden the review reported here, however, we suggest that more empirical research needs to be organised using surveys, interviews and up to date documents on state-of-the-art projects. SmartGov should take a particularly keen interest in these IST projects: eGov, PRISMA, IMPULSE and CITATION.

5.6.1 Indicators of Best Practice for Development and Use of e-Forms in the Public Sector

Notwithstanding the need for additional empirical research, it is possible from an examination of the data reviewed here to identify a number of best practice elements important in the design, development and use of e-forms in the public sector. Best practices are split into the following categories: Management; Access; Privacy and Security; Citizen Centred Vision and Citizen Involvement; Trust; and Balance. The category of Management is further sub-divided into: Skills and Training; Sharing Solutions and Pointing the Way; Back Office Organisation; Identify/Listen/Respond; Policy Input; Alliances and General Issues, as follows.

5.6.1.1 Management

Skills and Training

- Ensure good leadership and breadth of thinking, and recruit the right project team with appropriate skills
- Ensure on-going skilling and adequate training

Sharing Solutions and Pointing the Way

- Ensure simple procedures and centrally co-ordinated approach to service provision
    - Identify and share common features across and between different organisations; and build competence centres for central solutions
- Ensure metadata registry and fruitful search mechanisms, and support the public in finding required locations and e-forms
- Create catalogues of e-forms available and keep updated as old forms are converted to electronic format
- Produce a range of better practice checklists to providing e-forms

Back Office Organisation

- Ensure back office re-organisation
    - to transform complex transactions into simple e-form procedures
    - to ensure interactivity in public services
- Ensure synergy between strategic thinking and backroom development strategies

Identify/Listen/Respond

- Adjust overall Internet strategy based on public input and activity on the internet, and revise departmental strategies and goals to keep in line with the public's emerging expectations
- Identify international benchmarking as a strategy for innovation in design and use of e-forms
- Refine service delivery targets to consider measures of citizen take-up

- Identify and manage risks and problems rather than ignore them
    - Departments should be open in highlighting examples of bad as well as good practice so that others can benefit from these insights
    - Identify and tackle potential sources of distrust
- Ensure flexibility and ability to address obstacles, recognise emerging issues and encompass changing priorities

Policy Input

- Help shape future policy by informing policy makers

Alliances

- Establish new alliances with software manufacturers
- Ensure close association with appropriate collaborative technologies and applications crucial in meeting e-form communication objectives
- Look for existing models that work elsewhere; understand and improve these processes
- Understand the full range of cultural and legal contexts and conditions
- Commit to appropriate partnerships
- Ensure innovative ideas are sold to decision makers

General Issues

- Define and maintain shared vision, purpose and scope, tempered with common sense
- Avoid under or over ambitious goals and realise it won't be cheap or easy
- Avoid overly complex organisation, technology and/or legal frameworks
- Ensure on-line transactions are as legally binding as off-line counterparts
- Adopt appropriate tools and techniques able to manage simple and complex transactions, and match appropriately to need
- Develop one-stop on-line services and clear route to e-forms
- Ensure coherent investment strategy
- Ensure continuing focus on innovative design and use of e-forms
- Adopt simple language in explaining the form of improved services
- Ensure that hierarchical structures are replaced with more horizontal networks that are supportive of interaction, rather than predominantly top-down one-way communication.
- Ensure a culture that is more receptive to the internet

5.6.1.2 Access

- Ensure 24-hr public access

- Ensure emergency information is available and updated regularly in event of crisis

5.6.1.3 Privacy and Security

- Tackle issues of privacy, security and data protection as they come into sharper focus and ensure the minimum amount of data is disclosed when completing any given transaction

5.6.1.4 Citizen Centred Vision and Citizen Involvement

- Ensure citizen-centred vision and approach, organising pilot-and-citizen involvement schemes wherever possible; this will also help to build trust in use of e-forms
- Ensure the public are directed to appropriate IT awareness raising courses to gain adequate level of skills; this supports the development of trust
- Promote widespread use and encourage and enable people to use e-forms, *e.g.* active marketing to alert the public to existence of e-services and advantages of using e-forms
- Visualise the public as stakeholders/partners, consider citizens as expert, ensuring citizen input to delivery of e-forms that are closer to the customer
- Ensure open channels of communication; listen to public feedback in regard to e-service delivery and use of e-forms; and manage and respond to conflict rather than avoid or ignore it.
- Routinely publicise current activity in key areas of e-form development
- Evaluate effectiveness of success of e-government services through participatory dialogue and interaction; *e.g.* ensure key focus is on public feedback rather than complaints.
- Ensure those less likely to use the internet are digitally included

5.6.1.5 Trust

- Ensure good information to create better understanding about the role of e-forms
- Ensure good interaction between all the stakeholders involved in developing and using e-forms
- Tackle fear of technology and human resistance to change
- Develop cultures that are appropriate to the modernising government agenda, delivery of e-public services and use of e-forms
- Ensure transparency and accountability
- Ensure confidentiality is never impaired
- Build trust by using intermediaries such as banks and post offices, where people already have experience of electronic service transactions on a routine daily basis
- Protect deeper constitutional values that can maintain public confidence in government while ensuring efficient services and effective e-forms

5.6.1.6 Balance

- Balance visibility, accessibility, convenience, clarity of information, and citizen focus, by offering joined up services, a portal to information systems, customer centred service, and advanced PKI developments
- Balance open-ness and citizen inclusion with privacy issues, public safety, security of electronic transactions and common policy on security of electronic networking
- Ensure balance between collaboration and leadership to change existing service models
- Balance diversity in European Union with possibilities for standardisation where degree of standardisation is desirable
    - Avoid erection of barriers to continued development of single European market and associated freedom of movement; and ensure e-services are open and e-forms accessible — where appropriate given the scope of cultural and legal differences — to citizens and enterprises in other member states

6 Current Situation in the Participating Public Authorities

6.1 Infrastructure and Technologies

6.1.1 The General Secretariat for Information Systems of the Greek Ministry of Finance

6.1.1.1 Overview

The General Secretariat for Information Systems of the Greek Ministry of Finance has developed and deployed the TAXIS system as the backbone of the Greek taxation scheme. The TAXIS system includes applications for seventeen major taxation areas (income, VAT, real estate, corporate taxes, vehicles etc.) and currently operates on 282 local tax offices all over the country. The TAXIS system uses two types of servers:

1. One central server, located at the premises of GSIS, which stores all taxation data.
2. Regional servers, one per tax office, with each such server storing the taxation data pertaining to tax payers of the specific tax office.

End-users are equipped with personal computers, which are loaded with the appropriate client applications. Applications request data from the respective regional server and, if the data is locally available, it is returned directly to the requesting client; otherwise, the regional server fetches the data from the central server and then returns it to the client. Similarly, updates are always submitted to the regional server, which arranges for their propagation to the central server in an asynchronous manner.

This architectural approach allows for optimised performance and resilience to communication failures or failures of the central site. The overall architecture of the TAXIS system is depicted in Figure 4.

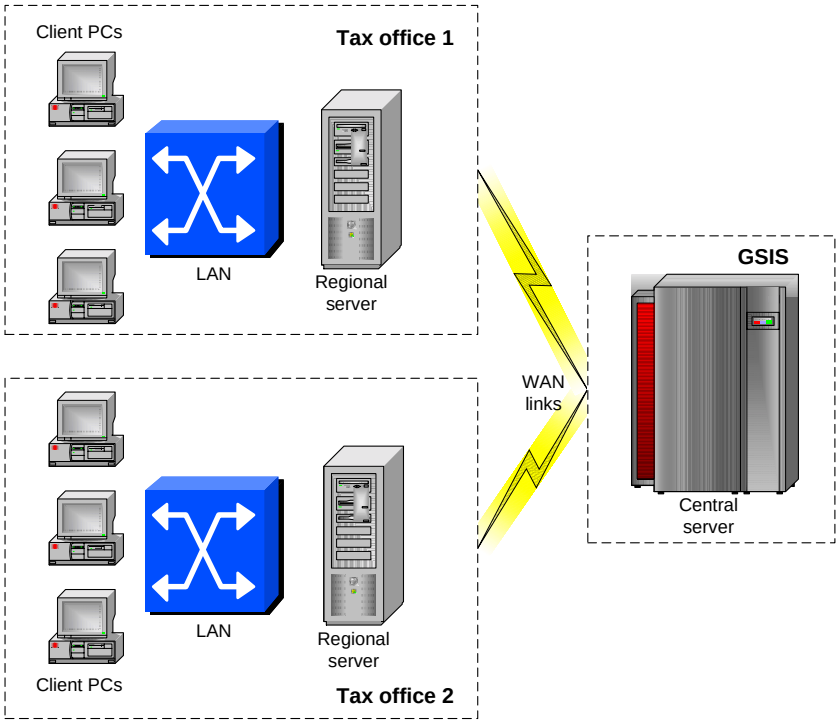


Figure 4 Architecture of the TAXIS system

The TAXIS system operates on top of a private network interconnecting the local tax offices and the central GSIS premises. Consequently, data stored and services provided by the regional and the central servers are available to employees of the local tax offices and employees and managers located at the GSIS headquarters.

The GSIS, aiming to provide high quality services to the citizens has developed and deployed the TAXISnet system, which allows users to fulfill certain taxation obligations through the Internet, relieving the need for their physical presence in tax offices. Currently, the services available through the TAXISnet system are:

1. Periodic VAT declaration submission
2. Annual income tax declaration submission
3. Submission of suppliers lists, customers lists, debit balance sheets and credit balance sheets.

These services are of a *transactional nature*, in the sense that user input is initially received by the TAXISnet system and subsequently forwarded to the TAXIS system where it is processed. Since no physical connection exists between the two systems for security reasons, data is transferred in an off-line fashion. Processing results are then returned to the TAXISnet system and the users are electronically notified regarding these results. Input data and/or processing results may be additionally forwarded to the local tax offices, as appropriate. For debit periodic VAT declarations, submitting citizens and enterprises pay the amount due through the banking system, using any applicable method (credit cards, internet banking, ATMs etc). Banks then forward the payment information to the GSIS by uploading a suitably formatted file via the Internet, and this information is first imported to the TAXISnet database and subsequently to the TAXIS database. Finally the banks are notified regarding the status of each payment they submitted.

The architecture of the transactional services provided by the TAXISnet system is depicted in Figure 5.

