White Paper

"European Interoperability Framework"

- ICT Industry Recommendations -

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Overview

Recent EU policy initiatives, including **eEurope,** have brought **'Interoperability'** to centre-stage of the European Union's ICT governance framework.

Today, in one way or another, all stakeholders - governments, industry, consumers, and other social partners - have recognised the need for interoperability and recognise the benefits interoperability could bring. In this sense, interoperability has supplemented, and in some ways even superseded, earlier controversial discussions focused exclusively on open group standards, different software licensing models, or technical specifications under public procurement laws. Interoperability embraces the wider policy perspective to enhance ICT-embedded industries and the information society at large.

However, while everybody may agree on the need for interoperability, the scope and implementation of interoperability, as well as the incentives that encourage it or the technical or political barriers that hinder it, remain controversial. What are the issues and what are the **recommendations by the ICT industry** for the role of governments in promoting interoperability and enacting related regulatory policies?

This **White Paper** aims to identify the issues and to develop replies. It gives an overview of the debate, summarises technical and industry experiences, and outlines possible directions for the policy framework within which further discussion will take place and needed answers will be found.

The *first part* introduces the subject and the terminology, by identifying various definitions used as well as the major policy initiatives launched to enhance interoperability and open standards in Europe, including the recently published draft "**European Interoperability Framework**" (EIF).

The *second part* looks at the experience of the ICT industry with regard to interoperability and considers how **industry interoperability could serve as a benchmark for governments** and the benefits of interoperability at different technical levels, including specific recommendations for public sector progress towards interoperability.

Through the **legal analysis of the draft EIF 'open standard' definition** the *third part* explores major legal issues and legal limits or benchmarks related to interoperability, in particular European intellectual property rights and public procurement laws.

The *fourth and fifth parts* draw **conclusions** and present concrete **policy recommendations** concerning the role of governments with regard to the different components of interoperability.

Annex I summarises the **Highlights of the draft EIF**.

The **'Open Standards Directory'**, in *Annex II*, collects a representative sample of alternative definitions used in the political debate, including the definition used in the draft EIF.

The key findings of this White Paper, as described in particular in the second part, as well as major policy recommendations, will be presented at the kick-off meeting of the **"European eBusiness Interoperability Forum"** (eBIF), established by CEN/ISSS, in Brussels on 18th February 2004.

This White Paper aims to stimulate an urgently needed, open debate through direct dialogue between governments and industry and all other stakeholders concerned.

The White Paper will be updated if and when appropriate in the light of joint lessons learned.

Part I - Introduction to Interoperability and Open Standards in the European Union

What is "Interoperability"?

In a Working Paper submitted to the Telecommunications Council on 5-6 December 2002 (see below for more information), the Commission considers the variety of meanings which may be attached to the term "interoperability":

> "The term 'interoperability' includes several aspects: to a network operator, it can mean the ability to inter-operate with other networks and provide seamless services to users; to a content provider or service provider, it can mean the ability to be able to run an application or service on any suitable platform; and, to the consumer, it can mean the ability ideally to obtain the relevant hardware device "and begin to consume and pay for services, without having prior knowledge which services would be consumed, in a simple way". All of these types of interoperability are desirable.

There is therefore some degree of confusion over what the term means. However, in general terms interoperability describes the capability of two or more hardware devices or two or more software routines to work together. Specifically in connection with software, interoperability describes a feature of the software in the same way that functionality, ease of use, security, reliability are features. Since interoperability becomes a quality of increasing importance for information technology products, such as "Grid computing", the term 'Interoperability' is widely used in product marketing descriptions.

The New Approach to standardisation

In 1985, the "New Approach" to technical harmonisation and standards was developed as a means of establishing a level playing field for free circulation of products in the Internal Market.

Under the New Approach, directives are used to define the essential requirements that products in a given area must meet when they are put on the market. However, these directives do not specify the technical means by which to meet those requirements (except very rarely). European standards are therefore envisaged as a means of meeting these essential requirements, and European standards organisations (ETSI, CEN, CENELEC) are charged with the elaboration of technical specifications, the use of which provides a presumption of conformity with legal requirements. These standards offer one route to complying with these obligations.

Beyond formal standardisation

However, in recent years the new regulatory framework for electronic communications has moved standardisation away from a monolithic, monopoly-dominated and public-sector led structure towards a heterogeneous software and computer-based, largely services-based market led by private enterprise. This liberalised framework, based around the competition law principles established in the European Court of Justice, has greatly reduced government micromanagement of standardisation issues.

As a result, other models of standardisation have developed which to some degree complement, and to some degree challenge and supersede the formal standardisation model: private sector standards consortia, global partnerships of private sector actors, and de facto proprietary standards now regularly deliver standards which, although they lack the formal status of harmonised standards, nonetheless achieve the same results and contribute to the efficiency of the internal market.[1]

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[1] The Council's Resolution on the role of standardisation in Europe (28 October 1999) states "that standardisation is a voluntary, consensus-driven activity, carried out by and for the interested parties themselves, based on openness and transparency, within independent and recognised standards organisations, leading to the adoption of standards compliance with which is voluntary", and asks the Commission "to examine how a community framework of principles should be developed with regard to the use within Community policies of specifications which do not have the status of formal standards".

Increasingly, there is a need for the standardisation process to reflect the emergence of a fully competitive software and services driven market. In this environment, technological solutions exist to provide interoperability without the need for formal standards. As a result, the cost of developing one single standard may actually be higher than any costs associated with ensuring interoperability via other means, and could hamper the competitive dynamics. However, "interoperability" may mean different things to different people, so it is important for any discussion to define the term clearly.

Alternative models for ensuring interoperability

The existence of formal, informal and hybrid[2] standardisation processes means that discussion of standardisation commonly focuses on the means of achieving standardisation, rather than the desired outcome – technical compatibility.

Experience demonstrates that technical compatibility can in fact be achieved by a number of alternative methods beyond standardisation[3]. For instance, the emergence of a dominant software specification can often induce widespread compatibility more forcefully than formal standards. Examples of successful standards include PDF as well as XML and HTML standards. In addition, programmes such as Linux or other applications and/or operating systems incorporate a number of standards.

One of the main criticisms of the industry-led standardisation model relates to the perceived lack of accountability. "According to the dominant view, consortia lack openness and are undemocratic. This view underestimates the openness of most industry consortia and overestimates the democratic procedures of formal standardisation. The research findings indicate that formal standards bodies and standards consortia work in similar ways. Consortia, too, strive for consensus, address minority viewpoints, etc.. Although the latter more explicitly target industrial parties, both settings include and exclude the same constituencies."[4]

Open Source and Open Standards[5]

A common extension to the "accountability" argument links to the question of open source software. According to this argument, developers should have access to source code to counteract the inherently undemocratic nature of industry-led standards mechanisms. Yet rather than the development model used, the determining factor in the eventual success of industry-led standards is the scale and manner in which the standard is adopted.

It is therefore important to distinguish between Open Source and Open Standards: Open Source refers to a particular kind of licensing arrangement which allows developers to build on existing source code; Open Standards on the other hand refers to a kind of technical framework which companies can agree on together in order to ensure greater interoperability for their product. The key difference is that Open Standards retains the important commercial incentives to innovate by maintaining Intellectual Property rights. Thus the question of Intellectual Property rights is also closely connected with the interoperability question.

