Interchange of Data
between Administrations

EUROPEAN INTEROPERABILITY FRAMEWORK

FOR PAN-EUROPEAN EGOVERNMENT SERVICES

FRAMEWORK

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Contents

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1   Introduction

1.1   What is the European Interoperability Framework?

In June 2002, European heads of state adopted the eEurope Action Plan 2005 at the Seville summit. It calls on the European Commission "to issue an agreed interoperability framework to support the delivery of pan-European eGovernment services to citizens and enterprises. It will address information content and recommend technical policies and specifications for joining up public administration information systems across the EU. It will be based on open standards and encourage the use of open source software." The present document establishes the European Interoperability Framework (EIF) to support the pan-European delivery of electronic government services. In particular, it will be the reference document for Interoperability of the new IDAbc programme[1].

Interoperability means the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable sharing of information and knowledge.

An interoperability framework can be defined as a set of standards and guidelines which describe the way in which organisations have agreed, or should agree, to interact with each other. An interoperability framework is, therefore, not a static document and may have to be adapted over time as technologies, standards and administrative requirements change.

The European Interoperability Framework defines a set of recommendations and guidelines for eGovernment[2] services so that public administrations, enterprises and citizens can interact across borders, in a pan-European context.

The target audience of the EIF are the managers of eGovernment projects in Member States Administrations and EU bodies. Member States Administrations should use the guidance provided by the EIF to supplement their national eGovernment Interoperability Frameworks with a pan-European dimension and thus enable pan-European interoperability. European Institutions and Agencies[3] should use the European Interoperability Framework for their operations with each other and with citizens, enterprises and administrations in the respective EU Member States.

The EIF focuses on supplementing, rather than replacing, national interoperability guidance by adding the pan-European dimension. This means that, if a Member State Administration wants to interoperate at the pan-European level, there should be in place a national interoperability framework, or equivalent technical strategy, to deliver eGovernment services. The EIF can then provide the pan-European layer

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[1] *The IDAbc programme will support the interoperable delivery of pan-European services to public administrations, businesses and citizens; it is expected to be adopted by the Council and European Parliament during the course of 2004. It will be the successor of the IDA programme (http://europa.eu.int/ispo/.ida)*

[2] *In the Communication "The role of Government for Europe's future", COM(2003)567 final of 26 September 2003, eGovernment is defined as the use of information and communication technologies in public administrations combined with organisational change and new skills in order to improve public services and democratic processes and strengthen support to public policies*

[3] *Proper account should nevertheless be taken of the sometimes "sui generis" nature of the European Institutions with regards to the Member State Administrations:*
The principle of "extra-territoriality" applies to many areas of the Institutions dealings with national administrations, which might require particular attention in such issues as handling data exchanges;
*The institutions are governed by explicit and separate regulations concerning such matters as personal data protection and public access to information, rather than being covered by the provisions in law of a particular Member State.*

to the national framework. (see also the Annex: Generic model for a national interoperability framework).

Additional information on eGovernment initiatives in Europe may be found in the IDA eGovernment Observatory[4].

Recommendation 1: The European Interoperability Framework defines a set of **recommendations and guidelines** for eGovernment services so that public administrations, enterprises and citizens can **interact across borders**, in a pan-European context. Member States Administrations, EU Institutions and Agencies should use the guidance provided by this European Framework to implement a **pan-European dimension** in their own interoperability frameworks and administrative infrastructures, to enable interoperable pan-European eGovernment services. The adherence to the European Interoperability Framework should also be mentioned in the national interoperability frameworks.

The following figure provides an overview of the main aspects of the European Interoperability Framework which are considered in this document

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[4] IDA eGovernment observatory: http://europa.eu.int/ISPO/ida/egovo
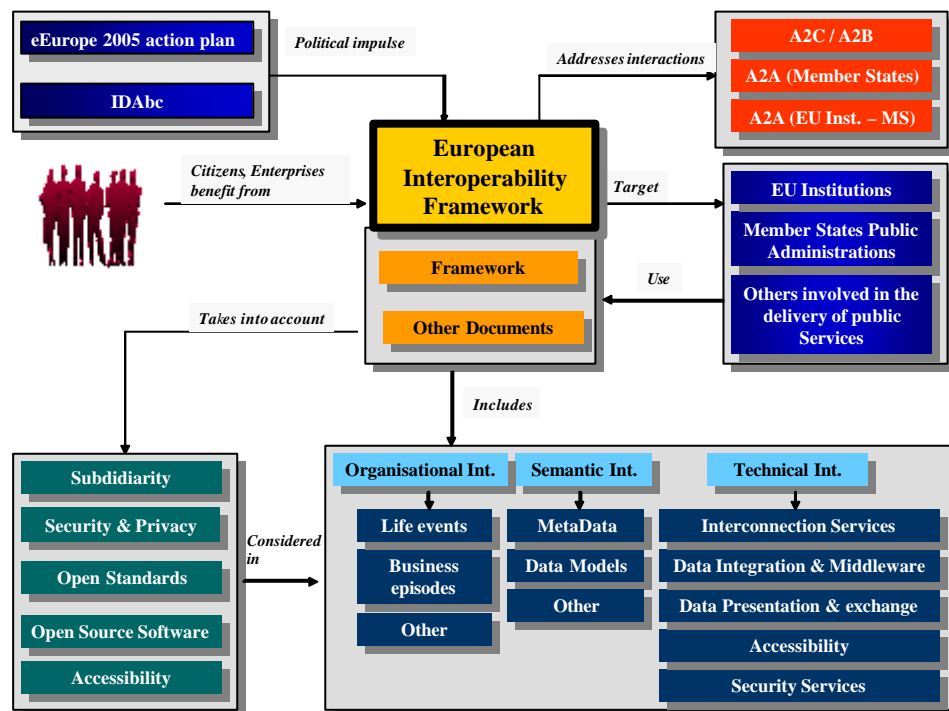
1.2   Background information

There is a growing awareness that interoperability of national public ICT infrastructures is a precondition for a more service oriented and competitive public sector. Ever since the adoption of the Interoperability Decision[5] of the European Council and the European Parliament in July 1999, the European Commission has focussed on the pan-European dimension of eGovernment and on the interoperability requirements to implement this.