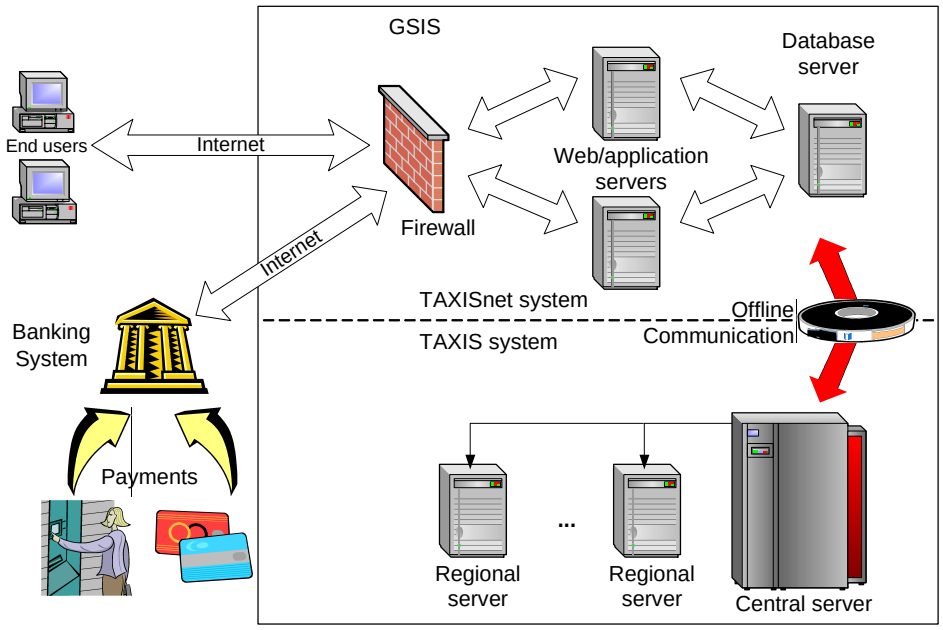


Figure 5 Transactional services architecture

Besides these transactional services, the GSIS offers through its web site the following services with an informational nature:

1. Search engine for activity descriptions
2. Information about the results of tax return form processing.
3. VAT number validation
4. Forms downloading

Informational services operate under a different scheme than transactional services: informational services retrieve in a batch manner data from the TAXIS system, and these data are then made available to the public through search forms, menus, or other appropriate web interfaces. All processing is performed at the TAXISnet system, and no user input or request is ever returned to the TAXIS system or processed by it. The architecture of the informational services provided by the TAXISnet system is illustrated in Figure 6.

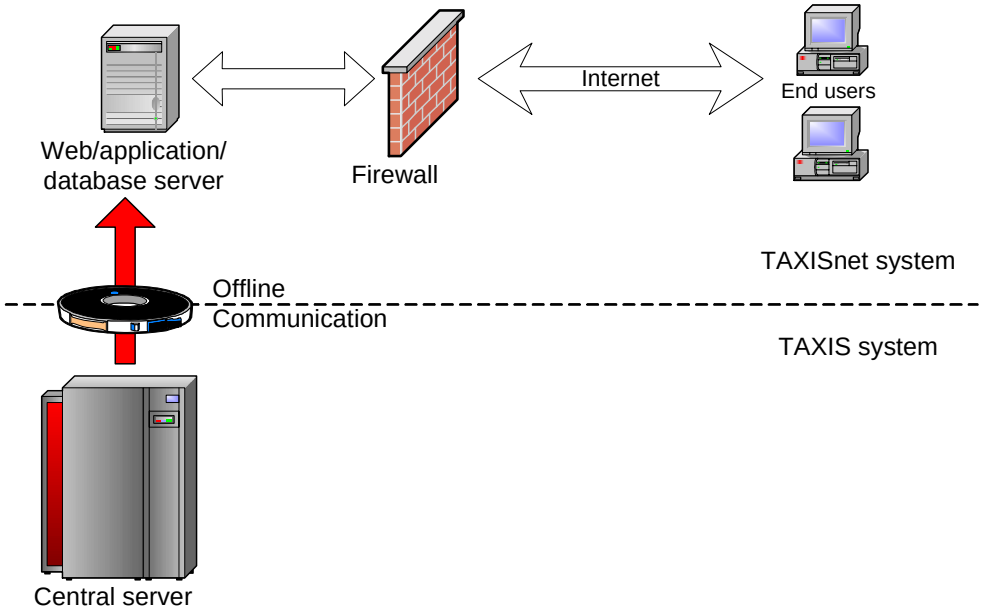


Figure 6 Informational services architecture

In the following paragraphs of this deliverable the hardware, software and practices employed for the TAXISnet system are described in more detail. Additionally, the components of the TAXIS system involved in the operation of the TAXISnet system are outlined, together with the methods used for data interchange between the two systems. Finally, we focus on the methodology and procedures followed for developing additional services and deploying them through the TAXISnet system.

6.1.1.2 The TAXISnet system

The TAXISnet system is the portal through which citizens and professionals (e.g. accountants) access the electronic services of GSIS, transactional or informational. Users of transactional services are required to *register to the service*, i.e. complete a procedure through which they enter identification data to the system. Data entered by the users are then matched against the corresponding data of the tax registry and, if the match is successful, users are provided with a user name and a password, which they can subsequently used to authenticate themselves to the system. Informational services do not require such authentication mechanisms, since no personalised transactions are executed and no private data are disclosed.

For maintainability and flexibility purposes, transactional services run on a different platform than informational services. In the following paragraphs, the hardware and software components of each service delivery platform are listed.

6.1.1.2.1 Hardware

6.1.1.2.1.1 Transaction service delivery platform

The transactional service delivery platform of TAXISnet system comprises of the following components:

1. One database server with 30GBytes of disk space and 1 GByte of main memory.
2. Two application servers providing the Web access facilities. The first server is a single processor machine with 2 GBytes of main memory, while the second server has four processors and 2 GBytes of RAM.
3. One firewall and intrusion detection server.
4. One server for e-mail communication.
5. Network devices for interconnecting the various servers.
6. One filtering router for connecting the platform to the Internet.

6.1.1.2.1.2 Informational service delivery platform

The informational service delivery platform of TAXISnet system consists of the following hardware:

1. One server hosting the database services and the web access services. This is a single processor machine with a total disk capacity of 26GBytes and main memory equal to 384 MBytes.
2. One server hosting DNS services, mail services and acting as a second-level firewall to the server providing the web services. This server runs on a single processor and is equipped with 128MBytes of memory, while its hard disk capacity equals to 6,5 GBytes.
3. One server for firewalling.
4. Network devices for interconnecting the various servers.
5. One filtering router for connecting the platform to the Internet.

6.1.1.2.2 Software

The servers listed in the previous paragraph deliver the services through the following software:

6.1.1.2.2.1 Transaction service delivery platform

The transaction service delivery platform of TAXISnet system operates under the following software:

1. Database services are provided by the SQL Server v.7 software running on a Windows NT 4.0 Server machine.
2. Web services and application services are provided through the IIS version 4.0 software, and the Cold Fusion 5.0 module, which is plugged into the IIS service. The machines hosting these services run under the NT Server 4.0 operating system.
3. Mailing services are offered by an Exchange v. 5.5 server running on top of the Windows NT 4.0 operating system.
4. Firewalling and intrusion detection functionality are implemented using the CheckPoint Firewall product, running on an NT Server machine.

6.1.1.2.2.2 Information service delivery platform

The informational service delivery platform of TAXISnet system runs the following software:

1. Web services are provided via the Apache v. 1.3.12 server and databases services are facilitated via the Oracle v. 8.0.5 DBMS. Both these services run on Suse Linux 6.4 server.
2. DNS services, mail services and second-level firewalling are hosted on a Suse Linux v. 7.3 platform, via the integrated DNS server module, Sendmail distribution and IPChains module.
3. The first level firewalling is based on a Suse Linux 6.4 distribution with an integrated IPChains kernel-level module for packet filtering.

6.1.1.3 The TAXIS system

The TAXIS system is an extensive platform, comprising of numerous hardware, software and communication modules and spanning to 282 locations throughout Greece. However, only a specific portion of this system is involved in the delivery of electronic services; in the remainder of this section we will focus only on this portion.

6.1.1.3.1 Hardware

The TAXIS system's central server is a Pyramid Nile computer with the following characteristics:

1. 12 processors.
2. hard disks with a total capacity of 600 Gbytes. The effective capacity drops to 300 GBytes due to mirroring.
3. main memory equal to 4GBytes.

6.1.1.3.1.1 Software

The software installed and running on the TAXIS system's central server is as follows:

1. The server runs under the AIX operating system.
2. Data storage services are facilitated through the Oracle RDBMS v. 7.3.
3. Data retrieval and update requests originating from the local tax offices are processed by the BEA Tuxedo transaction processing system.

6.1.1.4 Communication between the TAXISnet and the TAXIS systems

As already mentioned, communication between the TAXISnet and the TAXIS systems is performed via off-line methods. This is a design-level decision, in order to prevent any security risks that might be introduced by connecting the taxation database to the Internet, even through a number of restrictive firewalls.

The communication scheme between the TAXISnet and the TAXIS systems, both for informational and transactional service delivery platforms, is outlined in the following paragraphs.

6.1.1.4.1 Informational service delivery platform

In the context of informational services, the main issue of data exchange is the population of databases within the informational service delivery platform with data originating from the TAXIS information system. This is accomplished via the following procedure:

1. The TAXIS system generates ASCII files containing the relevant information. These files contain one record per line, while the fields within each line are of fixed length. The generation of these files is performed through custom programs, specifically written for this purpose.
2. The ASCII files generated in the previous step are dumped on tapes.
3. The tapes are moved to the TAXISnet system and the files are extracted from them.
4. Data from the files are inserted to the databases of the TAXISnet system using custom loading programs, specifically written for this purpose.

It is worth noting that although both platforms run the same DBMS (Oracle) data exchange is not performed via the standardised DBMS mechanisms (export/import), but through ASCII files. The reasons for choosing this option are as follows:

1. The data schemata on the TAXIS and TAXISnet system are not always identical, since (a) they are optimised for different purposes (b) the TAXIS system usually contains *supersets* of the information needed by the TAXISnet system.
2. The versions of the two DBMSs are not identical, introducing compatibility issues.
3. Greek characters are not always transferred correctly through the export/import procedure.

6.1.1.4.2 Transactional service delivery platform

The data exchange scheme for the transactional service delivery platform is inherently more complex than the scheme employed for the informational service delivery platform, since it involves bi-directional communication between the TAXIS and the TAXISnet systems, to cater for the various steps of data processing. However, the fundamental data exchange mechanism remains effectively the same, i.e.

1. The source system creates appropriately formatted ASCII files containing the information to be sent to the target system.
2. The ASCII files are copied to the target system using tapes as an intermediate storage medium.
3. Data from the ASCII files are inserted to the databases of the target system using either custom programs, or wizards provided by the SQL server software.

These three steps of the data transfer procedure are employed in the following situations:

1. Copy user registration data from the TAXISnet system to the TAXIS system.

2. Copy the results of the user registration data processing from the TAXIS system to the TAXISnet system.
3. Copy the taxpayers' declarations received by the TAXISnet system to the TAXIS system for further processing.
4. Copy the results produced by the processing of the taxpayers' declarations from the TAXIS system to the TAXISnet system.