Industry-led standards

A number of examples demonstrate the ability and willingness of industry to co-operate and create interoperable products on their own initiative, for the benefit of the industry as a whole:

- The **WS-I (Web Services Interoperability) Organisation** is an open, industry organisation chartered to promote Web services interoperability across platforms, operating systems, and programming languages. The organisation works across the industry and standards organisations to respond to customer needs by providing

[2] e.g. CEN/ISSS which combines a formal standardisation process with industry-responsive workshops
[3] A Commission report "Beyond Consortia, Beyond Standardisation? New Case Material and Policy Threads" (2001) accepts that these models have a role to play in the standardisation process and calls for "a more systematic inventory of compatibility-enhancing strategies is needed".
[4] Idem, page 4
[5] See also references to open standards and open source software on pp 16 and 18. For a legal analysis see Part III

guidance, best practices, and resources for developing Web services solutions. Current Web services standards (or de facto standards) include:

- Simple Object Access Protocol (SOAP), which provides a common industry mechanism for transmitting a request to a Web service and returning a response;
- Universal Description, Discovery and Integration (UDDI), which allows a company to publicize its services to other companies and Web users;
- Web Services Description Language (WSDL), which enables a business to formally describe what its service does.

- The **Open Platform Initiative for Multimedia Access** has been set up to develop specifications enabling a consumer to obtain a receiver and begin to consume and pay for services, without having prior knowledge of which services would be consumed, in a simple way such as by operating a remote control device. OPIMA constitutes the first Industry Technical Agreement (ITA) under the International Electrotechnical Commission (IEC), and is based on a Charter.

- The **Open Mobile Alliance** aims to "grow the market for the entire mobile industry by removing the barriers to global user adoption and by ensuring seamless application interoperability while allowing businesses to compete through innovation and differentiation". The OMA aims to be the catalyst for the consolidation of standards fora and works in conjunction with other existing standards organisations and groups such as IETF, 3GPP, 3GPP2, and W3C. The principles of the Open Mobile Alliance are:

  - Products and services are based on open, global standards, protocols and interfaces and are not locked to proprietary technologies
  - The applications layer is bearer agnostic (examples: GSM, GPRS, EDGE, CDMA, UMTS)
  - The architecture framework and service enablers are independent of Operating Systems (OS)
  - Applications and platforms are interoperable, providing seamless geographic and inter-generational roaming.

A common feature of these initiatives is that they have all arisen in response to the growing perception within industry that traditional standards bodies are unable to deliver the market-enhancing opportunities they require. They thus offer the clearest indication that the networking effects in the computer technology world have changed the face of standardisation forever.

Communication on "Interoperability of Information Society services"

There are two separate but interconnected initiatives relating to interoperability taking place within the European Commission.

The first of these strands is lead by DG Information Society and considers interoperability within the wider context of the Information Society. Viewed from this perspective, both inter- and intra- platform interoperability become pre-requisites for the creation of a functioning Information Society.

The first stage of this process began with the **Working Paper**[6] "Barriers to widespread access to new services and applications of the information society through open platforms in digital television and third generation mobile communications" which stated that "achieving widespread access by all citizens to new services and applications of the Information Society….is one of the goals of the EU for the coming decade." (See the Commission press release **here**[7]).

[6] http://europa.eu.int/information_society/topics/telecoms/regulatory/publiconsult/documents/211_29_en.pdf. This paper should not to be confused with the "Working Paper on Interoperability" produced by DG Enterprise (see following page)

[7] http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=MEMO/02/281|0|RAPID&lg=EN&display=

The report acknowledged that "voluntary initiatives by industry in both mobile communications and digital TV are moving towards an adequate level of interoperability", but the Commission underlined its intention, where necessary, to "take action in accordance with Community law (to mandate standards and/or specifications) if freedom of choice for consumers and interoperability are not adequately achieved in Member States".

Following a public consultation on the matter[8], in July 2003 the Commission adopted a **Communication**[9] on the "Interoperability of Information Society services." The title of the Communication makes explicit that rather than focusing simply on Digital TV and 3G mobile the Commission aims to present "a multi-platform approach to the delivery of Information Society services" as a whole. The communication concludes that:

- **"Interoperability is likely to evolve with technology**[10]. The Commission will monitor developments in multi-platform delivery of and access to electronic services with a view to determining if the use of proprietary technology has the effect of depriving users of widespread access to Information Society services in a way that limits their choice unreasonably."
- Accordingly "legislative and regulatory conditions should create a favourable environment for business, attracting investment and favouring innovation and economic development, as well as safeguarding the interests of consumers."
- The report also recognises that "public authorities can have a considerable impact on the creation of an Information Society" and that they should "follow public procurement policies that favour openness and interoperability."

Working Paper on Interoperability and the European Interoperability framework

The second strand of work relating to interoperability is led by DG Enterprise under the Interchange of Data between Administrations (IDA) programme. This strand of work has a narrower focus and considers interoperability as one component of the EU's strategy to deliver inter-connected pan-EU e-Government services.

In June 2002, the **eEurope 2005 Action plan**[11] made the development of a European Interoperability Framework (EIF) a priority component of the EU's strategy to develop pan-European e-government services for citizens and enterprises.

DG Enterprise subsequently presented its **Working Paper on Interoperability**[12] in support of eGovernment at the July 2003 eGovernment conference in Italy. The **Ministerial Declaration**[13] issued at the end of the conference reiterated that the interoperability of public administration systems remains a top EU priority and called for completion of the EIF by end 2003. Ministers also noted "the increasing interest in the use of open source software in public administrations, and welcomed further exchange of experiences between their Countries and the Commission."

The European Interoperability Framework

The EIF is being developed under the "Interchange of Data between Administrations" (IDA) programme which is managed by the Enterprise DG of the European Commission. According to the first draft of the EIF working document published in January 2004[14], the EIF focuses on "supplementing, rather than replacing, national interoperability guidance by adding the pan-European dimension". [15]

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[8] View the responses here: http://europa.eu.int/information_society/topics/telecoms/regulatory/publiconsult/comments/barriers_to_widespread_access/index_en.htm

[9] http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/documents/acte_en.pdf

[10] See also page 12

[11] http://www.europa.eu.int/information_society/eeurope/news_library/documents/eeurope2005/eeurope2005_en.pdf

[12] Commission staff working paper SEC (2003) 801: "Linking up Europe: the importance of interoperability for e-Government services"; http://europa.eu.int/ISPO/ida/export/files/en/1523.pdf

[13] See http://www.e-govconference2003.org/doc/MinisterialDeclaration.doc

[14] Commission working document on European Interoperability Framework http://europa.eu.int/ISPO/ida/export/files/en/1673.doc

[15] The UK, France, Germany, Spain, Denmark, Netherlands and Finland all have their national frameworks. See Annex II of the Commission Working Paper on Interoperability, note 12 infra

According to the document, an interoperability framework defines "a set of standards and guidelines which describe the way in which organisations have agreed, or should agree, to interact with each other." The three aspects of interoperability considered in the EIF include:

- Technical – linking up computer systems by agreeing on standards for presenting, collecting, exchanging, processing, transporting data.
- Semantic – ensuring that transported data shares the same meaning for link-up systems
- Organisational – organising business processes and internal organisation structures for better exchange of data.

This draft EIF, to be followed by a Communication, will be complemented by separate "IDA Architecture Guidelines" describing the technical issues involved. These guidelines are expected to comprise both abstract definitions and rules regarding interoperability, along the lines of existing national interoperability frameworks, as well as the existing IDA Architecture Guidelines which cover more technical components of interoperability. For a fuller description of the draft EIF, see Annex I below.

Issues relating to the EIF

From an industry perspective, a number of questions will need answering regarding the draft EIF published in January 2004:

- How will EIF approach technical standards? Will the EIF avoid establishing preferences for one type of solution over another?
- How will the EIF take into consideration work already done by industry-led standardisation / interoperability consortia?
- What are the implications of the interoperability framework on intellectual and industrial property rights?
- How will the EIF reflect the growing number of "technology neutral" policy statements made by several EU governments with regard to public procurement of software?
- How will the EIF accommodate national frameworks which are not technology neutral in their scope?
- How will the EIF impact the definition of R&D priorities and the allocation of funding for specific projects?
- How will the EIF relate to other interoperability activities, particularly the Open Platforms Communication discussed above?