One of the conclusions of a conference[6] on pan-European eGovernment services at Sandhamn, Sweden, was that:

> … to implement eGovernment services an agreed interoperability framework for Europe is a pre-requisite. This is required to underpin the fast and efficient development of e-services. In addition to technology, this framework must also address both procedures and content.

Similarly, the Ministerial Declaration issued at the European eGovernment conference (Como[7], Italy, 7-8 July 2003), co-organised by the Italian Presidency of the European Council and the European Commission, recognised that interoperability is the key condition for the development of pan-European eGovernment services. It also stated that to reach such interoperability an agreed European Interoperability Framework was a necessary condition[8]. The Ministers also welcomed the Commission staff working paper on interoperability in support of eGovernment and restated their desire to see the Commission, in close cooperation with the Member States, deliver the interoperability framework for pan-European services by end 2003, as announced in *e*Europe 2005 action plan.

On 26th September 2003, the Commission issued a Communication to Council and Parliament on "The role of eGovernment for Europe's Future" (ref: COM(2003) 567), which supports interoperability and the importance of an agreed European Interoperability Framework. In its meeting of 20 November 2003[9], the Council invited the Commission, the Member States and the Acceding States: "to ensure that the creation, development and implementation of these [eGovernment] services should be accompanied by joint actions to build up experience and validate advanced solutions concerning common approaches to key aspects of seamless pan-European eGovernment service provision such as accessibility, user identification, security, interoperability, including data definitions and procedures. As far as appropriate, pan-European eGovernment services should be integrated and interactive."

The proposal from the Commission for a Decision on Interoperable Delivery of pan-European eGovernment Services to Public Administrations, Businesses and Citizens (IDAbc) is expected to be adopted by the Council and by the European Parliament in the course of 2004. As successor of the IDA programme, IDAbc will continue to work on improving cooperation between public administrations and on supporting the delivery of pan-European eGovernment services to citizens and businesses, thus contributing to a greater efficiency of both the public and the private sectors.

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[5] *1720/1999/EC: Decision of the European Parliament and of the Council of 12 July 1999 to adopt a series of actions and measures in order to ensure interoperability of, and access to, trans-European networks for the electronic interchange of data between administrations (IDA).*

[6] *"e-Government in the service of European citizens and enterprises – what is required at the European level", Sandhamn, Sweden, 13 to 14 June 2001.*

[7] *eGovernment Conference 2003, 7-8 July 2003, Villa Erba, Como (Italy)*
http://europa.eu.int/information_society/eeurope/egovconf/index_en.htm

[8] *Ministerial Declaration, European eGovernment Conference 2003*
http://europa.eu.int/information_society/eeurope/egovconf/doc/ministerial_declaration.pdf

[9] *14671/03 (Presse 327), 2543th Council meeting - TRANSPORT, TELECOMMUNICATIONS AND ENERGY - Brussels, 20 November 2003*

Interoperability, and in particular, the European Interoperability Framework is one of the key elements of the new programme to support the set-up of the pan-European eGovernment services.

The present document, therefore, is produced to meet the demands of the Council conclusions, the new IDAbc Decision and of the *e*Europe Action Plans for an interoperability framework for Europe's public administrations.

1.3   Objectives

The objectives of the European Interoperability Framework are

- To support the European Union's strategy of providing user-centred e-services by facilitating the interoperability of services and systems between public administrations, as well as between administrations and the public (citizens and enterprises), at a pan-European level;

- to supplement national Interoperability Frameworks in those areas that cannot be adequately addressed by a purely national appr oach;

- to help achieve interoperability, both within and across different policy areas and, where appropriate, with business and citizens, notably in the context of the new IDAbc programme and any other relevant Community programmes and initiatives.

The European Interoperability Framework shows how services and systems should interrelate in order to serve, supplement and enrich each other. It complements national interoperability frameworks by providing a multilateral framework for the achievement of interoperable pan-European eGovernment services. In doing so, the Framework creates benefits such as economies of scale and re-use of knowledge and resources, whilst leaving the maximum degree of independence for each Member State.

In particular, the European Interoperability Framework should:

- Address the pan-European dimension of interoperability and provide an answer for the following questions: What is interoperability? Why interoperability is needed at the pan-European level? Which are the implications of interoperability from a pan-European and national point of view.
- Provide a description of the elements which have to be addressed for the interoperability of pan-European eGovernment services.
- Identify reference information providing additional orientation on the elements of interoperability.
- Support the activities and pan-European eGovernment projects to be launched, notably in the context of the IDAbc programme.

In so doing it will:
- Identify a number of actions to be carried out by the Member States and the EU Institutions and Agencies in order to achieve interoperability.

2   Framework

2.1   Scope

2.1.1   Interaction types

In the most general form of interoperability, three interaction types can be defined that encompass most of the current trans-border eGovernment services. These are:

- direct interaction between citizens or enterprises of one particular Member State with administrations of other Member States and/or European institutions;
- exchange of data between administrations of different Member States in order to resolve cases that citizens or enterprises may raise with the administration of their own country;
- exchange of data between various EU institutions/Agencies or between an EU institution/Agency and one or more administrations of Member States.