6.1.1.5 Developing new services

The development of new services for the TAXISnet platform and their deployment is a rather complex procedure, having to address the following issues:

1. Develop, install, test and deploy the web forms and associated programs that enable the citizens to access the service functionality. This step includes the analysis of user requirements regarding form content, form layout, inter-form dependencies and validation checks associated with the forms.
2. Create the appropriate data processing applications, which will handle the input collected by the service users.
3. Design and develop the programs that will facilitate data exchange between the TAXISnet and the TAXIS system, regarding the information pertaining to the newly developed service.
4. Provide an administration framework for this service, which will enable the appointed employees of the GSIS to perform a number of administrative tasks, such as account management, reviewing of submitted forms, initiation of data transfer procedures etc.

Currently, these tasks are performed using the traditional software engineering approach, since no suitable tool exists for transforming the domain knowledge that exists in the GSIS directly to operational services.

6.1.2 The City of Edinburgh Council

The City of Edinburgh Council currently provides a number of services, with most of them being information services. Thus a wide range of information is provided on-line which is searchable. At the same time interaction services are provided with a range of forms being available for download while guidance is also given. Transaction services are not currently supported but a library service is provided which allows book requests and renewals and can be categorized as a two way interaction service.

CEC performs programming work on its own for creating e-services and the programming languages that it uses are C/C++ and Visual Basic while middleware technologies are not currently used. However CEC does not use a commercial development environment for performing its programming work. The legacy systems installed in the organization are not involved in the e-services delivery model apart from the TALIS libraries system, which has an interface to the web. As far as software security is concerned CEC uses Antivirus software and generally follows the British standards regarding security.

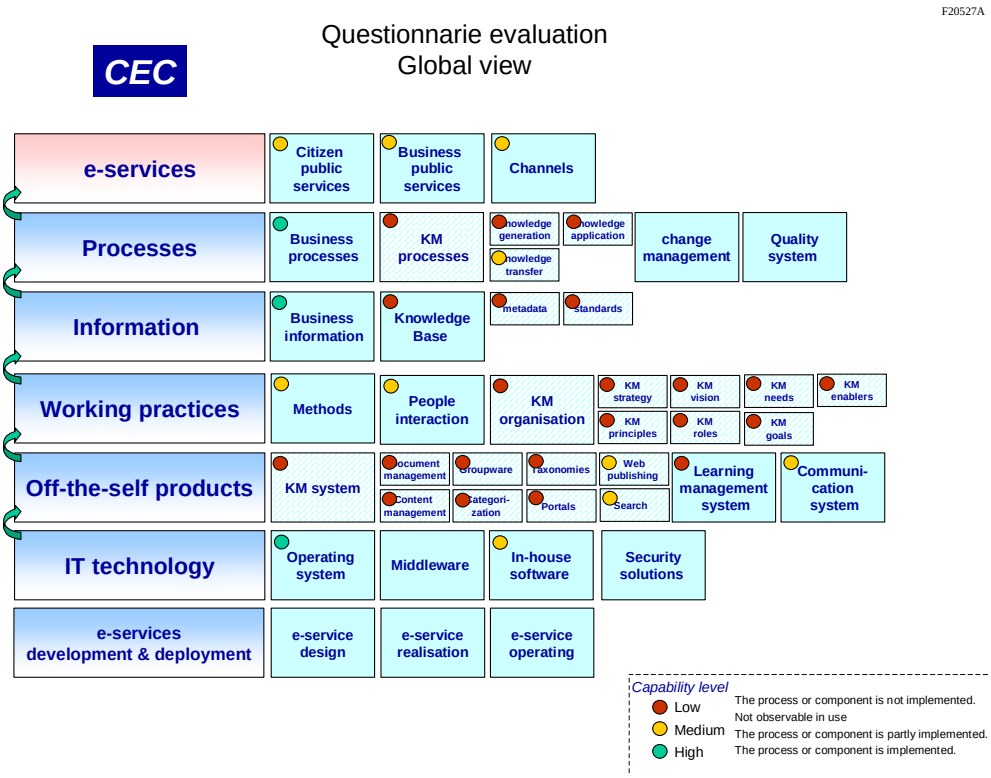
The content publishing in CEC is centralized and static and dynamic web pages are used. As far as content management CEC does not use categories or any kind of classifications for sorting documents. However they are familiar with the concept of metadata even though their uses are very limited at the moment.

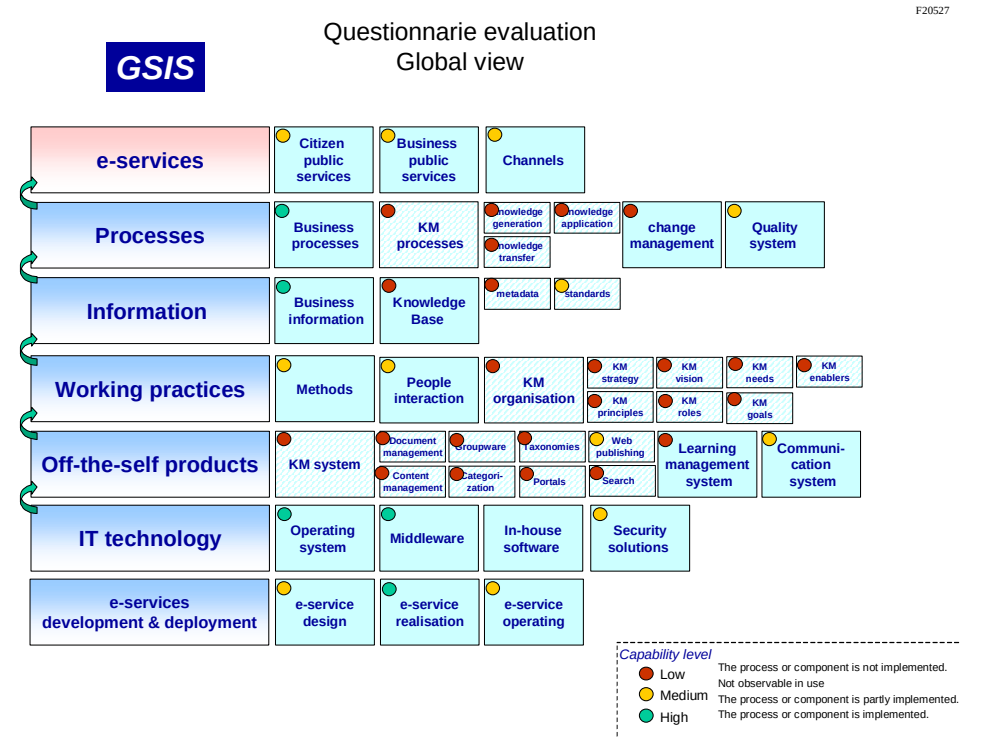
CEC is running a portal at the moment and plans to use a CRM system (Siebel version 7) at the near future. Currently there are not any user profiling, personalization or authentication mechanisms in place. Users can access the CEC portal by home PCs and kiosks.

Following standards is very important for CEC and especially UK government guidelines (www.ogc.gov.uk). However at the moment CEC is well behind in its web conformance in standards. The file formats that are used by CEC's website for distributing information currently are: HTML, PDF, MS Word, MS Power Point, MS Excel, RTF and XML.

6.2 Current situation on Knowledge management in the participating public authorities

The observed situation through the questionnaires is quite similar in both target domains: CEC and GSIS. These two situations are shown schematically in the following layered architecture:





Looking at the previous global pictures, we can state that some core components appear on the knowledge **radar screen** for both target domains (CEC and GSIS) with a low maturity level. The global view have been composed by processing the information obtained from the questionnaires, providing a wider vision of the situation and highlighting the advances carried out in the different domains of interest. A detailed examination of the responses from CEC and GSIS gear towards the

following considerations and statements concerning the current situation of knowledge management:

- Knowledge management **vision**. Up to now neither KM strategic objectives nor responsibilities have been addressed, yet CEC is more concerned about the important role of knowledge to help people in their usual activities. It is worth to mention that CEC is also now concerned about change management policies, an important aspect to be considered to be successful in the development of knowledge management strategies. This all means that increasing knowledge intensive jobs in the public administration context can be envisaged as special challenges for individuals and thus the participating authorities must provided adequate resources and facilities for learning and acquire knowledge.

- Knowledge management **drivers** and enablers. There are various e-services currently deployed in GSIS (*Tax service, Social security contributions or personal documents*) and CEC (*Tax service, VAT declaration*) that can act as driving forces to boost the definition and planning of a knowledge strategy gearing the deployment of specific KM initiatives. A smooth and controlled transition to knowledge sharing and use activities should be planned for the deployment of the pilot system. Feedback mechanism should provide a valuable information not only on system performance, but also in the degree of user adoption and satisfaction (change management measurement), and the process improvement.

- Knowledge management **processes and organisation**. No knowledge management formal activity (regarding the acquisition, organisation and delivery of knowledge assets) is been carried out in any of both participants. We only can mentioned that CEC is running a search engine (a valuable tool for future knowledge initiatives) to assist user to seek for information. Leadership and responsibilities must be allocated when planning the strategy; the creation of communities of practices gathering a common interest should be addressed in order to promote and contribute to the success of knowledge initiatives.

- Knowledge management **practices**. There exist supporting and helping practices (*e-mail based on-line support, Fans, or step-by-step guides*) that in the future should be aligned with the knowledge strategy. However there is a significant lack of team working practices and groupware facilities in use. Cause the success of any knowledge strategy to overcome the culture barriers imposed by the organisation must be reinforced by collaboration, communication and sharing spaces, such as *virtual rooms, chats, fora, and common libraries of documents,* their current absence is an important cumbersome and should be take into account to manage the change issue mainly during the pilot deployment. People must be able to communicate

their expertise so that it should be necessary to create an atmosphere of social relationships and networking to promote trust and knowledge sharing and use.

- Knowledge management **technology**. None of core knowledge management enabling products (*content and document management, collaboration and communication tools, taxonomies or learning systems*) have been integrated. But at least the technology infrastructure in use comprises the existence of an Intranet, databases, the spread use of the e-mail, and the adoption of security solutions (specially in GSIS) to protect information (basically access control policies and SSL). In the scope of this project and the pilot implementation this means that the Knowledge Base core platform of the *Smartgov* system shall not required to be integrated with any specific market or non-standard product or technology, except standard software components such as relational databases and e-mail systems.

Concluding in regards to the current situation in CEC and GSIS some assumptions can be done with a high level of probability:

- Lessons learned are not shared by individuals.
- Employees can't find existing knowledge in the right time and place.
- A lot of work is duplicated unnecessarily ("reinventing the wheel").
- A well-articulated link between public authorities strategy and KM strategy is missing.
- KM role is not understood properly.
- A shared context for knowledge transfer is missing.