IDA Open Source Migration Study

Alongside the EIF, the IDA unit of DG Enterprise has commissioned a feasibility study looking at the costs of migrating from a proprietary to an open source operating environment within the public sector[16]. This study will then be followed by a pilot project to establish an implementation test bed to examine an actual migration.

Of crucial importance will be the extent to which the findings of the report coincide with or influence the Architecture Guidelines and technical specifications of the EIF.[17]

Re-organisation of the IDA programme

Following the July 2003 eGovernment conference, which reaffirmed the European Union's commitment to supporting the development of eGovernment services at a pan-European level, the IDA Programme is set to become the IDABC (Interoperable Delivery of pan-European eGovernment Services to Public Administrations, Businesses and Citizens) Programme[18].

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[16] See the Open Source section of the IDA programme here:
http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showChapter&chapterID=134&preChapterID=0-17
[17] This was one of the issues discussed at the "Initiative for Software choice" roundtable of 2 October 2003
[18] See the "eGovernment Observatory"
http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showDocument&parent=news&documentID=1474
and the "Open Source Observatory"
http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showChapter&chapterID=452&preChapterID=0

The new programme will extend present IDA activities to support further the delivery of pan-European eGovernment services to businesses and citizens, as of 1 January 2005. As part of its remit, IDABC will also focus on projects of common interest that help with implementing Community legislation and improving interinstitutional co-operation in the field of e-government. [19]

European industry activities

- ISC "**Interoperability Workshop**", Brussels, 2 October 2003, looking at key issues arising out of the publication of the July Commission Staff Working Paper on Interoperability and the first outline on the European Interoperability Framework (ISC, see: www.softwarechoice.org)
- **CEN/ISSS "European eBusiness Interoperability Forum" (eBIF)**, kick-off meeting, 18 February 2004 (eBIF)[20]
- **EICTA Interoperability Workgroup** and "Comments on Commission Staff Working Document on barriers to widespread access to information society through open platforms in digital TV and third generation mobile communications" [21]
- CompTIA "**European eCommerce Standards Board"** (eECSB)[22].

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[19] See the Commission press release here: http://www.europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/03/973%7C0%7CRAPID&lg=en&display=

[20] http://www.cenorm.be/cenorm/businessdomains/businessdomains/informationsocietystandardizationsystem/ebusiness+and+ecommerce/ebusiness+interoperability+forum+(ebif)/ebusiness+interoperabilityforum.asp

[21] See http://www.eicta.org/1/GKHBJPNCELHIJCJDFPHHMHPH5R9GKT9DWD9C1DU1Y9VQ4TAL7TF4SHAPH7VNM6U9Y3PDB69GKT9DBDPY9DW71KM/EICTA/docs/DLS/CT-IPC-010-OpenPlatformEICTAcommentsfinal-2003-IPC-00022-01.pdf

[22] See http://www.comptia.org/cyberalliances/ecsb.asp

Part II - ICT Industry Comments on Interoperability

Introduction

Now more than ever, governments and industry are seeking to gain maximum business value from their investments in information and communications technologies (ICTs). Over the past 40 years, significant investments in ICTs, infrastructures, and software applications have been made. The results of these investments have been massive, and **undeniable, productivity gains**. As these investments have been made and productivity gains achieved, enterprise ICT infrastructures have become multi-platform, multi-vendor, widely distributed and increasingly complex. Desktop systems have become increasingly elaborate and powerful. In parallel with the growth and complexity of ICT infrastructures and applications, business processes and governmental services have become more and more complex, interdependent on one another, and dependent on ICT technologies.

The ICT Industry has recognized the ever-increasing importance of systems and software interoperability to enable business process/government service development and the integration of systems and business processes. Simply defined, interoperability is the ability of two or more ICT assets (hardware devices, communications devices, or software components) to easily or automatically work together and, in the business sense, expands to include the ability of two or more business processes, or services, to easily or automatically work together. It is clear that the ability to **interoperate is key to reducing ICT integration costs and inefficiencies**, increasing business agility, and enabling the adoption of new and emerging technologies.

Standards, and their widespread adoption, enable interoperability. Leading ICT industry players are very actively working together through industry associations and standards organisations to **advance the development and adoption of open standards**[23]. In addition to investing large sums of money on developing open standards and making their hardware and software compliant with such open standards, major ICT Industry players are cooperating at unprecedented levels to align their technologies so they interoperate, and significant progress is being made.

The recent example of IBM and Microsoft publicly demonstrating how their disparate software and systems interoperate using new Web services standards, they and other leading ICT industry players have developed over the past several years, highlights some of the progress and importance attached to interoperability. For quite some time, major ICT Industry players have been routinely sitting down together and hammering out interoperability issues on the technical committees of standards organisations such as the W3C (World Wide Web Consortium), OASIS (Organisation for the Advancement of Structured Information Standards), and others. Organisations such as the **WS-I (Web Services-Interoperability Organisation)** have sprung up to specifically address interoperability. The ICT Industry is convinced that best-of-breed, interoperable solutions can best be achieved through these competitive marketplace activities.

CompTIA encourages government, as a major end-user of ICT technologies, to be both a supporter of the ICT standards setting process and an active participant in that process. However, the ICT industry does not believe governmental mandates regarding the types of ICT solutions that governments may acquire and/or regulation of the types of ICT solutions eligible to receive public funding, are in either the best interests of government or private industry as a whole. Industry further believes that such mandates would slow progress towards interoperability and inhibit government's ability to select the most cost effective, best-of-breed hardware/software solutions. In particular, **mandated standards** run the risk of imposing a "technology penalty" on users, as the legislative process fails to keep up with technological development, depriving users of the benefits of innovation. In the end, the

[23] A multitude of various alternative definitions for 'Open Standards' exist. For a legal analysis of these definitions see Part III, together with the 'Open Standards Directory' in Annex II

development, adoption and evolution of open standards must be voluntary, driven by the benefits from the standards and technologies, with both suppliers and users able to articulate real business benefits.

Alternative definitions of interoperability

From a purely technological perspective, interoperability concerns the ability of two or more ICT assets (hardware devices, communications devices or software components) to easily or automatically work together. However, business and government also require interoperability of processes, so that business processes or administrative services can link up easily through computing/ communications processes. This paper will consider interoperability in this broader sense, covering both the process and the technology perspective.

In this broader context, interoperability can be defined or viewed from several different perspectives. A few of them are outlined below:

- **The EU Software Copyright Directive** defines interoperability between computing components generally to mean "the ability to exchange information and mutually to use the information which has been exchanged".[24] This does not mean that each component must perform in the same way, or contain all of the same functionality, as every other one – interoperability is not a synonym for cloning. Rather, interoperability means that the components, which may differ in functionality, can share information and use that information to function in the manner in which they were designed to.

- **The European Interoperability Framework[25]** definition identifies three separate aspects:
    - **Technical** – linking up computer systems by agreeing on standards for presenting, collecting, exchanging, processing, transporting data.
    - **Semantic** – ensuring that transported data shares the same meaning for link-up systems
    - **Organisational** – organising business processes and internal organisation structures for better exchange of data.

- **The UK e-GIF (e-Government Interoperability Framework)** model focuses on 4 aspects: interconnectivity, data Integration, access, and content management.

From the perspective of the ICT industry, interoperability can be conceptualised as a means of connecting two or more "end-points" with a "wire", where a "wire" means an exchange of data using data and communications standards. Under this definition the aim of interoperability is to define "wires" so that software/ computers can interconnect and interoperate on demand. A common set of standardized, widely-adopted "wires" enable connections and interoperability quickly at minimum cost.