A2A: administration to administration
A2B: administration to business
A2C: administration to citizen
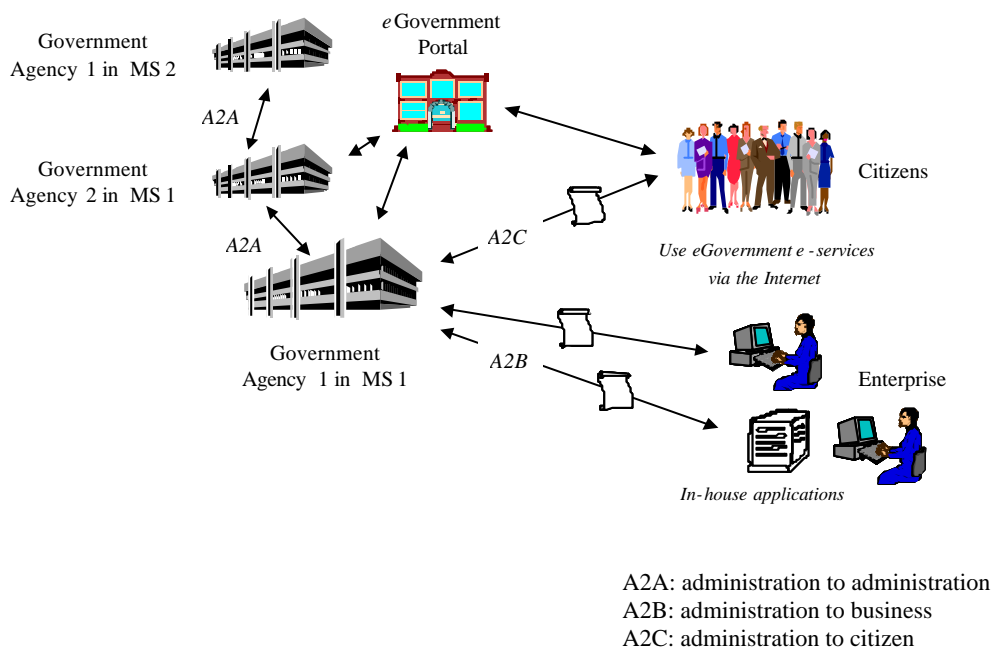
The first interaction type comprises those government e-services that are provided to citizens (or enterprises) at a national level, but that may also be of interest to citizens or enterprises located in other countries, on account of requirements such as freedom of movement of people and goods:

Case 1

A web-based job search service provided by a labour agency based in a European region can be accessed to find job vacancies and to submit cv summary. The supporting system features a "push" service to alert an applicant via e-mail when opportunities arise for that applicant, based on the experience record as specified in the cv summary. Designed to serve a national community, this service is in fact of interest to the wider EU community, i.e. to any enterprise or any individual, wishing to settle in that region.

To reach its potential EU-wide audience, this sample service needs to fulfil a wider set of requirements than a service that is designed for national requirements only, i.e.:
- the service needs to be available in a language that can be understood by potential users, who may be residing in any one of the Member States;
- rules for defining a job experience record should be formulated in a manner that is equally acceptable to all Member States.

The second interaction type takes the simple interaction scenario a step further because it involves processes in which multiple organisations play a role. In a typical example, a citizen or an enterprise accesses a government e-service to receive information, to submit information (e.g. an application) or to perform a fully-fledged administrative transaction that triggers a complex process involving multiple authorities.

At a pan-European level, this interaction type involves interoperability and the exchange of information between administrations in different Member States:

Case 2

An employee with a long record of working abroad (in different Member States) is retiring and needs to apply for a pension. To do so, the employee uses a web service provided by the local social security agency. In order to address the request submitted by the employee, the local social security agency needs to connect with all agencies (in each of the countries in which the employee has paid pension funds) to collect the data needed for the calculation of the employee's pension scheme.

The requirements imposed by this case include:
- the user needs to be identified, such identification then needs to be accepted/recognised by all administrations involved
- to allow the matching of data, a high degree of standardisation is required in terms of the relevant data structures;
- agreements must be made between the different administrations regarding the authentication of the sending and the receiving party, the accountability of the data transmitted and received, the appropriate security levels, and the procedures and mechanisms to be used in this respect;
- agreements for data exchange with administrations other than the social security agencies (e.g. tax departments) must be made.

The third interaction type concerns the case of the sectoral networks of administrations (such as the ones dealt with by the IDA programme), where a legal basis requires that the Member States Administrations collect/exchange/share data together and with EU Institutions and Agencies:

Case 3
National statistical agencies in each of the Member States must submit statistical data to Eurostat on a regular basis. Eurostat processes the data and then makes them available to its customers, which include a large number of Member States Administrations.

This case involves the regular collection, processing and delivery of large amounts of data from and to administrations located anywhere in the European Union. In addition to the pan-European dimension, high levels of reliability and security are of crucial importance. The requirements imposed by this case therefore include:

- to allow the matching of data, a high degree of standardisation is required in terms of different national statistical data dictionaries;
- agreements must be made between the Member States and Eurostat regarding the authentication of the sending and the receiving party, the accountability of the data transmitted and received, the appropriate security levels, and the procedures and mechanisms to be used in this respect.
- the service needs to be available in a language that can be understood by potential users, who may be residing in any one of the Member States;

2.1.2 Interoperability areas

Three aspects of interoperability need to be considered:

- Organisational interoperability
  This aspect of interoperability is concerned with defining business goals, modelling business processes and bringing about the collaboration of administrations that wish to exchange information, but that may have a different internal organisation and structure for their operations. Moreover, organisational interoperability aims at addressing the requirements of the user community by making services available, findable, accessible and user-oriented.

- Semantic interoperability
  This aspect of interoperability is concerned with ensuring that the precise meaning of exchanged information is understandable by any other application not initially developed for this purpose. Semantic interoperability enables systems to combine received information with other information resources and to process it in a meaningful manner.

- Technical interoperability
  This aspect of interoperability covers the technical issues of linking up computer systems and services. This includes key aspects such as open interfaces, interconnection services, data integration and middleware, data presentation and exchange, accessibility and security services.

Recommendation 2: Setting-up eGovernment services at a pan-European level requires to consider and solve interoperability issues which appear at **organisational, semantic and technical level**

2.2   Underlying principles

Recommendation 3: The following **principles**, of general nature, should be considered for any eGovernment services to be set-up at a pan-European level:
- Accessibility
- Multilingualism
- Security
- Privacy
- Subsidiarity
- Use of open standards
- Assess the benefits of Open Source Software
- Use of multilateral solutions

- Accessibility
  There is a need to ensure that eGovernment is aimed at creating equal opportunities for all towards open, inclusive electronic services publicly accessible without discrimination. Generally accepted design principles for interfaces should be applied in order to ensure access for disabled persons and offer support in a language understood by the user. The Web Accessibility Guidelines established by the Web Access Initiative of the World Wide Web Consortium should be taken into account.
  Issues such as socio-economic disparities between regions and groups of citizens should also be addressed. In terms of e-inclusion, multi-channel approach should be considered in order to render the services available to citizens and enterprises through several different communication means (whether kiosks, web-TV, mobile connectivity, etc.)