6.3 Policies

6.3.1 Introduction

This section describes policies related to electronic service delivery in SmartGov's participating public authorities: the Greek Ministry of Finance and The City of Edinburgh Council.

The value of identifying these policies at this stage is that development of SmartGov can be sensitive to the policies and culture of the different public authorities. It may also be that SmartGov will have some future effect on some of the policies. Documenting the current situation will help us later to identify what those effects may be.

6.3.2 Method

Policies were identified by asking key personnel the set of questions in Appendix A in section 2 and by reading appropriate documents, both internal and external.

For the Greek Ministry of Finance, Costas Vassilakis of the University of Athens provided the answers, based on his close knowledge and understanding of their policies.

At The City of Edinburgh Council, Andrew Unsworth, Managing Consultant in Corporate Services, provided invaluable information. Andrew is at the heart of the Smart City initiative described in section 6.3.3.1.2 on page 133. Information also came from the Smart City Information Pack and the Council's web site at www.edinburgh.gov.uk

6.3.3 Policies in the Participating Public Authorities

6.3.3.1 Greek Ministry of Finance

6.3.3.1.1 Social

What are your organisation's key social policies?

The General Secretariat for Information Systems (GSIS) is a public administration agency of the Greek Ministry of Finance (GMoF) with a mission to:

- *develop technological infrastructures and manage information content, thereby providing quality services to the citizens and enterprises for all their transactions through the Ministry of Finance*
- *utilize new technologies, introducing innovative and advanced services and products, for the citizens' enterprises' and Public Sector's benefit in Greece and in the European Union*
- *take advantage of the opportunities that create added value to the Greek economy by using the know-how of its human resources*
- *contribute to compliance of the law and facilitates effective, efficient and transparent communication between the citizens and the Ministry of Finance.*

6.3.3.1.2 Service Delivery

What services does your organisation deliver?

GSIS covers taxation issues and provides statistics for interested public authorities.

What is the organisation's policy on service delivery?

Taxation services should be as simple and efficient as possible.

How centralised is the control of service delivery?

All decisions are made/cleared within the GSIS or the ministry.

6.3.3.1.3 Electronic Service Delivery

What services does your organisation deliver electronically?

Submission of VAT declarations, submission of tax return forms, submission of clients and suppliers lists, tax clearance notes.

What is your organisation's policy on electronic service delivery?

Moving to electronic services is strongly encouraged. However, no long-term planning is available.

6.3.3.1.4 Service Management (Roles, Responsibilities, Level of Formality)

Who has overall responsibility for electronic service delivery?

GSIS, in cooperation with ministry subdivisions.

How centralised is the control of electronic service delivery?

Totally.

What management structure is in place to support electronic service delivery?

A special subdivision of GSIS (TAXISnet Group) is dedicated to electronic service delivery.

How are new electronic services defined and developed?

New electronic services are usually modelled after their paper-based counterparts. Development is outsourced.

6.3.3.1.5 IT Management (roles and responsibilities)

What is your organisation's policy on management of IT systems?

IT systems are managed by permanent staff, with help from vendors or maintenance contractors.

6.3.3.1.6 Security of Information

How does your organisation ensure that data and transactions are secure?

Use of various security techniques, data validation, backups and replication.

6.3.3.1.7 Access to Information (includes privacy)

How does your organisation ensure that only authorised people gain access to data?

Use of user authentication techniques, along with physically securing critical areas.

How does your organisation ensure privacy of personal data?

By appointing trustworthy personnel to data management.

6.3.3.1.8 Re-use

How much does your organisation re-use IT analyses, designs, software modules or systems?

Not across different subsystems, to some extent within each individual system.

How does your organisation ensure effective re-use of these?

Usually performed by the contractor that develops systems.

6.3.3.1.9 Skills Development (in the PA and external users)

What is your organisation's policy on developing the skills necessary for electronic service delivery?

Employees are initially trained by the vendors, then they train other employees.

What is your organisation's policy on developing the skills that your clients need for receiving electronic services?

Clients need to have necessary web navigation knowledge. Help and step-by-step instructions are provided as appropriate.

6.3.3.1.10 Software Development

What is your organisation's policy on the development of software systems?

Software development is outsourced.

6.3.3.2 City of Edinburgh Council

6.3.3.2.1 Social

What are your organisation's key social policies?

Part of the Council's vision is to secure the highest quality of life for all in the city of Edinburgh, through the provision of excellent public services, by being close to the community and through strong civic leadership.

The Council is committed to promoting social justice: all Edinburgh citizens should enjoy a high quality of life, and the Council targets resources towards improving the quality of life of people and groups in greatest need.

The Council believes that people should have a say in the decisions that affect them: the Council will ensure that people can participate in the running of their community.

The Council works in partnership with public, voluntary, community and private sector agencies in pursuit of Edinburgh's objectives.

The Council's Social Inclusion policy identifies poverty as the main barrier that prevents individuals, families and groups in the city from sharing in and enriching the quality of its social, economic and cultural life. Poverty and exclusion are tackled on six fronts:

- *jobs:* by helping people share the quality employment produced by their city's economic strength and business opportunities.
- *income and costs:* by reducing living costs and maximising income
- *opportunity:* by including people of all ages, genders, social or ethnic background; health, disabilities or caring responsibilities, in Edinburgh's opportunities for life, work and leisure.

- *safety and good health:* by improving physical and mental well-being, reducing the impact of poor living conditions and poor diet, reducing stress such as the fear of crime, and by improving safety in all aspects of life.
- *social and family life:* by improving the quality of social, recreational and community life, especially for children and young people and their families
- *homes:* by ensuring people can make homes in secure, affordable, good quality housing, in a safe, attractive environment

6.3.3.2.2 Service Delivery

What services does your organisation deliver?

The Council provides a very wide range of services to citizens and business, including social work; housing; education; planning and building warrants; traffic and transport; road maintenance and design; registration of births, deaths and marriages; arts development; sports development; libraries; museums and art galleries; parks; environmental health; trading standards; waste management.

With over 15,000 employees, the Council is the second largest employer in the city of Edinburgh. Total funding is around €1000 million (£600 million), about three-quarters of which comes from Central Government funding and a quarter from Council Tax paid by residents in the city. Income from council house rent is used to maintain and improve council houses and provide the housing service.

What is the organisation's policy on service delivery?

Until now, there has been no council-wide policy on service delivery. Each of the eight Council departments has its own service plan.

There is now in place a Council Corporate Plan, "Making Edinburgh Better", that has Thematic Plans, one of which is the 21st Century Government Plan.

How centralised is the control of service delivery?

Control is, by necessity, centralised, because the elected members, who constitute "The Council" as a legal entity, are directly responsible to citizens.

Services are provided by eight departments, led by the Chief Executive. Departments report to and take instruction from appropriate committees.

Services are structured around Council departments:

- City development
- Corporate services
- Culture and leisure
- Education
- Finance
- Environmental and consumer services
- Housing
- Social work

The Council has a "cabinet" style approach to its decision-making structure, that includes:

- an Executive (comprising 13 of the 58 elected members of the Council)
- seven scrutiny panels that help the Council scrutinise the activities of the Executive and hold it to account for its performance. The scrutiny panels are made up of elected council members who are not part of the Executive.
- six local development committees that give an opportunity for citizens to interact directly with elected members and senior Council managers

6.3.3.2.3 Electronic Service Delivery

What services does your organisation deliver electronically?

There are very few electronic services so far. The most advanced are the services provided by the public library service: customers can browse the online catalogue, reserve items, extend loans on items and check their individual account status.

Some forms can be downloaded for printing and returning, *e.g.* arranging to pay Council Tax by Direct Debit.

It is also possible to send email messages to various offices, such as CLARENCE (**C**ustomer **L**ighting **A**nd **R**oads **EN**quiry **CE**ntre).

What is your organisation's policy on electronic service delivery?

The City of Edinburgh Council has an overall policy, *Delivering the Smart City*, and a number of local policies.

The vision of the Smart City initiative is based around these strands:

- Government to Citizen
- Inter Agency Working
- Building Communities

At the heart of these is the principle of **digital inclusion**, embodied by these general aims:

- promotion of social inclusion.
- a renewal of democratic processes of citizen engagement
- support for community planning and partnership working
- transparent and accountable processes of information exchange
- open standards in technology development, to ensure scalability and technology transfer
- engagement of the private sector to achieve best value

The Council has the vision of a city portal that will provide a single port of entry or gateway to all relevant services and information, irrespective of who is responsible for delivery.

A recent survey indicated that 75% of Edinburgh's citizens would prefer this approach to service delivery. Evaluation of customer needs is key to its successful implementation.

Access will be achieved through whatever approach a citizen or customer prefers, whether it is through the internet, digital TV, telephone call to a contact centre or personal visit to a local one-stop shop.

The aim is for a "one and done" service, in which customers need to make only one call or visit to achieve their goal.

6.3.3.2.4 Service Management (Roles, Responsibilities, Level of Formality)

Who has overall responsibility for electronic service delivery?

The Chief Executive.

How centralised is the control of electronic service delivery?

Until recently, control of service delivery has been substantially decentralised. There has been little pooling of resources across departments, sharing of projects across departments, or planning to ensure that one project dovetails with another.

The Council now has a partnership arrangement with BT and Syntegra that will radically change the model of service delivery. (Syntegra is BT's consulting and systems integration business). From now on, new services will be developed and delivered under an umbrella Corporate Customer Service Model that will ensure that new services are developed in tune with Smart City.

This represents a significant change for the Council and therefore a Council-wide change management programme is under way.

What management structure is in place to support electronic service delivery?

The management of the partnership with BT is based on a two-tier structure of a Strategic Partnership Board and a Partnership Steering Group. Both the Board and the Steering Group are made up of senior Council staff and BT and Syntegra staff.

Within the Council, a Core Team takes overall responsibility for co-ordinating partnership activity, managing the interface between the Council and BT and mobilising the change programme across the Council. The Core Team sits on the Partnership Steering Group.

A Change Network, consisting of managers from across the Council, helps to define and oversee the change management programme.

How are new electronic services defined and developed?

New projects are identified by either the Council or BT, discussed by the Partnership Steering Group and approved by the Partnership Board to proceed to feasibility study. The Council identifies a manager and sponsor for the project, who help to scope the project. BT prepares a budget and plan. Large projects require approval from the Partnership Board.

There are well-defined procedures for reporting, decision making, initiating a new project, taking forward a feasibility study and taking forward a business case.

6.3.3.2.5 IT Management (roles and responsibilities)

What is your organisation's policy on management of IT systems?

The Council's partnership agreement with BT gives BT responsibility for management of all its IT systems. Almost all of the Council's IT assets have been handed over to BT to manage.