Just as the edges of a jigsaw puzzle define how a puzzle piece connects with other puzzle pieces, the goal of interoperability to define the "wires" or the puzzle edges so that software/hardware/business processes can interconnect and interoperate on demand. In designing hardware and software, and implementing business processes, the ICT industry attempts to make the edges ("**wires**" or "**interfaces**") as common as possible while maintaining the functional features of the ICT components and accomplishing their combined business requirements. This practice of "defining the edges" rather than the implementation of the component itself also promotes innovation and differentiation, which is highly desirable as it promotes beneficial competition in a multi-vendor environment. One must recognize that, in designing and using these component pieces, interoperability is not an end-state but rather is a continuum, i.e., a given component can't interoperate with every other component but rather with only those components designed to interoperate through the same standard(s) ("wires" or "edges").

[24] Council Directive of 14 May 1991 on the legal protection of computer programmes (91/250/EEC); see also Part III
[25] See page 7 above, and Annex I for more details

In designing ICT components and utilizing the "wires" that connect the components, the designers attempt to keep components from being too dependent on one another so they can be used to interconnect with other hardware/software components. The concept of dependence/independence of two components is called coupling by the ICT industry, and the most "loose" coupling possible, while meeting business requirements for the hardware/software, is a highly sought-after characteristic in design. "Tight" coupling of hardware or software results in more "brittle" processes that break when either of the components is changed. Unfortunately, as the features/functions of the hardware/ software components change and are enhanced, frequently the "wires" that connect it to other components must also change to take advantage of the new technology. This means that **interoperability is not static, rather it is a continually evolving situation** driven by rapid changes in technology and customer requirements.[26]

Scope

Interoperability, as an issue, extends through all ICT technology use and through the whole of the ICT-embedded industry. It extends from industry to industry, including the ICT Industry (as an end-user of technology); other industries such as the financial, automotive, chemical, etc. industries; as well as government. It includes private sector technology use by the largest, as well as the smallest, of companies. In the public sector it includes technology use by the smallest governmental agencies and entities as well as the largest.

It follows that interoperability is not just a country-specific or national issue, but is **global in scope**. This international perspective, which the ICT industry has done much to emphasise, has led key policy and decision-makers in Europe to realise that there is a need for interoperability in Europe both within and between public administrations and with enterprises.[27]

The UK's e-GIF Service Delivery Infrastructure, for example, identifies the various components of an interoperable e-Government system: Citizens and Business ("users"); the Multiple Access Channels; the portals (Local Authority, Government, Private Sector); the infrastructure (Government Gateway); Government Systems (Local Authorities, Departmental Systems, Other Public Sector Systems). All of this requires **different kinds of interoperability for different groups** (citizens, enterprises, and other government entities).

- **Interoperability with individuals/citizens** is typically accomplished primarily through Internet/Web Browser interfaces. It also includes direct data exchanges (e.g., file transfers of tax form submissions), mobile communications, etc., which are likely to grow in importance over the next five to ten years.

- **Interoperability with private enterprises** must take into account that enterprises have a wide range of systems. It may be accomplished through the same ICT vehicles as are used with individuals/citizens but may also involve more sophisticated business-to-Government data exchanges and the like.

- **Government and public authorities seeking interoperability** both within their own administration and with others face the same interoperability challenges that private enterprises face in accomplishing enterprise application integration (EAI) and business-to-business (B2B) integration, such as business process alignment, data semantics resolution. Interoperability with other governmental entities must take into account the diverse application software systems and ICT hardware that governmental entities already have in place as well as local governmental business processes predicated on local and national laws.

[26] See page 7 above
[27] See Commission Staff Working Paper: "Linking up Europe: the importance of interoperability for e-Government services" http://europa.eu.int/ISPO/ida/export/files/en/1522.doc

Benefits of interoperability

Connectivity and interoperation among computers, among entities (governments, businesses, citizens, and individuals), and among software components can increase the flexibility and agility of ICT systems, thus reducing administrative and software costs for government. They may also reduce the time needed to implement software and e-Government services.

- **At a EU Member State level**, E-Government flexibility and agility may be increased as interoperability increases. Interoperability can, for instance, assist in the delivery of e-government services based on life events, and help the business sector interact electronically with administrations, reducing administrative costs burden and encouraging SME's to "go digital".

- **At the European level**, interoperability supports the Single Market and its associated "four freedoms of movement of people, capital, goods and services". As people move and enterprises trade across Europe they need to interact electronically with public administrations in Member States other than their own. For e-Government services to be usable across border, national administrations will need to obtain information from other Member States (e.g. relating to taxation status, social welfare contributions, registration information on enterprises, etc.). Since the Single Market and other key European policy objectives require interoperability between European administrations, the needs of trans-border users of e-Government services must be taken into account when developing e-Government services.

Business sector experiences and synergies

Technical standards are being developed through open processes, and their adoption is being driven by the pressure software companies are under to meet their customers' requirements for standards adherence. Standards and interoperability work best when processes are loosely coupled.

The problems of interoperability are not unique to government. The interoperability problems of integrating disparate databases, distributed networks, e-procurement solutions, B2B data exchanges, enterprise application integration, portal integration, B2C (consumer/citizen) solutions, mobile communications, and others all exist in private industry as well as the public sector. In general, there is a common need across all industries for research, new technologies, and improved standards to address interoperability.

CompTIA's global perspective

CompTIA, the leading global ICT industry association, is in the unique position of representing both companies that develop ICT hardware/software solutions as well as those that consume ICT solutions. On the one hand, CompTIA's corporate members develop software such as middleware, database software, and portals. On the other hand, those same major ICT companies use their software, and the software of others, to manage their own computer and electronics supply chains, interact with their customers and suppliers, and perform other business processes.

Given CompTIA's unique perspective, what are the experiences of the ICT industry in addressing interoperability? At the technical infrastructure level, the ICT industry is approaching interoperability through standards and, in many cases, conceptualises those standards through "technology stacks". Technology stacks are conceptual layers of hardware or software functionality that interoperate between the layers within the stacks, and between stacks at the same conceptual layer. Examples include the OSI Protocol, ebXML, and Web Services. A schematic of technology stacks is shown in Figure 1:

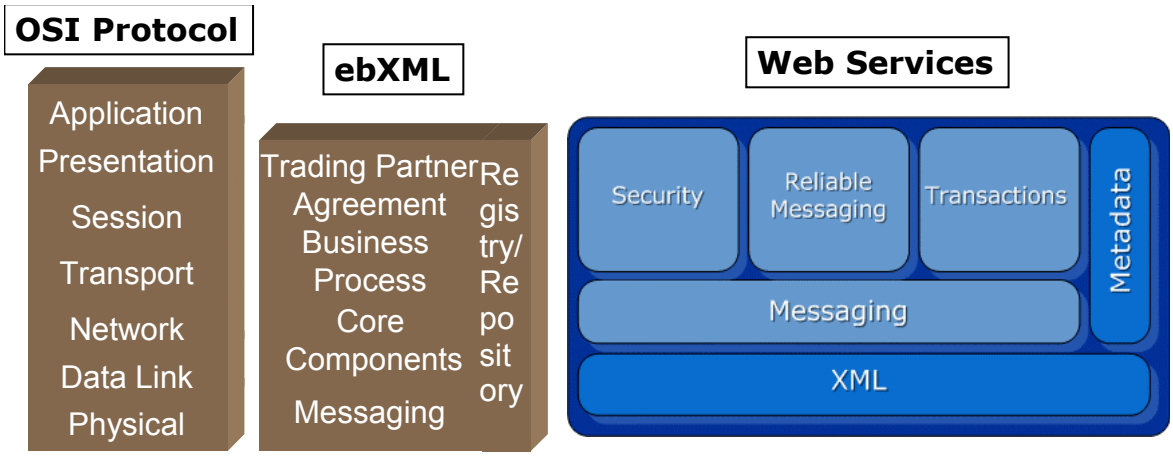

Figure 1: Technology Stacks

The "technology stack" approach

Utilizing this stack approach, and through the various technology industry associations and standards organisations, the ICT industry has a track record of success in achieving interoperability (with the Internet being accomplished in part due to OSI Protocol), although obviously much remains to be done. At what the IDA unit[28] of the European Commission terms the technical layer, computers and communications networks are now able to interconnect relatively effortlessly compared to, say, ten years ago, when a plethora of networking and infrastructure data exchange technologies existed. Technology standards developed primarily by the ICT industry through open processes, such as USB interconnections, Ethernet, TCP/IP, XML, Wireless LAN technology, Web Services, etc., are truly enabling interoperability at the technical layer. Both the ICT industry and the ICT end-customers have found that voluntary standards adherence and adoption is symbiotically beneficial. ICT end-customers can benefit by greater interoperability – in many cases these standards provide means they can use to more easily and less expensively interconnect computers and software. The ICT industry benefits by having to research, develop and support a more limited set of technologies. Although there is always more that can be done to enable greater "plug-and-play", from the viewpoint of the ICT industry and many end-users technical interoperability appears close to being achieved for most technologies.