- Multilingualism
  In Europe, a vast variety of languages are used extensively in services today.
  At the presentation level (front office and web pages on the Internet – the level at which citizens and enterprises are to interact), language is clearly a major factor in the effective delivery of trans-European eGovernment services.
  At back-office level, the underlying information architectures should be linguistically neutral so that multilingualism is not a blocking issue for the delivery of eGovernment services.

- Security
  Overall, reliable exchange of information takes place within an agreed security policy; this is achieved by conducting appropriate Risk Assessment activities prior to the set-up of the services and the related security measures. This principle applies as well to the information exchange at pan-European level; in this case, the Administrations concerned will need to consider their own security policy to come to an agreement about a common security policy at pan-European level.
  In particular for document classification at EU level and related security measures, the Council's security regulation[10] applies.

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[10] OJ L 101/1 - COUNCIL DECISION of 19 March 2001 adopting the Council's security regulations (2001/264/EC),
see also OJ L 137/1 COMMISSION DECISION of 29 November 2001amending its internal Rules of Procedure (notified under document number C(2001) 3031) (2001/844/EC, ECSC, Euratom)

From the user perspective, functions associated with security (identification, authentication, non-repudiation, confidentiality) should have a maximum level of transparency, involve a minimum of effort, and at the same time provide the agreed level of security.

- Privacy (Personal Data protection)
  Pan-European eGovernment services need to ensure uniform levels of protection for the individual, including measures in which individuals have the right to choose whether their data may be used for purposes other than those for which they originally supplied the data in question[11]. Appropriate information regarding the data processing activities should be made available to the concerned individuals.
  Full compliance with the existing European and national data protection legislation should be ensured (in particular Directive 2002/58/EC[12]). In particular, work on interoperability should be coordinated with the mechanisms already in place following the Directive 95/46/EC[13] (in particular article 29). When available, technologies that are privacy-compliant and privacy-enhancing should be used.

- Subsidiarity
  The guidance provided by the European Interoperability Framework is concerned with the pan-European level of the services. In line with the principle of subsidiarity, the guidance does not interfere with the internal workings of administrations and EU Institutions. It will be up to each Member State and EU Institution to take the necessary steps to ensure interoperability at a pan-European level.

- Use of open standards
  To reach interoperability in the context of pan-European eGovernment services, guidance needs to focus on open standards.
  The word "open" is here meant in the sense of fulfilling the following requirements[14]:
      the costs for the use of the standard are low and are not an obstacle to access to it;
      the standard has been published;
      the standard is adopted on the basis of an open decision-making procedure (consensus or majority decision etc);
      the intellectual property rights to the standard are vested in a not-for-profit organisation, which operates a completely free access policy;
      there are no constraints on the re-use of the standard.

- Assess the benefits of Open Source Software
  Open Source Software (OSS) tends to use, and often helps to define, open standards and publicly available specifications. OSS products are, by their nature, publicly available specifications, and the availability of their source code promotes open, democratic debate around the specifications, making them both more robust and interoperable. As such, OSS corresponds to the objectives of this Framework and should be assessed and considered favourably alongside proprietary alternatives.

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[11] The European Court of Justice has emphasised in its recent judgement of 20 May 2003 in the Rechnungshof case the importance of the cumulative application of articles 6 and 7 of Directive 95/46/EC

[12] *Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)*

[13] Directive 95/46/EC *of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data*

[14] *Definition from Dutch Programme for Open Standards and Open Source Software in Government (OSSOS)*

- Use of multilateral solutions

  In a multi-actors environment, one way to interoperability is to consider different solutions according to the exchange partner you have to communicate with; this leads to bi-lateral solutions and agreement; the net effect (and disadvantage) of such approach is the requirement to maintain as many different solutions to communicate as there are external partners which induces a high degree of inefficiency and high costs. On the other hand, if each of the interoperating partners adopts the same set of agreements for interoperability solutions, each of them can reap the benefits of a single solution that needs to be developed only once but fit all.
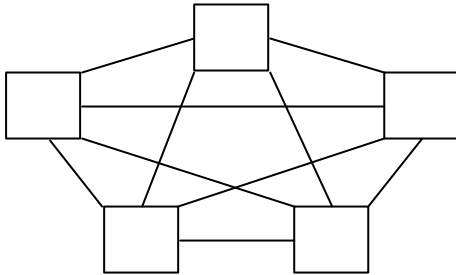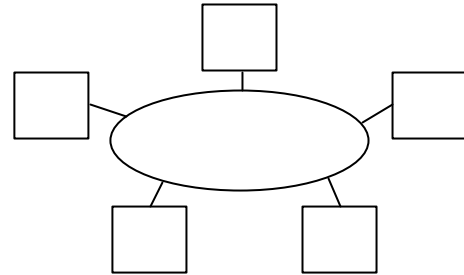
Bilateral agreements   Multilateral agreements

2.3 Key interoperability areas

2.3.1 Organisational interoperability

To bring public administration closer to citizens and enterprises, Member States make use of "life events" for citizens (e.g. getting married) and "business episodes" (e.g. founding a company) for enterprises. In doing so, citizens and enterprises can remain focused on their needs instead of having to deal with the specific functional organisation of the public sector; the service delivery is customer-oriented, transparent, and it follows the so-called one-stop shop approach.

Each life event or business episode is then associated with the required actions and interactions needed with and between the public administrations to fulfil the case. In the context of eEurope this translates into defining eGovernment services available to citizens and enterprises and the subsequent business processes which have to be performed by the public administrations.