The Council runs an ICT Client and Development Team to support its staff. It is the first point of contact for BT. It ensures that services delivered through the partnership meet specified standards. Some of its responsibilities are:

- development and review of corporate technology strategy and standards, in liaison with BT
- evaluation of feasibility studies, business cases, enhancements and changes
- benchmarking, market-testing and procurement of services outside the partnership
- management of assets not transferred to BT

6.3.3.2.6 Security of Information

How does your organisation ensure that data and transactions are secure?

The Council conforms to British Standard BS7799 (ISO17799), which is the most widely regarded information security standard in the world.

6.3.3.2.7 Access to Information (includes privacy)

How does your organisation ensure that only authorised people gain access to data?

Council systems are comprehensively protected by outer, inner and local firewalls. There are no Council-wide passwords: different systems each require individuals to have a password for that system.

How does your organisation ensure privacy of personal data?

The Council is developing a council-wide data protection policy that follows the eight legally enforceable principles of the UK Data Protection Act 1998. According to the Act, personal data must be:

- Fairly and lawfully processed
- Processed for limited purposes
- Adequate, relevant and not excessive
- Accurate
- Not kept for longer than is necessary
- Processed in accordance with the data subject's rights
- Kept secure
- Not transferred to countries without adequate protection

6.3.3.2.8 Re-use

How much does your organisation re-use IT analyses, designs, software modules or systems?

As much as possible, certainly for design modules and very much so for

systems which are common throughout.

How does your organisation ensure effective re-use of these?

Through the business case evaluation process.

6.3.3.2.9 Skills Development (in the PA and external users)

What is your organisation's policy on developing the skills necessary for electronic service delivery?

As already mentioned, the Council's plans for modernising government include a major change management programme. As part of the programme, staff are trained on a project-by-project basis in the necessary skills including PC training, the use of the internet and the use of the Council's intranet. Over 3000 people across the Council have so far taken this training. Training is carried out both in the classroom and online.

Workshops and briefings on change management have been held for managers. They then take responsibility for percolation throughout the organisation of the main issues, information, principles and practice. Managers in project teams also receive, where appropriate, training in project management, business process re-engineering and process modelling.

Many of the Council staff who will operate the proposed Contact Centre (due to open in summer 2003) will already have back-office experience in service delivery. It is also likely that there will be some rotation of staff between back office and front office.

What is your organisation's policy on developing the skills that your clients need for receiving electronic services?

The principles of digital inclusion and social inclusion have already been mentioned. A number of initiatives in Edinburgh are aimed towards achieving them.

The Council is a member of The Edinburgh Lifelong Learning Partnership (Edinburgh Learning), which was established in 1997 as a collaborative venture by a group of partners from the public, private, business and voluntary/community sectors in Edinburgh. Its purpose is to conceive, encourage, implement and facilitate initiatives designed to create a culture of lifelong learning in Edinburgh. Its **cityconnect** project "exists to promote local, affordable access to computers and the internet,
and to provide training and support to community organisations in the use of computers"[126] One of the key elements of cityconnect is myEdinburgh, a community portal due for release in summer 2002.

Courses are run by community education teams, aimed at bringing people up to European Computer Driving Licence standard.

[126] cityconnect web site, http://www.cityconnect.org.uk/, consulted on 24 May 2002.

Libraries throughout the city provide computer facilities for citizens, including standard office applications, internet access and open learning centres that offer flexible access.

6.3.3.2.10 Software Development

What is your organisation's policy on the development of software systems?

Software development is along similar lines to the Dynamic System Development Method (DSDM). Some projects, however, are based on output-based specifications that are less well suited to DSDM.

6.3.4 Conclusions

The Greek Ministry of Finance already supports a range of electronic services, including the submission of tax returns. Management of service delivery is very much centralised, but development of services is outsourced. There is a strong commitment to developing more new electronic services, although there is not a concerted plan.

The City of Edinburgh Council has few services available at present, but has ambitious plans to deliver many services over the next few years, gathered under a coherent plan. Like the Greek Ministry of Finance, management of electronic service delivery is also centralised, which marks a significant change from the department-led approach in the past. A large change management programme is under way. Provision of all ICT services is outsourced to a single supplier.

6.4 Process Models

6.4.1 Introduction

Today it is usual to provide e-services similar to internet-presentations via internet for the customers. So it is already possible to get more that information, e.g. about opening hours, addresses. E.g. the e-service provided by the public library: customers can browse the online catalogue, reserve items, extend loans on items and check their individual account status. There is no special software, e.g. a client software, necessary, the customer can use a usual browser software.

To provide a complete e-service ore internet-presentation to the customers it is necessary to prepare all basic and specific requirements very detailed and, if it is possible, convert them in the same way. So it could be realized, that all requirements on an e-service and internet-presentation are elaborated in the right way and the realization will be on time.

During the analysis of the current situation to realize and provide an e-service or internet-presentation in two Public Authorities. We give an overview, in which way the staff of the different departments work together, which technical utilities they are using and which results are available during the development process.

The aim of this document is to summarize the experiences in the PAs and to propose a process description that is useable in general to create and provide an e-service or a

internet-presentation. It starts from the idea for an e-service/internet-presentation, goes on to different phases of creation and design up to provide an e-service for the customers.

6.4.2 Current situation in the Public Authorities

6.4.2.1 Process model description for the questionnaire

In the first step we propose a general process model that could be used to create a new e-service or internet-presentation. This process model is proposed to the Public Authorities (PAs) in the questionnaire to get a structured overview of the current policies in the PAs.

The general process to create a new e-service ore internet presentation will be realised in three different phases.

- Design-phase: This phase describe the whole service, the aims of the e-service/internet presentation, the requirements and content, the target group, special procedure for government solutions requirements in the view of the government department. The main part of this phase will be realized in the government departments of the PA.
- Realization phase: This phase contains the technical description of the new e-service/internet presentation in the technical view and the realization in the technical area of the provider. It contains also a test phase to prepare the roll out of the e-service/internet presentation. The main part of this phase will be realized in the technical departments of the PA (e.g. IT-department) according to the requirements of the government department(s).
- Operating phase: This phase contains the official start of the e-service/internet presentation for the user (citizens), the performance and monitoring of the e-service in the technical area and the takeover and control of the service in the back office systems.

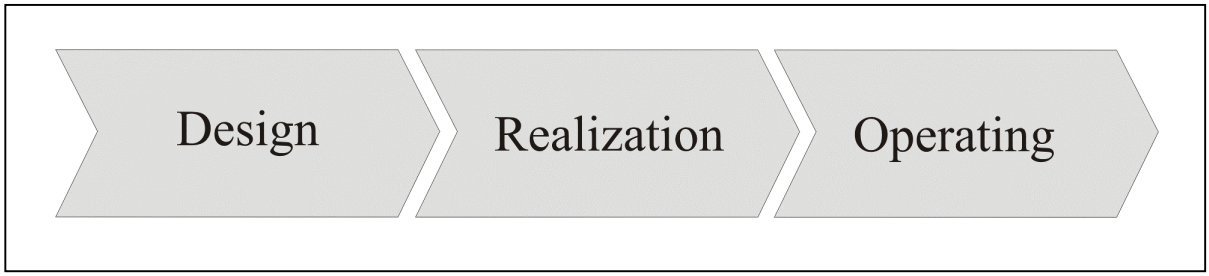


Figure 7 General overview of the process map

In the second step we describe the current processes in the PAs to prepare, realize, perform and monitor a new e-service/internet presentation according to the results of the questionnaire.

The aim of the questionnaire was to get information about

- the main steps of the whole process
- which departments are involved and which dependencies are existing between them
- which employees (staff) are involved in the different process steps
- which responsibilities are included in the different departments (e.g. government departments, IT-departments)
- which dependencies are existing to third party departments, political parties, organizational structures (e.g. for special e-services, to special departments like an IT-provider, security, payment).

Parallel to the process model it is important to describe some roles related to the different process steps. So it is possible to define the main areas of responsibility of this roles an the necessary interactions between them.

The aim of the questionnaire was also to get information about

- which responsibilities are connected to which roles during the different process steps
- which assignments (rights and obligation) are connected to the responsibilities
- which interactions are existing between the different roles (responsibilities)
- in which way the different roles are represented in the separate organisational units.

The following sections describes the process steps related to electronic service delivery in SmartGov's participating Public Authorities: The Greek Ministry of Finance and the City of Edinburgh Council as a result of the questionnaires.

6.4.2.2 Process steps in the Greek Ministry of Finance

The General Secretariat for Information Systems (GSIS) is a public administration agency of the Greek Ministry of Finance (GMoF) with a mission to

- develop technological infrastructures and manage information content, thereby providing quality services to the citizens and enterprises for all their transactions through the Ministry of Finance
- utilize new technologies, introducing innovative and advanced services and products, for the citizens' enterprises' and Public Sector's benefit in Greece and in the European Union
- take advantage of the opportunities that create added value to the Greek economy by using the know-how of its human resources
- contribute to compliance of the law and facilitates effective, efficient and transparent communication between the citizens and the Ministry of Finance.

The GSIS has overall responsibility for electronic service delivery in cooperation with ministry subdivisions.

6.4.2.2.1 Design phase

New electronic services are usually modelled after their paper-based counterparts and according to the legislation. Assessments of citizens' convenience, cost and benefit analysis and technical maturity are also substructures to prepare a new electronic service. Special technical information and requirements are prepared and designed by domain experts and technology consultants. The target group for the e-service is defined according to the taxation registries and paper-based services statistics.

The information of the citizens is realized via web pages, e-mails and press announcements.

Responsibilities:
All decisions are made/cleared within the GSIS or the ministry.

Approval:
There is a special person who is responsible for the whole service and he prepare an appropriate proposal to the ministry heads. On this way he get approval for the new e-service.

6.4.2.2.2 Realization phase

The development of the new e-service is outsourced. The detailed technical description of the new e-service is the basic to get the approval for the specific e-service of the ministry heads.

The testing of the new e-service are realized by the domain experts. They define the test cases based on experience and test the new e-service.

The information for the staff (operation manual, administration manual, forms, online help) and citizens (compilation of guidelines and FAQs, forms, online help) are prepared for the new e-service according to the requests from the vendors.

Approval:
There is a special person who is responsible for the start of the new e-service and he prepare an appropriate proposal to the secretary general or the ministry heads. On this way he get approval for the new e-service.

6.4.2.2.3 Operating phase

A special subdivision of GSIS (TAXISnet Group) is dedicated to electronic service delivery. The roll out plan is the basic for the start of the new e-service.

Responsibility:

The Head of TAXISnet department and the Secretary General are responsible for the roll out plan an its realization. The e-service will be observed in technical and statistical way according to the instructions in the plan to observation.

The Head of TAXISnet department is responsible for the observation plan.

6.4.2.2.4 Summary

The Greek Ministry of Finance already supports a range of electronic services, including the submission of tax returns. Management of service delivery is very much centralised, but development of services is outsourced. There is a strong commitment to developing more new electronic services, although there is not a concerted plan or definite procedures according to a process description.