The experience of EDI

Semantic and organisational interoperability have multiple technological/business aspects. For example one could discuss making desktop office systems interact, using web sites as a conduit for communications, integrating application software within an entity, or exchanging data between entities. Regarding both application integration and the exchange of data between entities, private industry is leveraging a history of B2B e-commerce, in the form of EDI (EDIFACT/X12), to standardise business transaction semantics and business process choreographies going forward. According to the Data Interchange Standards Organisation (DISA, see www.disa.org), over 300,000 organisations use the 300+ EDI transaction sets to conduct business. The benefits of EDI include[29]:

- Reduced cycle time
- Better inventory management
- Increased productivity
- Reduced costs
- Improved accuracy
- Improved business relationship
- Enhanced customer service
- Increased sales
- Minimized paper use and storage
- Increased cash flow

[28] European Commission, DG Enterprise, Unit D/2
[29] See http://www.x12.org/x12org/about/faqs.cfm#a1

In the 20+ years of EDI, private industry companies, with some public sector participation, worked together through the EDI standards organisations (UN/CEFACT, X12, etc.) and industry organisations to develop the EDI transaction sets, guidelines for the use of the transaction sets, and business process choreographies that interoperate. These EDI efforts are being leveraged by many standards efforts (e.g., ebXML, RosettaNet, the new UN/CEFACT work on aligning its global business process standards work with Web services, etc.) to address semantic and organisational interoperability and are proving to be a model for addressing semantic and organisational interoperability.

Even with leveraging the EDI work, **semantic and organisational interoperability** are being found to be far **more difficult problems** than **technical interoperability**. Achieving semantic and organisational interoperability requires strictly agreeing on the meaning of information and aligning business processes across enterprises/governments. At one level, general cross-industry frameworks and software infrastructure approaches can be, and are being, developed for semantics and business processes. For example, general semantics for major business transactions, such as purchase orders and invoices, are outlined through standards such as UBL (Universal Business Language), UN/CEFACT Core Components, and OAGIS (Open Applications Group Integration Standard).

Furthermore, infrastructure software standards to define and execute business process choreology/orchestration, e.g. BPEL4WS (Business Process Execution Language for Web Services), can be, and are being, developed. Additionally, there are industry efforts to resolve data vocabularies and provide data semantics, such as the Semantic Web efforts of the W3C; the UDEF (Universal Data Element Framework) efforts of the Aerospace Industry Association and the Association for Enterprise Integration; and the Cross-Reference Project of **EIDX (Electronics Industry Data Exchange, a part of CompTIA).** Leading ICT Industry software companies, working with major private sector companies with some government participation, are aggressively addressing these general cross-industry semantics and business process execution infrastructure software standards.

Specific requirements of the government sector

At another level, work must be done to define and agree upon Government sector-specific semantics and on the alignment of business processes. Many e-Government services exist, such as taxation functions and social services, that require government agreement on their own semantics and processes. Likewise there are frequently additional public sector requirements in general business processes such as procurement that are not found in the private sector, e.g., specific competitive bidding requirements and/or specific approval approaches. For e-Government, business process alignment in many cases requires an alignment of laws, regulations, etc. – something that the European Union, with its Single Market approach, can leverage.

Private industry experience makes it clear that business process re-engineering and improvement is a **continual process, not a one-time event**. The overall goal must be the most cost-effective business process solutions, both intra-entity (within government) and inter-entity (between governments). From a software perspective, competition drives the ICT software vendors to develop applications that embody the most efficient business processes and that provide open environments for the exchange of data between software.

At another level, data semantics - the vocabulary for expressing governmental business and contains a number of elements unique to government – has implications for the entire sector. **Governmental data vocabularies should be common across governmental boundaries.** Historically, private industry addressed inter-company B2B data semantics through EDI (principally EDIFACT in Europe) and the development of industry guidelines on the usage of EDI standards. From what we have seen, the public sector's usage of EDI has been more limited in scope than that of many private sector industries due to governmental procurement and payment processes. With the advent of XML, private industry is addressing the data semantics interoperability issue through various standardisation efforts, including cross-industry efforts such the UN/CEFACT Core Components and Web services/business process alignment work, the Open Applications Group Integration Standard (OAGIS), OASIS's

UBL (Universal Business Language) work, and others. Certain industries have also initiated data semantics standardisation efforts based on XML, notably RosettaNet (the technology industry inclusive of the Semiconductor Industry, Electronic Components Industry, Computer Industry, and most recently the Telecommunications Industry), the Chemical Industry (CIDX – Chemical Industry Data Exchange), Finance Industry (IFX), and others.

There appears to be some focus by governmental representatives on the OASIS e-Government Technical Committee. There also have been some discussions in CEN/ISSS as to the applicability of its e-CAT (electronic catalogue) project to e-Government and the obvious long-term implications of the W3C's Semantic Web efforts. However, to date, from what we can determine, **the public sector's response to the data vocabulary issue appears to be primarily comprised of high-level discussions and liaisons without addressing in detail the precise data semantics for e-Government.** In the absence of specific efforts to address the e-Government data vocabulary, government entities at all levels are being left to adopt the semantics and vocabularies developed for private industry for cross-industry applications or creating local, non-standard vocabularies. Governments therefore need to **examine and analyse the various data vocabularies being standardised** and decide which one of these vocabulary efforts could form the basis for a solution that specifically addresses the requirements of e-Government

Open standards – the industry view

ICT industry experience is that "best of breed" solutions, regardless of the business or development model but evaluated on the basis of the best value for the money, provide the best functionality mix, support interoperability between components through their compatibility with open standards, and ensure continual upgrades, software support and expertise. Open standards compatibility should be a major selection criterion for software to ensure its interoperability, though it should be recognised that open standards may evolve quickly and **preferences for any open standard or versions of open standards should be avoided** to preserve the utmost flexibility in a best value assessment of technology and solutions for business problems.[30]

A major contributor to interoperability is voluntary open standards development plus voluntary open standards adoption. Open standards development, without significant adoption of the resultant standards, does nothing in the effort to achieve interoperability. Standards, like software, must evolve to take advantage of technology advances. Best-of-breed solutions, evaluated on a best value for money basis, that are continually updated and have software support to meet customer standards-compatibility expectations are the best approach to achieve and ensure ongoing interoperability.

Public Sector progress towards interoperability

The European Interoperability Framework

For a number of years, many EU Member States have worked to develop their own "e-Government interoperability frameworks". As part of this process, much work has been done to reach agreement on a wide range of associated issues, such as metadata definitions, document formats, privacy and security, e-signatures. Examples of national interoperability schemes include the UK's "E-government Interoperability Framework (E-Gif)"; the French "Cadre commun d'interopérabilité"; the German "Standards und Architekturen in eGovernment Anwendungen (SAGA)"; and the Dutch "Open Stanaarden en Open Source Software voor de overhead (OSOSS)". Other schemes have been developed in Denmark, Finland, Greece, Spain, etc.