Member States have agreed a common list of twenty public services (12 for citizens and 8 for enterprises) for which the online sophistication is being benchmarked at national level[15]. Such list does not yet exist for eGovernment services to be provided at pan-European level:

	Public Services for Citizens (benchmarked at national level)
1	Income taxes: declaration, notification of assessment
2	Job search services by labour offices
3	Social security contributions (3 out of the following 4): • Unemployment benefits • Child allowances • Medical costs (reimbursement or direct settlement) • Student grants
4	Personal documents (passport and driver's licence)
5	Car registration (new, used and imported cars)
6	Application for building permission
7	Declaration to the police (e.g. in case of theft)
8	Public libraries (availability of catalogues, search tools)
9	Certificates (birth, marriage): request and delivery
10	Enrolment in higher education / university
11	Announcement of moving (change of address)
12	Health related services (e.g.interactive advice on the availability of services in different hospitals; appointments for hospitals.)
	Public Services for Businesses (benchmarked at national level)
1	Social contribution for employees
2	Corporation tax: declaration, notification
3	VAT: declaration, notification
4	Registration of a new company
5	Submission of data to statistical offices
6	Customs declarations
7	Environment-related permits (incl. Reporting)
8	Public procurement

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[15] *The European Commission has published it on*
http://europa.eu.int/information_society/eeurope/2002/action_plan/pdf/basicpublicservices.pdf

eGovernment services hide the level of complexity lying behind the service offered to the citizen and enterprises. So, depending on the way public administrations are organised, a given eGovernment service may imply either a single process or several business processes to be performed in a given sequence between different administrations. This is true at national level, this is also true at pan-European level, which is the concern of the EIF: eGovernment services provided in a pan-European context will rely upon the interaction between public administrations from different Member States.

For example, if a citizen of Member State A marries a citizen of Member State B, this should trigger an event 'marriage / change of civil status' in the Member State where the marriage occurs. Processing the event will result in the change of the citizens' civil status being recorded in various administrative systems of this Member State. For example, getting married may alter one's taxation status, entitlement to social welfare, etc. While automatic modification of status would be achieved within a Member State if the participating administrative systems (e.g. taxation, social welfare) implement their national interoperability framework, change of its citizen's civil status would not be registered in another Member State's information systems unless the respective national administrative systems interoperate.

> **Recommendation 4 (organisational)**: The **requirements** for pan-European eGovernment services should be jointly determined by the participating Administrations via a **demand driven approach**[16]. This should lead to the identification and **prioritization** of such services to be provided at pan-European level.
>
> Demand can be determined from the views of citizens and enterprises (e.g. in co-operation with Eurobarometer[17], Citizen Signpost[18], etc.) and also from the investigation of the practical problems that occur when citizens and enterprises try to relocate or trade across Europe's borders (e.g. in co-operation with SOLVIT[19] and the Euro Info Centres[20]).

The subsidiarity principle enforces decentralised responsibility. Decentralised responsibility involves the capability for each partner concerned to organise its business processes in a way best suited to its practices at national level. Consequently, it is unrealistic to believe that administrations from different Member States will be able to harmonize their business processes because of pan-European requirements. Indeed, steps and processes that are internal to a particular Member State can remain unchanged provided that "entry and exit points" of these processes are made transparent to and interoperable with the other Member States involved. The key to organisational interoperability is therefore to identify and document those "business interoperability interfaces" (BII) through which the Administrations from different Member States will be able to interoperate at pan-European level for a given eGovernment service.

The following figure provides for an illustration of the concept of BII in the case of a request addressed to one Administration (Member State X) which implies information to come from another Member State as well (Member State Y). From an organisational point of view, such request is allowed when the administrations involved have agreed in advance on:
-    which pan-European eGovernment services they contribute to,
-    which business processes are involved and

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[16] *The recent Communication Public Services for Europe's Future: the Role of eGovernment (SEC(2003) 1038) recognised the importance of a demand-driven approach.*
http://europa.eu.int/information_society/eeurope/2005/all_about/egovernment/index_en.htm
[17] *Eurobarmeter http://europa.eu.int/comm/public_opinion/*
[18] *Citizen SignPost Service http://europa.eu.int/citizensrights/signpost/front_end/signpost_en.htm*
[19] *SOLVIT solving administrative obstacles in cross-border procedures*
http://europa.eu.int/comm/internal_market/solvit/index_fr.htm
[20] *Euro Info Centres http://europa.eu.int/comm/enterprise/networks/eic/eic.html*

- which administrations will provide the BII functionality to interconnect the 'national' business processes which might be completely different (from organisational, semantic and technical points of view).
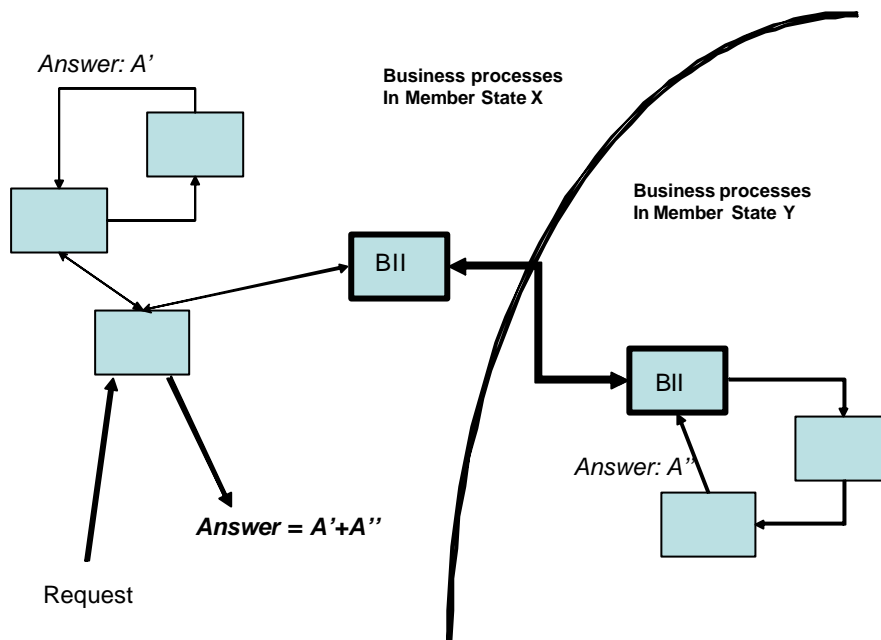
"**Recommendation 5 (organisational)**: In the context of life events and business episodes, public administrations that consider to set up eGovernment services with a pan-European dimension, should consider the related business processes and actors to be involved; they should agree on the necessary **business interoperability interfaces** (BII) through which their business processes will be able to interoperate at pan-European level.

In addition, the cooperating public administrations have to consider the required contributions and commitment necessary from each other to provide an acceptable level of quality and security to the customer. To address these requirements with confidence, public administrations will need to enter into some sort of agreement that gives assurance to all parties (e.g. service level agreements on timely delivery, on quality, on data protection, on security measures, etc.).