6.4.2.3 Process steps in the City of Edinburgh Council

The Council provides a very wide range of services to citizens and business, including social work; housing; education; planning and building warrants; traffic and transport; road maintenance and design; registration of births, deaths and marriages; arts development; sports development; libraries; museums and art galleries; parks; environmental health; trading standards; waste management.

Until now, there has been no council-wide policy on service delivery. Each of the eight Council departments has its own service plan.

Services are provided by eight departments, led by the Chief Executive. Departments report to and take instruction from appropriate committees.

Services are structured around Council departments:

- City development
- Corporate services
- Culture and leisure
- Education
- Finance
- Environmental and consumer services
- Housing
- Social work

The Council has a “cabinet” style approach to its decision-making structure, that includes:

- an Executive (comprising 13 of the 58 elected members of the Council)
- seven scrutiny panels that help the Council scrutinise the activities of the Executive and hold it to account for its performance. The scrutiny panels are made up of elected council members who are not part of the Executive.

- six local development committees that give an opportunity for citizens to interact directly with elected members and senior Council managers

There are very few electronic services deliver electronically. The most advanced are the services provided by the public library service: customers can browse the online catalogue, reserve items, extend loans on items and check their individual account status.

Some forms can be downloaded for printing and returning, e.g. arranging to pay Council Tax by Direct Debit.

The Council now has a partnership arrangement with BT and Syntegra that will radically change the model of service delivery. (Syntegra is BT's consulting and systems integration business). From now on, new e-services will be developed and delivered under an umbrella Corporate Customer Service Model that will ensure that new services are developed in tune with Smart City.

6.4.2.3.1 Design phase

Projects originate either within council departments or from BT, who are strategic partners of the Council on all IT matters.

For more information on the BT partnership, see the Council's answers to the policies questionnaire. There is a well-defined process for project initiation, approval and planning.

Groups participating in the process are:

- the Council Executive (elected members of the Council);
- the ICT Sounding Board (responsible for regular progress reports on customer service delivery as a whole and individually for major projects prior to the decision-making stages);
- the Chief Executive's Management Team;
- the Strategic Partnership Board;
- the Partnership Steering Group.

Each project has a

- Project Sponsor (usually a senior manager in the relevant Council department) and a
- Project Manager (also a manager in the department).

New projects are identified by either the Council or BT, discussed by the Partnership Steering Group and approved by the Partnership Board to proceed to feasibility study. The Council identifies a manager and sponsor for the project, who help to scope the project. BT prepares a budget and plan. Large projects require approval from the Partnership Board.

There are well-defined procedures for reporting, decision making, initiating a new project, taking forward a feasibility study and taking forward a business case.

The requirements on the new e-service are collected and analysed by either BT or by the Council's Corporate Services Department. In both cases they are assisted by the relevant Council department.

The information of the citizens is realized via web pages of the Council online portal, e-mails and press announcements, e.g. leaflets and newspaper articles.

Responsibilities:
The overall responsibility for the new e-service has the Chief Executive.

Until recently, control of service delivery has been substantially decentralised. There has been little pooling of resources across departments, sharing of projects across departments, or planning to ensure that one project dovetails with another.

Approval:
Approval is given by the Strategic Partnership Board with assistance from a Partnership Steering Group.

For the lawful guidelines the Strategic Partnership Board and Partnership Steering Group take advice from the Council's own lawyers on issues of data protection.

6.4.2.3.2 Realization phase

Software development is along similar lines to the Dynamic System Development Method (DSDM). Some projects, however, are based on output-based specifications that are less well suited to DSDM.

The Council runs an ICT Client and Development Team to support its staff. It is the first point of contact for BT. It ensures that services delivered through the partnership meet specified standards. Some of its responsibilities are:

- development and review of corporate technology strategy and standards, in liaison with BT
- evaluation of feasibility studies, business cases, enhancements and changes
- benchmarking, market-testing and procurement of services outside the partnership
- management of assets not transferred to BT

The requests on data and transaction secure are realized in the conformity of the Council to British Standard BS7799 (ISO17799), which is the most widely regarded information security standard in the world.

The testing of the new e-service are realized by department that is responsible for delivering the service. The tests are realized according to the test scenarios.

The citizens and users get also information in FAQs and search facilities are available. More specific services will have customised help.

Responsibilities:
The Council's partnership agreement with BT gives BT responsibility for management of all its IT systems. Almost all of the Council's IT assets have been

handed over to BT to manage. For the technical part of realization the BT, assisted by Corporate Services and the relevant department is responsible.

Approval:
The BT, assisted by Corporate Services and the relevant department is responsible for the approval of the new e-service.

6.4.2.3.3 Operating phase

The security of information and the access to information are realized on very high level solutions. Council systems are comprehensively protected by outer, inner and local firewalls. There are no Council-wide passwords: different systems each require individuals to have a password for that system.

The Council is developing a council-wide data protection policy that follows the eight legally enforceable principles of the UK Data Protection Act 1998. According to the Act, personal data must be:

- Fairly and lawfully processed
- Processed for limited purposes
- Adequate, relevant and not excessive
- Accurate
- Not kept for longer than is necessary
- Processed in accordance with the data subject's rights
- Kept secure
- Not transferred to countries without adequate protection

Responsibility:

For the roll out plan for the new e-service the BT Partnership is responsible, a Change Network in the Council is responsible for publishing and dissemination.

For the plan to disseminate the new e-service the Corporate Communications section of the Corporate Services Department is responsible.

Each project has its own project team, who prepare the plan to observe and monitor the new e-service, in whatever way is appropriate.

6.4.2.3.4 Summary

The City of Edinburgh Council has few services available at present, but has ambitious plans to deliver many services over the next few years, gathered under a coherent plan. Like the Greek Ministry of Finance, management of electronic service delivery is also centralised, which marks a significant change from the department-led approach in the past. A large change management programme is under way. Provision of all ICT services is outsourced to a single supplier.

6.4.3 Conclusion

According to the results of the questionnaire it is recommended to describe the process model more detailed. For each process part it is possible to definit subprocesses, input and output of the subprocesses and establish the responsibilities of the involved departments and roles..

6.4.3.1 Design phase

Table 7 Design Phase

	Design phase		
Responsibility for the whole e-service	Chief executive		
Process steps	Project initiation	Project approval	Project planning
Primary activities	- Identification of request - Collection and analysis of the information - Feasibility study - Business Case	- Definite the new e-service - Check the new e-service on security and data protection	- Plan the new e-service - Check the new e-service - Prepare the dissemination to the customers - Confirm the forms, presen-tation etc. to the Corporate Design
Roles	- Council Executive - Project Sponsor (Council department) - Project Manager (Council department) - Project Manager (IT-department)	- Project Manager -	- Project Manager - IT-Project Manager
Responsibility for	- Assistance to IT-Services	- Approval from the legislation - Approval from the data protection - Approval from	- Confirm the project description with the Chief executive

		the Chief executive	
Primary results	- Definition of the aims, requirements and target group of the new e-service	- Release notes in security and data protection	- Description of the planned e-service

6.4.3.2 Realization phase

Table 8 Realization phase

	Realisation phase		
Responsibility for the whole e-service	Chief executive		
Process steps	Development	Testing	E-Service start
Primary activities	- Develop software modules or systems - Report the development, soft- and hardware, interfaces, etc. - Define the test cases - Prepare the roll out plan	- Execute the test cases - Test the security and data protection systems - Ensure the conformation to secure and development standards	- Publishing to the citizens - Dissemination to the citizens (user name and passwords)
Roles	- IT-Project Manager - Domain experts	- IT-Project Manager - Domain experts	- Council Executive - Project Manager - IT-Project Manager
Responsibility for	- Assistance to Project Management - Technical realization	- Approval from the IT-Manager - Approval from the Council Executive	- Approval from the Chief executive
Primary results	- Description of the technical realization	- Release note in security and data protection	- Operating manual - Administration manual

6.4.3.3 Operating phase

Table 9 Operating Phase

	Operating phase		
Responsibility for the whole e-service	Chief executive		
Process steps	Providing	Monitoring	Supporting
Primary activities	- Running of the system according to the Operating manual - Realize the security and data protection - System maintain	- Observe the operation of the system - Administration of users, customers, citizens - Software-updates	- Back office - Complete the FAQs -
Roles	- IT-Project Manager - Domain experts	- IT-Project Manager - Domain experts	- IT-Project Manager - Domain experts
Responsibility for	- Assistance to the Project Manager - Assistance to the Council Executive	- the practicality of the system - change management	- for handling of the e-service to the users, customers, citizens
Primary results	- reports	- reports, protocol	- Statistics - Summaries

The phases of the proposed process model to create a new e-service are described very basically. Now the next step is to definite the process steps and subprocesses very detailed. In the City of Edinburgh Council a new e-services will be developed and delivered according to the Corprate Customer Service Model. This model could be a practical supplementing for the Smart Gov process model solution.

7 Conclusions

The work within the SmartGov project commenced with a review of related State-of-the-Art. This survey spanned thematic areas addressed by the SmartGov project including knowledge management, e-forms and relevant enabling technologies, policies and process models all in relation with the public sector.

The survey concluded that there is a lot of knowledge available particularly from the area of e-commerce. However, there is also a clear need for integrating existing knowledge with advanced know-how and innovation in all areas (technical, organisational etc.) in order to better meet the needs and peculiarities of the public sector. There is also need in exploiting existing knowledge within an organization especially a public one and using it in the provision of intelligent e-services like the ones that the SmartGov project aims to provide.

Mature technologies like Java and XML will be the enablers for developing the SmartGov platform while e-forms specific technologies like XForms and XFA will definitely affect the SmartGov platform specifications. For mapping processes the SmartGov project will in-depth investigate the Business Process Modelling Language (BPML) and probably base a large part of its work on this emerging standard. As far as knowledge management, there are several off-the-shelf products that provide holistic solutions and cover a wide range of features and functionality. These products will be further investigated and evaluated in order for SmartGov to make innovative combinations of features, make extensions of provided features or invent new ones. Finally a set of indicators of best practices (as explained in section 5) will be used to ensure as much as possible the project's success and minimize the possible risks.

Moreover the work that culminated in this deliverable included the recording of the current situation, regarding e-services, in the participating public authorities. With the use of questionnaires significant information were extracted regarding their policies, processes, infrastructure and their working experience and expertise in software technologies related to e-forms and knowledge management. This information constitute valuable feedback to all partners of the SmartGov consortium and will help in producing results that will have a real practical value.