These national e-Government frameworks address the use of various technologies and protocols. Each national framework addresses some combination of the following technologies/frameworks, as well as others:

- Networking LAN/WAN protocols

[30] See also references on pp 16, 18 and also Part III on legal aspects of open standards

- Directory Services
- Domain naming
- File, HyperText, and Message transfer protocols
- Messaging/Data integration
- Schema/Metadata Registries
- Web-based services and middleware
- Security
- Email security
- Authentication / security
- Character sets
- Newsgroup services
- Browsers and viewer
- SMS/WAP/iMode.

Many of the national e-Government frameworks also address policy issues such as compliance, governance, etc.

Following the publication of the **eEurope 2005 Action Plan** in June 2002, interoperablility on a European level became a political priority. The draft European Interoperability Framework[31] builds on the national frameworks and aims to identify how national interoperability programmes can incorporate the relevant measures to ensure interoperability with other European administrations.

The European Commission has underlined that the EIF is not intended as a gateway. Rather, national administrations are invited to reference or incorporate EIF guidance into their national frameworks to ensure interoperability with each other. EIF is thus intended to complement national e-Gifs by providing a framework for the achievement of interoperable pan-European government e-services.

CompTIA applauds these interoperability framework efforts and believes they represent essential initial steps, and great progress, towards e-Government interoperability. The Single Market foundation of the European Union, too, is itself an enabler of interoperability. Nonetheless, some issues, particularly the issue of open standards, will require further consideration.

Industry interoperability as a benchmark

CompTIA would put forth mainly two thoughts regarding these e-Government interoperability frameworks:

- The national frameworks and EIF generally limit their scope to what IDA would refer to as technical interoperability and do not try to address semantic and business process interoperability to the same degree. The next step would therefore be to address semantic and organisational interoperability. This means that eGovernment interoperability has reached roughly the same evolutionary point as the question of interoperability for much of private industry.

- E-Government should fully leverage the work of the ICT industry and the competitive marketplace to achieve and maintain interoperability. Government, through its procurement, research, and policies, should support and encourage the efforts of the ICT industry to voluntarily develop, adopt and promote open standards. Government should also leverage and be protective of the intellectual property the ICT industry develops.

Taking interoperability to the next level requires resolving the much more difficult issues of semantic interoperability and business process interoperability. The ICT industry has provided technology stacks, such as ebXML and Web services, and cross-industry semantic/business process standards, but at a detailed level, semantic and business process interoperability are more "user-specific" in nature and require the involvement and leadership of the users in question (in this case, governments).

[31] See Annex I below

While there have been some efforts in private industry to align semantics and business processes, for example the technology industry with RosettaNet, these efforts have met with somewhat limited acceptance owing to a variety of reasons such as the costs of aligning business processes, perceived competitive advantage derived from certain business processes (or portions of business processes), etc. . Achieving semantic/business process interoperability for eGovernment raises its own challenges, including aligning laws and regulations, etc. Government involvement and leadership in defining the needed semantics and business processes and/or adopting private industry semantics/business processes is critical. At an infrastructure framework level, the ICT industry will develop and provide open standards addressing content exchange and business process execution (e.g., ebXML, BPEL4WS).

E-Government should fully leverage the competitive marketplace to reach interoperability. The ICT industry has devoted considerable resources towards voluntarily defining, and changing hardware and software to adhere to open technology standards. Government, through its procurement, research, and ICT policies should support these efforts and fully utilize them to reach interoperability. Cost effective, open-standards compatible hardware and software, where the underlying standards have been widely adopted, is an enabler of interoperability. **Open-standards compatible software can be developed using any software development model, and can be licensed under a variety of business models**.

Open source does not mean or imply "open standard"[32] or compatibility with open standards, and vice-versa, as open standards may be implemented by software developed under any business or development model. Open source is not a standard or set of standards, but instead simply software whose code is publicly available. Nothing in and of itself ensures that OSS is interoperable, even with other OSS programmes. For instance, the freedom to modify OSS code necessarily provides the ability to change the code in ways that may undermine a programme's ability to interoperate with other programmes and devices. Beyond open-standards compatibility, general business requirements, functionality requirements, total cost of ownership, and other elements of a **"best value for money" evaluation** should drive the selection of software, not how the software was developed or is licensed.

Private/public multi-stakeholder partnerships

The best approach to achieve and ensure e-Government interoperability is by the public sector partnering with the private sector, in particular the ICT industry. Without partnering with the private sector, e-Government runs several risks:

- The risk of adopting technologies and standards that become outdated and unsupported over time.
- The risk of not being able to rapidly take advantage of technology advances and business process improvements that private industry develops.
- The risk of adopting standards that do not interoperate between the private and public sectors (e.g., privacy standards, security certification standards).

CompTIA applauds the efforts of, for example, the UK Office of the E-Envoy and their work with major international standards bodies such as OASIS and W3C. Standardisation and frameworks within governments, such as the EIF, e-GIF, etc., plus direct involvement in international standardisation efforts, such as those of the W3C, OASIS, and others, are essential to e-Government interoperability.

Many of the interoperability hurdles the public sector faces are the same as, or very similar to, the hurdles private sector companies face, but some distinct differences do exist. In particular, many governmental business processes are closely tied to legislation, regulations, and court findings. Process improvement and data semantics resolution frequently requires

[32] See also references on pp 16 and 18

revision to the underlying legislation or regulations. The European Union's coordinated approach facilitates such legislative and regulatory changes.

Nevertheless, governmental services/business process "owners" must aggressively pursue change to affect it even within the context of the EU. CompTIA agrees with the European Commission that there is a need for commitment at all levels for interoperability to happen (i.e. global and international, European, national, regional and local) and there is a need to ensure that consequential adjustment of European or national policies occur.

CompTIA recognises that, through greater interoperability, large improvements in EU intra-Government and inter-Government services are possible. Additionally, from the private industry perspective, improved interoperability with the private sector and citizens/consumers could, and should, be a major source of e-Government business process/services improvement. Many of the business process improvements made in the private sector over the last decade or so have been accomplished by companies working with their customers and suppliers (the "extended enterprise") to streamline their "supply chains". Information flow, as well as the flow of physical goods/services, from supplier to government and, in many cases, from government to citizen/consumer, could be streamlined through similar extended enterprise efforts. There is a plethora of commercial software available to support such business-to-business (or, in this case, business-to-Government or government-to-business) exchange of data. Similar to private industry, these extended enterprise efforts would result in more customer-centric, citizen-friendly, governmental enterprises.

Public sector software must meet governmental business requirements. The public sector faces many of the same decisions that private industry does in deciding whether to acquire or build software – such as what software to acquire. Governmental entities, like private companies, vary in size and business requirements. Like private industry, in some cases governments should allow software to drive process, while in other cases, governments should have process drive software. Also like private industry, **software applications may be developed in a variety of ways, and offered under many different types of licenses**. In almost all cases, software and hardware acquisition costs are merely a part of the overall total costs of ownership (TCO) – interoperability and cost elements such as training have become major parts of the cost equation. In the competitive environment, ICT companies offering open standards compatible proprietary software solutions have strong incentives to deliver robust functionality and open standards based interoperability to meet customer requirements and sell their products.

Conclusions: Open Source and Open Standards

In acquiring software, compatibility with open standards should be a major selection criterion. Ubiquitous access and interoperability frequently suggests the use of open, widely adopted standards. It is therefore important to distinguish between Open Source and Open Standards:

- An **Open Standard** can be seen as a set of rules and specifications that collectively describe the design or operating characteristics of a programme or device and is published and made freely available to the technical community[33]. Open standards are vetted through an open process.