Recommendation 6 (organisational): Where the provision of a pan-European eGovernment service requires contribution from several public administrations over Europe, the respective expectations should be formalised, for example by means of **service level agreements**. Such agreements should at least be considered between the different business interoperability interfaces (BII) concerned (at pan-European level). In addition, a **common security policy** should be agreed.

2.3.2   Semantic interoperability

To move from simply presenting information to where computer programmes can exchange it, combine it with other information resources and subsequently process it in a meaningful manner requires agreement on a wide variety of issues that relate to the context within which information is created and used. This is the subject of semantic interoperability. It entails agreement on, for example, ways to discover, represent and give context to information. This will allow automated tools to share and process information, even when they have been designed independently. The objective is, not only to allow information resources to be linked up but also to allow information to be automatically understandable, and, consequently, reusable by computer applications that were not involved in its creation[21]

In the context of the 2005 target of eGovernment services, semantic interoperability concerns the need to agree on common definitions and understanding for the pieces of data that will need to be exchanged on a pan-European level.

Solving semantic interoperability is an activity to be done at the sectoral level, i.e. within a specific eGovernment service, taking into account the life event or business episode it serves. However, it is most likely that a common set of data items (the core eGovernment data elements) may be identified for pan-European eGovernment services, such as basic national identifiers of enterprises, citizens and administrations (name, address, nationality, etc.).

Recommendation 7 (semantic): For each eGovernment service considered at a pan-European level, the data elements to be exchanged should be made interoperable:
- Responsible Administrations to **publish information** on the corresponding data elements involved at national level;
- Responsible Administrations to draft proposals for and agree on the **data** and the related **data dictionaries** required at pan-European level; this work should be performed on the basis of **core eGovernment data elements** common to all pan-European eGovernment services (in particular the **basic identifiers to be used for enterprises, citizens and administrations**); the **sector-specific eGovernment data elements** (i.e. depending on that given eGoverment service) should then be defined and agreed upon;
- Responsible Administrations to draft proposals for and agree on **multilateral mapping tables** between the various national and pan-European data elements.

Recommendation 8 (semantic): In the European Union's legal and social framework, there is a **presumption of linguistic equivalence** in directives and regulations that are approved as part of the legislative process. To the extent that vocabulary used in such law subsequently finds itself used in the delivery of eGovernment services, due account should be taken of this when considering semantic interoperability.

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[21] *In e-government this would, for example, allow a computer application in one Member State's administration to access an information resource of another Member State's administration to validate the taxation status of an enterprise from that Member State or to check the eligibility for social welfare of a citizen from another Member State. It could do this with the same ease as it could check the taxation status of nationally registered enterprises or the eligibility of its own citizens, without any foreknowledge of the way the information is created or used by the other national administration. Similarly, the technical and semantic interoperability of geographic information, for example, would enhance trans-border intra-agency co-operation, environmental monitoring and the co-ordination of disaster relief.*

An essential requirement for the exchange of information is a single language that enables to describe the meaning and structure of the underlying data, i.e. a mark-up language. In the context of current technologies and market developments this mark-up language is XML. Being a mark-up language, XML does not, and cannot by itself, guarantee or deliver *semantic* interoperability. This is achieved through initiatives to develop common semantics on the basis of XML; the subsequent introduction of XML schemas and related artefacts (e.g. metadata, ontologies, etc.) then make it possible to integrate services that were developed with different vocabularies and with different perspectives on the data.

Recommendation 9 (semantic): Initiatives at pan-European level to develop common semantics on the basis of XML should be performed in a **coordinated way**, and should consider cooperation with the existing standardisation bodies. In particular, the **XML vocabularies** should be developed whilst taking into account the agreed core/specific eGovernment data elements.

2.3.3 Technical interoperability

Internet-based services, including government e-services are available in a myriad of forms and appearances, and offer a variety of interaction types, ranging from simple websites to interactive ways of doing business. In the context of eGovernment services, a commonly used classification of these interaction types distinguishes the following sophistication levels:

- Stage1: Online services only provide information: the consumer can read this information online or download it.
- Stage2: Forms are available online, and can be downloaded, and returned by post, fax or e-mail.
- Stage3: Individual transactions between an administration and an enterprise or citizen are possible: forms can be completed online, orders can be placed and paid for.
- Stage4: Multiple transactions are possible; services are integrated and transactions between administrations and enterprises and citizens are fully automated.

Although each of these levels describes e-services, the most challenging requirements for electronic interoperability are at the fourth level. Stage1 and Stage2 mainly concern the interaction of the eGovernment service with the user (front-office), there is no automated electronic processing of the forms performed, whilst Stage3 and especially Stage4 involve background electronic processing of the information provided and possibly electronic interactions with external systems from other administrations and/or from enterprises (back-office interoperability).

The main focus of Stage1/ Stage2 services is the provision of information to citizens and enterprises. Examples of such eGovernment services at EU level include EURES[22], PLOTEUS[23], COWEBS[24], SOLVIT[25], TRIS[26], SIMAP[27] and the Your Europe portal[28] that provides information on cross-border public services in Europe.

One way of providing eGovernment services is to set up a portal in front of the government applications. The portal handles the communication with the citizen and enterprises (user identification and authentication, presentation of a coherent view of the multitude of government services involved, provision/collection of data to/from the user, communication with the government applications, …). Additional portal components include forms servers and distributed content management systems. The communication between the portal and the applications, or between the application themselves is then provided by specific middleware components which ensure the interoperability between the diverse systems. See for example some middleware solutions considered in Sweden[29] and Germany[30], where Stage3/ Stage4 services are dealt with.

In the context of pan-European eGovernment services, this means connecting together applications which belong to different Administrations, and which are located in different Member States.