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Abbreviations

ASP	Active Server Pages
API	Application Programming Interface
B2B	Business-to-business
B2C	Business-to-consumer
BMRM	Business Media Reference Model
BPR	Business Process Reengineering
BPML	Business Process Modelling Language
CFML	Cold Fusion Markup Language
CORBA	Common Object Request Broker Architecture
CRM	Customer Relationship Management
CSS	Cascading Style Sheet
CM	Content Management
CRM	Customer Relationship Management
DHTML	Dynamic HyperText Markup Language
DNS	Domain Name Server
DTD	Document Type Definition
EJB	Enterprise Java Beans
EU	European Union
EDM	Electronic Document Management
ERP	Enterprise Resource Planning
EIP	Enterprise Intranet Portals
GPRS	General Packet Radio Service
HTML	HyperText Markup Language
HTTP	Hypertext transfer protocol
HRM	Human Resource Management
IDL	Interface Description Language
IIS	Internet Information Server
IT	Information and Communication Technology
J2EE	Java 2 Enterprise Edition
JMI	Java Message Interface
JSP	Java Server Pages
KM	Knowledge Management

LDAP	Lightweight Data Access Protocol
MIME	Multipurpose Internet Mail Extensions
ODBC	Open Database Connectivity
PDF	Portable Document Format
PDA	Personal Digital Assistant
RTF	Rich Text Format
RUP	Rational Unified Process
SFM	Service Flow Management
SQL	Structured Query Language
SMTP	Simple Mail Transfer Protocol
SSL	Secure Socket Layer
TIFF	Tagged Image File Format
UDDI	Universal Description, Discovery and Integration
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System
URN	Universal Resource Name
VM	Virtual Machine
XMI	XML Metadata Interchange
XML	Extensible Markup Language
XSL	Extensible Stylesheet Language
XSLT	Extensible Stylesheet Language Transformations
XCM	eXtended Content Management
W3C	WorldWide Web Consortium
WAP	Wireless Application Protocol
WSDL	Web Services Description Language

Appendix A. Questionnaires

1 Technology Questionnaire

1.1 E-services development-runtime environment

1. Please describe the e-services currently provided by your organisation. Categorise them in the following main categories:

   Information services (e.g. online information about public services):

   …….

   Interaction services (e.g. downloading of forms):

   …….

   Two-way interaction services (e.g. processing of forms, including authentication):

   …….

   Transaction services (e.g. case handling; decision and delivery (payment)):

   …….

2. Did you perform programming work to create your e-services?

   Yes ☐ No ☐

   If yes, which of the following programming languages-platforms are used?

C / C++	❑	Perl	❑
CGI	❑	PHP	❑
Java Core	❑	Visual Basic	❑
JavaScript	❑	.NET	❑
Java Applets	❑	Java Servlets	❑
Java Beans	❑	JSPs	❑

   Other, please specify: .....……

3. Do you use a commercial development environment for developing e-services?

   Yes ☐ No ☐

   If yes, which one(s)? …….

4. Which of the following middleware services are used?

   CORBA ☐

RMI ☐

JMS ☐

DCOM ☐

Other .....

5. Which of the following security-privacy solutions-protocols-practices are used by your organization?

Antivirus Software ☐

IDS ☐

IPSec ☐

SSL ☐

VPN ☐

Contingency plan and crisis management ☐

Access Control Policy ☐

Accountability ☐

Versioning and Rollback ☐

Other .....

6. Do you use an electronic payment system for your e-services?

……

7. Are there any e-services accessible through other channels apart from the web?

……

8. Please state the manufacturer and the type of your server hardware.

……

9. Please state the manufacturer and the version of your server operating system.

……

10. Please list the software you are using, especially the **Web server**, **Application Server**, **Databases**, **content and document management tools**, commercial tools you use to create and manage your services.

……
……
……
…….

11. Please describe your legacy systems, which are involved in e-services delivery model. Give any additional details regarding interfaces, communication channels, data types, etc. between legacy systems and e-services components.

……
……
……
……
……
……
……
……

1.2 Web publishing

12. Does your organisation has:

An Intranet? Yes ☐ No ☐

An Extranet? Yes ☐ No ☐

13. Does your organisation have dynamic or static web pages?

Dynamic ☐ Static ☐ Both ☐

14. Would you regard your content publishing and content management model centralised or decentralised?

Centralised ☐ Decentralised ☐

1.3 Data management & metadata

15. Are you familiar with the concept of metadata?

Yes ☐ No ☐

16. Have you any metadata-related solutions in use?

Yes ☐ No ☐

17. Does your organisation use categories and classifications to sort your documents?

Yes ☐ No ☐

If yes, what are these classifications based on?

……..……..

1.4 Portal

18. Is your organisation running a kind of Portal?

Yes ☐ No ☐

19. Are you currently using a Portal Server product?

Yes ☐ No ☐

If yes, please name the Portal Server product in use

……..……

20. Do your services communicate with other services?

Yes ☐ No ☐

If yes, with which kind of services are your services communicating?

Other public authorities

Companies

Non Profit Organisations

Others .....

If yes, what are the means of communication?

……..……..

21. Does your portal support other access technologies: wireless (PDA, Mobile, SMS etc.), kiosks, digital TV, etc

Yes ☐ No ☐

If yes, what access technologies are supported?

……..……

22. Which of the following techniques have been used in your services?

User authentication	Yes	☐	No	☐
User authorisation	Yes	☐	No	☐
User profiling	Yes	☐	No	☐
User personalisation	Yes	☐	No	☐
Single sign-on	Yes	☐	No	☐
Encryption	Yes	☐	No	☐
Digital signature	Yes	☐	No	☐

1.5 Standards

23. How important are supporting standards as an objective for your organisation?

Very Important	Important	Somewhat Important	Not Important
❑	❑	❑	❑

24. Which accessibility standards (Bobby, W3C, etc) are followed by your organisation?

…….

25. How well up to standards would you say your web conformance is at the moment?

Fully up ☐ a little behind ☐ well behind ☐

26. Are all web browsers (IE, Netscape, Opera etc.) equally supported?

Yes ☐ No ☐

If no, which browsers are specifically supported?

.....

27. What file formats are used on your organisations web site for distributing data?

HTML	Yes	☐	No	☐
PDF	Yes	☐	No	☐
MS Word	Yes	☐	No	☐
WordPerfect	Yes	☐	No	☐
MS Power Point	Yes	☐	No	☐
MS Excel	Yes	☐	No	☐
Rich Text Format	Yes	☐	No	☐
XML	Yes	☐	No	☐

Other (please specify): .....

1.6 Overall design, planning, and organizational strategy for a knowledge management program or initiative.

1. Have you planned or developed any of the following e-services'?

   Public Services for Citizen:

   Income taxes: declaration, notification of assessment ☐

   Job search services by labour offices ☐

   Social security contributions (unemployment benefits, child allowances, Medical costs, Student grants) ☐

   Personal documents (passport and driver´s licence) ☐

   Car registration (new, used and imported cars) ☐

   Application for building permission ☐

   Declaration to the police (e.g. in case of theft) ☐

   Public libraries (availability of catalogues, search tools ☐

   Certificates (birth and marriage):request and delivery ☐

   Enrolment in higher education / university ☐

   Announcement of moving (change of address) ☐

   Health related services (interactive advice on the availability of services in different hospitals; appointments for hospitals) ☐

   Public services for Business:

   Social contributions for employees ☐

   Corporation tax: declaration, notification ☐

   VAT: declaration, notification ☐

   Registration of a new company ☐

   Submission of data to a statistical office ☐

   Custom declarations ☐

   Environment related permits ☐

   Public Procurement ☐

2. Do you identify KM strategic objectives and needs?

   Yes ☐ No ☐

3. Do you identify and assign/control responsibilities for knowledge management activities?

Yes ☐ No ☐

If yes, which of the following departaments?

Direction Information services systems ☐

KM department/CKO ☐

HR department ☐

Others, please specify …….

4. Do you implement strategies, methods and policies (establish legal copyright, fair-use policies…)?

   Yes ☐ No ☐

5. Do you promote the use of standards, practices, and rules of interaction (collaboration, communication…)?

   Yes ☐ No ☐

6. Do you associate information/knowledge with specific job roles or tasks?

   Yes ☐ No ☐

7. Do you have policies about change management?

   Yes ☐ No ☐

1.7 Knowledge sources and knowledge acquisition.

8. Do you have mechanisms to analyze and filter sources of information in order to choose, rank and share the useful one?

   Yes ☐ No ☐

9. Do you validate the input information (data, docs., skills…)?

   Yes ☐ No ☐

10. Do you identify corporate intellectual assets and map them on the knowledge organization structure?

    Yes ☐ No ☐

11. Do you provide facilities to locate Experts and/or knowledge domain/groups?

    Yes ☐ No ☐

12. Do you have strategies for retrieving and managing external relevant resources of knowledge (web sites, documents, reports, legacy sites…) ?

Yes ☐ No ☐

If yes, which of the following sources?

Publications ☐

News ☐

Reports ☐

Articles ☐

Legislation ☐

Others, please specify …….

1.8 Knowledge base repository.

13. Do you have a KM repository (To organize, structure and create hierarchies of documents, …)?

Yes ☐ No ☐

14. Do you manage the life-cycle of knowledge (knowledge promotion, creation, edition, consumption and valuation)?

Yes ☐ No ☐

15. Do you facilitate dissemination/publication/routing of documents or other units of information as needed?

Yes ☐ No ☐

16. Do you use standards to manage contents, such XML, ODMA, SOAP or others?

Yes ☐ No ☐

1.9 Delivering (transfer) explicit knowledge, and maintaining / managing corporate knowledgebase.

17. Do you have a downloadable area?

Yes ☐ No ☐

If yes, what type?

E-forms ☐

Reports ☐

Legislation ☐
White papers ☐
User guide ☐
Programs ☐
Tools ☐
Others.....…….....……

18. Do you have an uploadable area?

Yes ☐ No ☐

If yes, what type of information do you upload?

…….....……

19. Do you have link sections?

Only with related web sites ☐
With other government sites ☐
Legislation sites ☐
Business sites ☐
Others.....……

20. Are you running a search engine?

Yes ☐ No ☐

If yes, what type of searches is carried out?

Keywords ☐
Semantic search (supported by dictionaries, ontologies or thesaurus) ☐
Patronal ☐

And where do you perform the searches?

Internal sources (docs., data…) ☐
External sources (web sites, legislation…) ☐
Other repositories ……

21. Do you make use of agents and user profiles to “push” knowledge?

Yes ☐ No ☐

1.10 Integrate individual activities with group activities (ongoing process).

22. Do you have any kind of on-line assistance?

Yes ☐ No ☐

If yes, what type?

Contact telephone or fax number ☐

E-form based ☐

E-mail based ☐

Chat based ☐

Other synchronous system based……..

23. Do you have another internal/external channels of communication?

Yes ☐ No ☐

If yes, what type?

Chat ☐

Discussion forums ☐

Frequent Asked Questions (FAQ´s) ☐

Distributed information by e-mail ☐

Others.....……..