- Generically, **Open Source** refers to a programme in which the source code is available to the general public for use and/or modification from its original design form of charge[34] Open Source is also used to refer to a method of licensing software. Open Source software is therefore <u>not</u> an open standard, per se (for example, open source software changes are generally not vetted through an open process). It may interoperate with other open source software if the two "end point" open source software applications adhere to the same open standard. However, the fact that software is open source does not mean that it necessarily implements the same open standards as other open source software applications.

[33] for 'Open Standards' definitions see Annex II
[34] 'Webopedia' definition of computer terms (http://www.pcwebopedia.com/)

Hardware/software utilising proprietary standards can generally interoperate only with other hardware/software utilising the same proprietary standard. Similarly, open standards-based hardware/software can generally also only interoperate with other hardware/software that utilizes the same open standard, and open standard version. Even with the adoption of standards, either open or proprietary, the **standards will need to continually evolve** and be updated to take advantage of technology advances, and everyone will need to address software updates and version control to stay current with standards.

Part III – Legal Issues of Related IPRs and Public Procurement Laws

Analysis of the EIF 'Open Standard' Definition

Introduction

As stated above, in June 2002, the European Heads of State adopted the **eEurope Action Plan 2005**[35], which called on the European Commission "*to issue an agreed interoperability framework to support the delivery of pan-European eGovernment services to citizens and enterprises*". The eEurope Action Plan 2005 describes the framework as a document addressing information content and recommending technical policies and specifications for joining up public administration information systems across the EU. It also states that the framework "*will be based on open standards and encourage the use of open source software*".

In January 2004, the 'Interchange of Data between Administrations' (IDA) working document entitled "***European Interoperability Framework for pan-European eGovernment Services***" (version 4.2) was released. This document "*establishes the* ***European Interoperability Framework (EIF)*** *to support the pan-European delivery of electronic government services*". It is intended to become "*the reference document for interoperability of the new IDAbc programme*"[36].

Defining 'Open Standard'

Generically, an 'open standard' is a set of rules and specifications that collectively describe the design or operating characteristics of a programme or device and is published and made readily available to the technical community. 'Open standards' are publicly available specifications that describe the characteristics of a technology. The objective of open standards is to promote interoperability.

Individual definitions attempt to establish those characteristics or criteria which should be met for a standard to be described as 'open'. It follows that the definition applied in any given context will directly influence the degree and kind of interoperability achieved.

Annex II to the present White Paper provides an **overview of various alternative definitions** for the term 'open standard' currently in circulation.

The EIF 'Open Standard' definition

The EIF Working Document states that, in order to reach interoperability in the context of pan-European eGovernment services, guidance needs to focus on so-called 'open standards'. The latter term is defined in the EIF Working Document as a standard satisfying the following requirements:

- 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.

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[35] See http://europa.eu.int/information_society/eeurope/2002/news_library/documents/eeurope2005/eeurope2005_en.pdf.

[36] The IDA Programme is set to become the IDAbc (Interoperable Delivery of pan-European eGovernment Services to Public Administrations, Businesses and Citizens) Programme, following a proposal adopted by the Commission on 9 July 2003. Under the proposed decision, the IDAbc Programme will both continue present IDA activities and provide greater assistance in the delivery of pan-European eGovernment services to businesses and citizens, as of 1 January 2005; see also footnotes 14-16

The above definition was developed by the Dutch Programme for Open Standards and Open Source Software in Government (OSSOS)[37].

Such a definition appears to favour an 'open source' business model and thereby automatically excludes other equally valid business models. A number of jurisdictions (e.g. the Brussels Francophone Community/COCOF and France's National Assembly) have gone further by proposing legislation defining 'open standards' in ways that require or imply the abandonment of a vendor's source code (it's IP rights), even though the software's interoperable design and operating characteristics are published and made freely available.

Importance and impact of an 'Open Standard' definition

The importance and impact of any definition of 'open standard' is to be well-understood. As stated in the EIF Working Document, '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*". The inherent logic of interoperability brings with it that any definition of 'open standard' adopted, will necessary not only have important consequences for the organisation adopting the definition but will also to a large extent impact anyone who interacts or exchanges information with the organisation adopting the 'open standard' definition.

As stated in the EIF Working Document, the target audience of the EIF is very wide:

"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 should use the European Interoperability Framework for their operations with each other and with citizens, enterprises and administrations in the respective EU Member States."

Any definition of 'open standard' given in the EIF will necessarily not only impact the ICT systems and business processes of the European institutions and agencies, but equally those of citizens, enterprises and administrations in the Member States. As regards the computing industry in general, it is clear that any EIF 'open standard' definition will channel investment towards software and hardware that is compliant with the EIF 'open standard' definition while at the same time leading away investment from non-compliant hardware and software. The EIF 'open standard' definition will indirectly shape the future of the European computing industry and determine to a large extent the latter's ability to effectively compete in other parts of the world.

Consequently, any 'open standard' definition – and especially an 'open standard' definition put forward to be adopted by an international organisation such as the EU in the framework of a programme aimed at the delivery of pan-European eGovernment services to businesses and citizens – should be carefully assessed as to the impact such definition will necessarily have on the different stakeholders, including the computing industry in general.

The limits of 'Open Standard' definitions

When defining the term 'open standard', the EU should take into account the legal limits to any 'open standard' definition. These limits are to be found mainly in public procurement law and intellectual property law.

Public Procurement

European public procurement policy aims to create competitive, non-discriminatory public procurement markets in the European Union which will enable procurement sensitive goods

[37] See: Programma Open Standaarden en Open Source Software voor de Overheid, http://www.ossos.nl/.

and services to move freely, thus ensuring value for money for taxpayers and consumers of public services and fostering the competitiveness of European suppliers in domestic and world markets. The Single Market programme has widened and strengthened the public procurement regime in the EU by enlarging its scope to cover services and utilities, and by establishing specific procedures to guarantee that procurement contracts above a certain value are awarded in a competitive, transparent and non-discriminatory manner.

Current EU public procurement law is laid down in Directive 92/50/EEC of 18 June 1992 relating to the coordination of procedures for the award of public service contracts, Directive 93/36/EEC of 14 June 1993 coordinating procedures for the award of public supply contracts and Directive 93/37/EEC of 14 June 1993 concerning the coordination of procedures for the award of public works contracts.

Non-discrimination among suppliers is a fundamental principle underlying the EU public procurement policy as defined in the above Directives. To avoid discrimination, when defining **technical specifications**[38], contracting authorities are required to use European standards or specifications or national standards implementing EU standards wherever these exist. If they are not available, reference must be made to other **common European technical specifications**. In the absence of either European or common technical specifications, the contracting authority may define technical specifications by reference to (in order of priority) national standards implementing international standards, other national standards or any other standards[39].

In addition, contracting authorities are prevented from including in the contractual clauses relating to a given contract technical specifications which mention goods of specific make or source or of a particular process and which therefore favour or eliminate certain suppliers or products. In particular, the indication of trade marks, patents, types or of a specific origin or production are prohibited. However, if such indication is accompanied by the words 'or equivalent' it is authorised in cases where the contracting authorities are unable to give a description of the subject of the contract using specifications which are sufficiently precise and fully intelligible to all parties concerned.

In May 2000, the Commission launched two proposals for directive in the field of EU public procurement law (the "**New Public Procurement Package**")[40]. This 2000 Package, which was based on extensive consultations with contracting authorities and businesses, has two main objectives. The first is to simplify and clarify the existing Directives. The second is to adapt them to modern administrative needs, for example by facilitating electronic procurement and, for complex contracts, by introducing more scope for dialogue between contracting authorities and tenderers in order to determine contract conditions. The proposed directives impose competitive tendering for public contracts, transparency and, importantly, equal treatment for all tenderers to ensure that the contract is awarded to the tender offering best value for money.