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[22] *EURES – European-Wide job search portal*
http://europa.eu.int/eures

[23] *PLOTEUS, training opportunities database http://www.ploteus.net*

[24] *COWEBS - the social security portal for migrant workers*
http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showDocument&parent=crossreference&documentID=1438

[25] *SOLVIT solving administrative obstacles in cross-border procedures*
http://europa.eu.int/comm/internal_market/solvit

[26] *TRIS 98/34 information site concerning national technical regulations*
http://europa.eu.int/comm/enterprise/tris/index_en.htm

[27] *SIMAP – systeme d'information pour les marches publics http://simap.eu.int/FR/pub/src/welcome.htm*

[28] *http://europa.eu.int/public-services/*

[29] *SHS http://www.statskontoret.se/shs/pdf/1-1documentation.pdf*

[30] *OSCI http://www.osci.de/*

The following figure considers the most complex interaction type (stage4) which encompasses the other models:
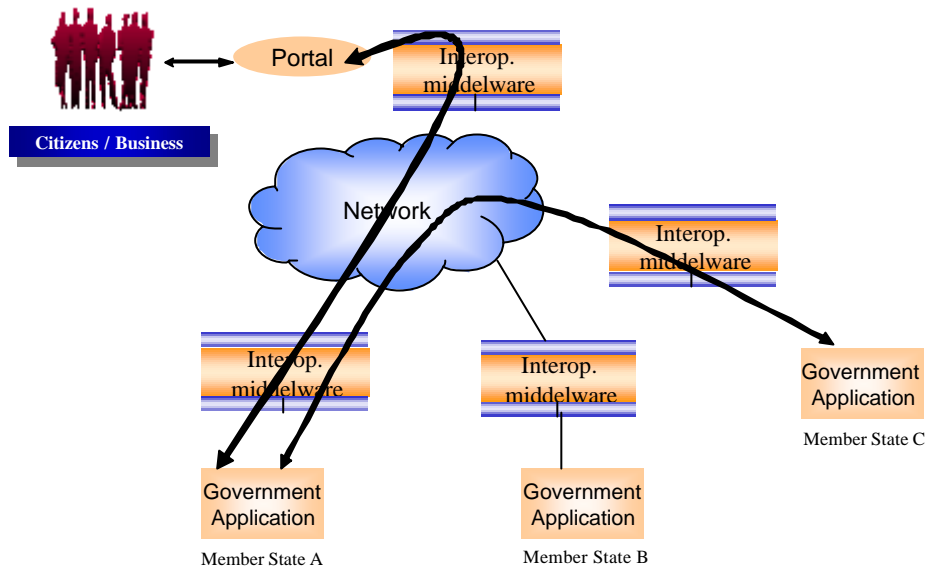

Figure: the scenario for pan-European eGovernment services

Another way, in particular for the communication between the enterprises and the public administrations, is to interconnect directly their respective applications via adequate middleware components. For example, a statistical application in an enterprise which sends automatically the required statistics to the National Statistics Institute, or an enterprise accounting system which sends tax declarations to the Finance Administration. Again this concerns back-office interoperability.
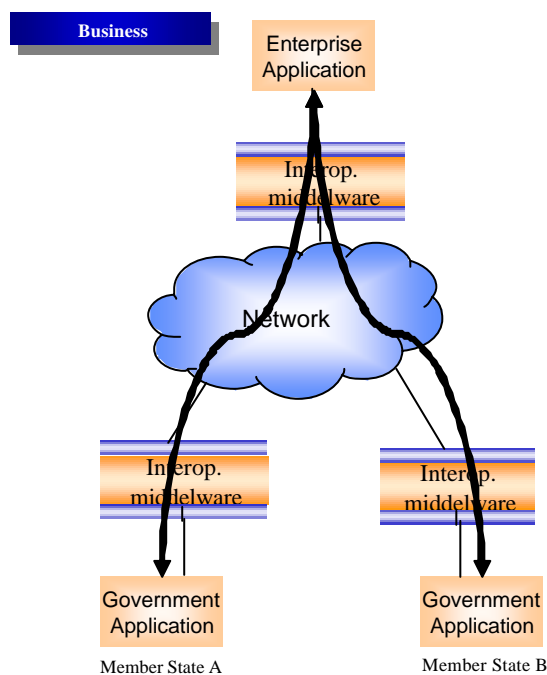
Recommendation 10 (technical): At front-office level, technical interoperability aspects should be considered for the following fields:

Data presentation and exchange
Accessibility - Interface design principles
Multi-channel access
Character sets
Collective authoring
File type and document formats
File compression

Recommendation 11 (technical): At back-office level, technical interoperability aspects should be considered for the following fields:

Data integration and middleware
XML-based standards
EDI-based standards
Web Services
Distributed Application Architecture
Interconnection services
File and message transfer protocols
Message transport and security
Message store services
Mailbox access
Directory and domain name services
Network services

Recommendation 12 (technical): Security aspects to be considered concern all layers:

Security services
General security services – PKI
Web service security
Firewalls
Protection against viruses, worms, Trojan horses and e-mail bombs

Indeed, it is only with the recent development and ubiquity of 'Internet-type' technologies, based on universally agreed open standards and specifications, that it has been possible to achieve a high degree of technical interoperability. The Internet itself is a good example of this, where computers and information resources all over the world can link up, present data in a universally readable format and exchange e-mails by simply respecting protocols such as TCP/IP, HTTP and S/MIME.

A comparative analysis of the standards and specifications mentioned in the national interoperability frameworks (eGIF) of France[31], Germany[32] and the United Kingdom[33] was performed before this framework was drafted. The comparison considered the key technical aspects. It showed a large degree of conformity in the technical choices that the countries have made at the national level:

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[31] http://www.adae.pm.gouv.fr

[32] http://kbst.bund.de

[33] http://www.govtalk.gov.uk

There is a commonality of standards for transport (e.g. networking LAN/WAN) and for presentation (e.g. file / hypertext / message transfer / character sets) of information. There is also a high degree of commonality in standards for domain naming, web browsers and viewers. This is because the national eGIFs, in effect, implement Internet standards at these levels. The use of the XML family of standards is recommended in national eGIFs for data integration. This is usually supplemented with recommendations for supporting standards such as UML or RDF for data modelling, XSLT for data transformation, Dublin Core, possibly with national extensions, for metadata, etc. Some Member States also make reference to Web Services interoperability.