24. Do you provide any real best practices?

Yes ☐ No ☐

If yes, what type?

E-forms filled-up ☐

Help ☐

Step-by-step guide ☐

Others.....……..

25. Do you implement tools or ways of feedback?

Yes ☐ No ☐

1.11 Use of off-the-self-products

26. Do you use any commercial Knowledge Management System (i.e. Meta4-KnowNet, Lotus Discovery Server,…)?

    Yes ☐ No ☐

    If yes, which one(s)? …….

27. Do you use any commercial EDMS (Electronic Document Management Systems) related with the previous e-services (i.e. Documentum, FileNet…)?

    Yes ☐ No ☐

    If yes, which one(s)? …….

28. And in webcontent management (i.e. Vignette, Broadvision…)?

    Yes ☐ No ☐

    If yes, which one(s)? …….

29. And in case of collaboration or groupware (i.e. Lotus Notes, Share Point,…)?

    Yes ☐ No ☐

    If yes, which one(s)? …….

30. Do you use any document and data capture systems: OCR and forms processing tools. (i.e. Eyes&Hands, Ascent Capture, Accelio …)?

    Yes ☐ No ☐

    If yes, which one(s)? …….

31. Do you use any commercial learning products(i.e. Luvit, Lotus Learning Space,.....)?

    E-learning ☐

    E-training ☐

    LMS (Learning Management System) ☐

    If yes, which one(s)? …….

32. Do you have an specific search engine and/or categorization tool(i.e. Verity, Convera-Excalibur, Autonomy,.....) ?

    Yes ☐ No ☐

If yes, which one(s)? …….

33. Do you manage taxonomies and/or ontologies related to e-services?

Yes ☐ No ☐

If yes, which one(s)? …….

34. What technologies do you use in asynchronous internal communication system?

E-mail ☐

Disscussion forums ☐

Virtual workspaces for groups (private web site) ☐

Others.....

35. And in synchronous internal communication system?

Videoconference ☐

Shared applications (i.e. Virtual blackboard, Messenger,..) ☐

Others.....

2 Policies Questionnaire

- What are your organisation's key social policies?
- What services does your organisation deliver?
- What is the organisation's policy on service delivery?
- How centralised is the control of service delivery?
- What services does your organisation deliver electronically?
- What is your organisation's policy on electronic service delivery?
- Who has overall responsibility for electronic service delivery?
- How centralised is the control of electronic service delivery?
- What management structure is in place to support electronic service delivery?
- How are new electronic services defined and developed?
- How would you ensure that your clients trust you and your services?
- How would you ensure trust within your organisation?
- What is your organisation's policy on management of IT systems?
- How does your organisation ensure that data and transactions are secure?
- How does your organisation ensure that only authorised people gain access to data?
- How does your organisation ensure privacy of personal data?
- How much does your organisation re-use IT analyses, designs, software modules or systems?
- How does your organisation ensure effective re-use of these?
- What is your organisation's policy on developing the skills necessary for electronic service delivery?
- What is your organisation's policy on developing the skills that your clients need for receiving electronic services?
- What is your organisation's policy on the development of software systems?

3 Process Models Questionnaire

3.1 Introduction

The main objective behind this questionnaire is to depict the current situation regarding process models and roules in the participating Public Authorities (i.e. GSIS, CEC) participating in the SmartGov consortium. The questionnaire aims at determining the state-of-the-Art and best practices in process view, that are currently available by the Public Authorities for e-services development and deployment.

3.1.1 Current basic process model and role model

In the first step the aim is to describe the current process steps in the PAs to prepare, realize, perform and monitor a new e-service/internet presentation to get an overview about the current situation.

For this description it is necessary to find out

- the main steps of the whole process
- which departments are involved and which dependencies are existing between them
- which employees are involved in the different process steps
- which responsibilities are included in the different departments (e.g. government departments, IT-departments)
- which dependencies are existing to third party departments, political parties, organizational structures (e.g. for special e-services, to special departments like an IT-provider, security, payment).

To get information about the roles it is necessary to find out

- which responsibilities are connected to which roles during the different process steps
- which assignments (rights and obligation) are connected to the responsibilities
- which interactions are existing between the different roles (responsibilities)
- in which way the different roles are represented in the separate organisational units.

3.2 Current Situation-Process Description

The process to create a new e-service ore internet presentation will be realised in different phases.

- Design-phase: This phase describe the whole service, the aims of the service, the requirements and content of the service, the target group, special procedure for government solutions requirements in the view of

the government department. The main part of this phase will be realized in the government departments of the PA.

- Realisation phase: This phase contains the technical description of the new e-service/internet presentation in the technical view and the realization in the technical area of the provider. It contains also a test phase to prepare the roll out of the e-service. The main part of this phase will be realized in the technical departments of the PA (e.g. IT-department) according to the requirements of the government department(s).

- Operating phase: This phase contains the official start of the e-service for the user (citizens), the performance of the e-service in the technical area and the takeover and control of the service in the backoffice systems.

According on this phases it is possible that people of different departments work together, have to define interface requirements and be responsible for the realisation in the different departments/sections. The following questions are classify to the three phases.

3.2.1 Design phase: Description of the e-service

1. When do you start to prepair information about the new e-service/internet presentation?
   Political requirements ☐
   PR department ☐
   other ☐ .....
   .....

2. How do you get the information about the new e-service and where do you get this information?
   - Requirements of an e-service: .....
   - Target group for the e-service.....
   - Object of the e-service (e.g. :.....
   - Necessary forms (design, content) for the e-service:.....
     .....
   - Necessary information about the e-service depending on the special governmental process: .....
     .....
   - Special requirements on the e-service (e.g. payment, signatur, lawlike guidelines): .....
     other: .....

2. Did you have special partner (role) in the Public Authorities to collect and clarify all this information?

   Yes ☐ No ☐

   If yes, on which position/department in the Public Authority?
   Special section ☐
   PR department ☐
   IT department ☐
   other ☐

3. Do you use an electronic form/check list to list the requirements of the Public Authorities on the new e-service?

   Yes ☐ No ☐

   If yes, which one(s) and where is it stored? .....

4. If you need information from other departments (e.g. security, coding) in the organisation do you have a special partner to ask for?

   Yes ☐ No ☐

   If yes, do you have some organisational constrains? .....

5. Do you have a special person (role), who is responsible for the whole new e-service/internet presentation?

   Yes ☐ No ☐

   If yes, in which way do you get approval for the new e-service?
   .....

6. Do you have a special person (role), who is responsible for the lawlike guidelines (e.g. data protection, signatur, securities)?

   Yes ☐ No ☐

   If yes, in which way do you get approval for the new e-service?
   .....

7. In witch way do you inform the citizens about the new e-service/internet presentation?

   (e.g. via internet, call center, E-Mail, web-page).....
   .....
   .....
   .....

8. If there are big differences to our questions, please describe briefly the actual way to create a new e-service/internet presentation (ore parts of it) in the Public Authorities.

E. g. Process steps, roles, constrains, dependencies:.....
.....
.....
.....
.....
.....
.....

3.2.2 Realization phase: Technical realisation and test of the e-service

9. Do you have a special person (role), who is responsible for the technical part of the new e-service/internet presentation?

Yes ☐ No ☐

If yes, in which way he get the information about the requirements of the new e-service/internet presentation?

.....

10. Do you realize description contains a detailed technical description of the used components to realize to e-service (e.g. security, payment, signature, forms server, special technical procedure for government solutions, data formats, administration tool)?

Yes ☐ No ☐

If yes, in which way do you get approval for the specified e-service?

.....

11. If you realized the first technical description of the new e-service, do you check it with the requirements of the PA again (e.g. realizable ore not)?

Yes ☐ No ☐

If yes, in which way do you get approval for the described e-service?

.....

12. Do you prepare different manuals for the perform of the e-service?

Yes ☐ No ☐

If yes, which on(s)?

Operating manual ☐
Administration manual ☐
Service manual ☐
other ☐ .....

13. Do you prepare information for the online help for the citizens, the user and employees?

Yes ☐ No ☐

If yes, in which way do you prepare the information?

.....

14. Do you prepare special information, the content of the forms and the whole governmental process information for the employees (online help)?

Yes ☐ No ☐

If yes, in which way do you prepare the information?

.....

15. Do you describe test scenarios for the new e-service to check the functional realization?

Yes ☐ No ☐

If yes, in which way do you prepare the test scenarios (roles, steps to do)?

.....

16. Do you have a special person (role), who is responsible for the start of the new e-service/internet presentation?

Yes ☐ No ☐

If yes, in which way do you get approval for the new e-service?

.....

17. If there are big differences to our questions, please describe briefly the actual way to realize a new e-service/internet presentation (ore parts of it) in the Public Authorities.

E. g. Process steps, roles, constrains, dependencies:.....

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.....

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3.2.3 Operating phase: Provide and perform the e-service

18. Do you prepare a roll out plan containing roles e.g. who is responsible for the start, for the performance (incl. Hotline, helpline), for the accessibleness of the new e-service/internet presentation?

    Yes ☐ No ☐

    If yes, who is responsible for it and in which way do you publish the roll out plan?

    .....

19. Do you prepare a plan to disseminate the e-service to the citizens, user , customer?

    Yes ☐ No ☐

    If yes, who is responsible for it and in which way do you perform the plan?

    .....

20. Do you prepare a plan to observe (technical and statistical) the e-service?

    Yes ☐ No ☐

    If yes, who is responsible for it and in which way do you perform the plan?

    .....

21. Do you prepare a plan to change ore adapt the e-service?

    Yes ☐ No ☐

    If yes, who is responsible for it and in which way do you perform the plan?

    .....

22. Do you have a special Quality Management System for process model?

    Yes ☐ No ☐

    If yes, which process steps are described?

    .....
    .....
    .....
    .....
    .....

23. If there are big differences to our questions, please describe briefly the actual way to perform a new e-service/internet presentation (ore parts of it).

    E. g. Process steps, roles, constrains, dependencies:.....
    .....
    .....

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.....
.....

4 Infrastructure Questionnaire

1. What is the overall architecture of your transactional e-services platform? Please include involved computer hardware components, network devices, firewalls and interconnections.

   .....
   .....
   .....
   .....
   .....

2. Do you use a different platform for deploying informational services than transactional services? If so, please describe the informational services platform.

   .....
   .....
   .....
   .....
   .....

3. Does your e-service (informational or transactional) platform communicate with other IT systems within your organisation? If so, please describe these IT systems, as well as the communication method (on-line, off-line, etc), the nature of data exchanged, periodicity etc.

   .....
   .....
   .....
   .....

4. Does your e-service (informational or transactional) platform communicate with IT systems external to your organisation? If so, please describe the communication method (on-line, off-line, etc), the nature of data exchanged, periodicity etc.

   .....
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   .....