Such result provides for a very positive and favourable technical ground to the establishment of interoperable pan-European eGovernment services. The technical solutions adopted for such services will need to respect the capability for each partner concerned to organise its data processing systems and networks in a way best suited to its practices (i.e. technological approach, legal framework, principles of management, etc.). Technical interoperability should then be achieved on the basis of common guidelines which will enable to adopt technical solutions which fit on a multi-lateral basis.

> **Recommendation 13 (technical)**: Member States Administrations and EU Institutions and Agencies should develop and use **common guidelines** for the technical interoperability of pan-European networks, applications and services in the context of eGovernment. The IDA guidelines[34] should constitute the basis for such guidelines, and be updated accordingly, also taking into account relevant results and guidelines coming from the Community research and technological development programmes and other Community programmes such as IST, eTen, and eContent.

> **Recommendation 14 (technical)**: The common guidelines should be based on recognised **open standards**.

Multilingualism is a well-known characteristic of Europe. It is a very nice but demanding aspect to be taken into account when designing technical solutions for pan-European eGovernment services.

> **Recommendation 15 (technical - multilingualism)**: Submission of requests via e-mail or front offices: if possible, there should be facilities for citizens and enterprises to submit requests in their own language. An alternative is to submit requests only in a limited set of languages at EU level (e.g. 3 languages such as English, French and German). The use of machine translation software should enable front office workers to understand requests and to respond to them, even though the translations may not be perfect.

> **Recommendation 16 (technical - multilingualism)**: Pan-European services provided via portals: the top-level EU-portal interface should be fully multilingual; the second-level pages on EU-level (in particular for the introductory texts and the descriptions of links) should be offered in the official languages; the external links and the related pages on the national web-sites for the identified services should be available in at least one other language (for example English) in addition to the Country one(s).

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[34] *IDA Architecture Guidelines*
http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showDocument&parent=crossreference&documentID =242

Recommendation 17 (technical - multilingualism): For other cases: machine translation software may be offered that will yield a rough translation of the contents of a website into the desired language. Even though this translation would not be perfect and may contain logical and grammatical errors, its result would at least give some impression of the contents of the site and could thus offer support in the decision whether or not to request or produce a professional translation.

When the open source software approach is followed, it is conceivable that a local administration translates particular components and makes them available again to the community at large. Coordination of efforts at a pan-European level should stimulate and support these activities.

3 Annex: Generic model for a national interoperability framework

3.1 High-level policy issues

High-level policy issues can be stated in terms of objectives. These objectives are to be realized by making use of opportunities provided by technological developments. Objectives may focus on improving:

- effectiveness: e.g., eGovernment will not be limited to the provision of standard administration services by electronic means; they will also allow the delivery of entirely new services;
- efficiency: e.g., improved access to information and cost reduction by integrating local, regional and national administrations;
- flexibility: e.g., multi-channel access to information and services for every citizen and enterprise, 24 hours a day, 7 days a week;
- transparency: e.g., ease of finding and consuming services, thus allowing citizens and enterprises better access to and participation in administrative matters and political issues.

All these objectives may have a European dimension. National interoperability frameworks should pay attention to this dimension if there is a need for cross-border exchange of information. The results may influence how other issues are addressed. Entirely new services may be required that are primarily aimed at citizens and enterprises of other countries. These services may require different channels to provide them and they may need to be offered in different languages.

When stating the objectives, attention should be paid to the realities of the country. These realities provide information on the obstacles that have to be overcome in implementing the policy. Areas that must be considered are:

- the level of technology in the country;
- economic disparities between regions;
- socio-economic disparities between groups of citizens;
- cultural and language differences;
- different legal systems that may hinder integration.

If these obstacles are not addressed, they may even have a cumulative effect if a country enters into interoperability on a pan-European scale.

If advances in technology are not matched by developments in other areas, the digital divide will widen, thereby excluding groups from accessing the services. On the other hand, seen from the perspective of the service provider, if an e-service is based on technology choices that exceed the skills of the intended target groups, the potential benefits of the service may not be reaped: a clever solution that works well in one country may exceed the capabilities of citizens and enterprises in another country.

3.2 Scope

In order to define clear policies, it is important to have a clear view of:

- the target groups of the national interoperability framework (only government administrations or also enterprises from the private sector that provide public services);
- whether the target groups must adhere to the interoperability framework for their country or that all or only some target groups are merely "invited" to do so.

3.3   Business requirements for eGovernment services

If an e-service is to contribute to the implementation of the high-level policy, it should adhere to generic business requirements for eGovernment services. In this context, the following priority requirements can be stated.

- E-services are made known to users and users are aware of the benefits of using the services.
- E-services can be located easily.
- E-services must be accessible to all members of the intended target groups.
  This may imply a differentiation between services that are used anonymously and services that require identification.
  Accessibility also includes awareness of the needs of disabled and elderly persons.
- E-services should be user-centred.
  They should be comprehensive, correct, readily available, and easy to understand in terms of language and structure.
- E-services should add value.
  A service that is merely "paper on glass" does not realize the full benefits of available information technology. Where applicable, a service should be integrated with other services.
- The provision of e-services should be safe, confidential and in no way harm the privacy of either party.
- The design of eGovernment applications should comply with the existing legal data protection requirements and, where available, make use of technologies that are privacy-compliant and privacy-enhancing

3.4   General approach

When implementing a national interoperability framework the emphasis is obviously on "interoperability". Standardization in technology and harmonization in legislation are just two ways to achieve this.

Other recommendations are:
- Use open standards.
- Incorporate existing standards in a larger context.
- Stimulate re-use of proven standards.
- Redesign administrative processes, make the best use of available technology.
  This is also an opportunity to make services more user-centred.
- Keep administrative procedures independent from technology;
- Coordinate and manage the eGovernment initiative.
  Centrally agreed XML schemas may be provided free of charge throughout the public sector. This form of re-use reduces cost while the need to develop separate mechanisms for interchanging data is greatly reduced.
- Keep track of developments in the wider community. For instance, changes in privacy legislation may impose requirements to the provision of some e-service
- Reduce the amount of data to be collected by using well-defined data dictionaries and data structures;
- Ensure information security: prevent unauthorised access to systems and, in the case of highly confidential information, secure each record (or even each component) individually;
- Enable wide access (user-friendly interfaces, access for the disabled, foreign language support, etc.).