The proposed directives are aimed at, amongst others, further **re-enforcing the principles of non-discrimination and equal treatment:**

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[38] 'Technical specifications' is defined as "*the totality of the technical prescriptions contained in particular in the tender documents, defining the characteristics required of a material, product or supply, which permits a material, a product or a supply to be described in a manner such that it fulfils the use for which it is intended by the contracting authority; these technical prescriptions shall include levels of quality, performance, safety or dimensions, including the requirements applicable to the material, the product or the supply as regards quality assurance, terminology, symbols, testing and test methods, packaging, marking or labelling*".

[39] Article 8 of Directive 93/36/EEC of 14 June 1993 coordinating procedures for the award of public supply contracts.

[40] Proposal for a Directive of the European Parliament and of the Council on the coordination of procedures for the award of public supply contracts, public service contracts and public works contracts (see: http://europa.eu.int/comm/internal_market/en/publproc/general/com275en.pdf) and Proposal for a Directive of the European Parliament and of the Council coordinating the procurement procedures of entities operating in the water, energy and transport sectors (see: http://europa.eu.int/comm/internal_market/en/publproc/general/com276en.pdf); the new Public Procurement Package has been adopted recently by the third and final reading of the Council on 2 February 2004

"Application of the provisions of the Directives has led in certain cases to a situation where standards have been treated as de facto requirements; these provisions can be construed as limiting the buyer's choice to only those products which comply with the standard.

Such an interpretation does not fit with the notion of a "reference" according to which other solutions can be compared to the solution provided by the standard. In addition, it has also meant that technical solutions where a standard exists have been unduly preferred to the detriment of other solutions and of new technologies. The rapid technological obsolescence in certain sectors, coupled with the interpretation that standards are de facto requirements, is particularly harmful where, by the very nature of things, the adoption of a standard lags some way behind technological progress (as is the case in the information technology field).

Accordingly, there is a need to simplify these provisions (so as to clarify the extent of the "reference" obligation and limit referral to provisions specific to certain sectors, such as telecommunications and construction), which add to the complexity of the current texts. These changes will also encourage effective competition through the participation of the greatest possible number of tenderers and in particular innovative businesses."

It follows from the above that, when defining the term 'open standard' within the EIF (and **implementing it through technical specifications** or other means) the fundamental principles of non-discrimination and equal treatment, which underlie the EU public procurement policy, have to be observed.

Defining 'open standard' through categorical preferences for or references to particular business or licensing models would favour or eliminate certain suppliers or products and thus violate the fundamental principles of non-discrimination and equal treatment.

It would moreover prevent the utilisation by the contracting authorities of the full panoply of possible technical solutions and thereby be in contradiction with the Commission's stated goal to ensure that the contract is awarded to the tender offering best value for money.

Intellectual Property

Intellectual property law protects creations of the mind such as inventions, literary and artistic works, software, symbols, names, images and designs used in commerce. For the computing industry, the most relevant intellectual property rights are copyright (which protects the object code and source code of software), patents (which may protect hardware, software and ICT-related services) and semiconductor topographies (which protects the design of integrated circuit boards).

For at least the last two decades, the Commission has consistently sought to strengthen intellectual property protection as part of an overall strategy to create a Single Market:

"The key to success is the creation of an open and competitive Europe, which delivers choice for the consumer and new markets for business. To achieve this we need to create an environment which nurtures dynamism and creativity, built upon the foundations of a secure legal environment. We need to encourage as much innovation as possible and thereby make it attractive for industry to invest in Europe. In this context, it is particularly important to put more emphasis on the protection of intellectual property rights."[41]

This has been evidenced, amongst others, by the adoption of Directive 87/54/EEC of 16 December 1986 on the legal protection of topographies of semiconductor products[42] and Directive 91/250/EEC of 14 May 1991 on the legal protection of software ("**Software**

[41] Speech by Commissioner Frits Bolkestein, Alicante, 29 May 2000, see: http://europa.eu.int/comm/internal_market/en/speeches/spch194.htm.
[42] See: http://europa.eu.int/smartapi/cgi/sqa_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31987L0054&model=guichett.

Copyright Directive')[43]. More recently, on 20 February 2002, the Commission put forward a Proposal for a Directive on the patentability of computer-implemented inventions ("**CII Patent Directive**"),[44] which aims at harmonising existing (case) law regarding the patentability of computer-implemented inventions throughout the EU.

Any definition of 'open standard' should be consistent with the EU's overall policy of promoting innovation and competition by protecting intellectual (including industrial) property.

Strong intellectual property rights and interoperability are not mutually exclusive. Both the existing **Software Copyright Directive** and the Commission's original draft **CII Patent Directive** address the issue of interoperability by providing for well-devised interoperability exceptions to the exclusive rights of the copyright/patent holder, thereby carefully balancing the rights of the copyright/patent holder and the rights of users. Said exceptions provide for strong incentives for software vendors to enable interoperability by making interface information readily available, while at the same time guaranteeing strong intellectual property rights.

The Software Copyright Directive protects code, whether in its object (binary/executable) or source (human language) form. Unlike patents, protection is only granted to an original expression of the software in tangible form and not to the underlying principles and ideas. This copyright law includes, among other things, the right to reproduce, translate, adapt and/or distribute a computer programme to the public. Ordinarily, **'reverse-engineering', 'decompiling'**, **'ripping'** or **'disassembling'** a piece of software to reveal its codes is considered copyright infringement, because such action inherently involves both an act of reproduction and translation.

Again, the Software Copyright Directive strikes a compromise by making an exception to such acts in the context of achieving interoperability, if and when a set of specific conditions are met.[45] This **'interoperability exception'**, as delineated under Article 6 in the Software Copyright Directive, is further preserved under Article 6 of the Commission's draft CII Patent Directive (notwithstanding the fact that copyright law is complementary to, yet separate from, patent law, the Commission appears to have chosen to make the preservation of this interoperability compromise explicit).

Part of the European Parliament's amendments to the CII Patent Directive proposal, on the other hand, threatens to dramatically destabilise this equilibrium. Parliament arguably clarifies the scope of the Commission's proposed Article 6 by narrowing the preservation of interoperability in the Software Copyright Directive only to Articles 5 and 6 (the Commission's draft, in contrast, is not as specific in its reference to provisions relating to **'decompilation'** and interoperability and includes reference to semiconductor topographies and trademarks). Of serious contention is the insertion by Parliament of a new draft Article 6a, which states:

- *Article 6a – Use of Patented Techniques*

  "Member States shall ensure that, wherever the use of a patented technique is needed for a significant purpose such as ensuring conversion of the conventions used in two different computer systems or networks so as to allow communication and exchange of data content between them, such use is not considered to be a patent infringement."

This particular **'interoperability exception'** has also been referred to as the **'conversion exception'**. According to its proponents, Article 6a would make it possible to convert data from a patented format to an unpatented one. The article, however, permits CII patent

[43] See: http://europa.eu.int/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31991L0250&model=guichett.
[44] See: http://europa.eu.int/comm/internal_market/en/indprop/comp/com02-92en.pdf.
[45] Namely, (1) it is indispensable to achieve interoperability, (2) the person performing the reverse engineering has been granted the right to use the software, (3) the information has not previously been readily available and (4) the reverse engineering is limited to parts of the software necessary to achieve interoperability.

infringement based solely on a undefined "needed to exchange data" for a "significant purpose" — by its language, the exception is not limited to conversions and would be open to wider interpretation.

Article 6a has been justified politically as **'avoiding abuse of dominant positions'**. However, if adopted, it would permit infringement absent the showing of a dominant position in a relevant market, let alone actual anti-competitive activity by a dominant player. Unlike copyright law, patent protection is not automatic upon creation and it should be kept in mind that in order to receive patent protection, an inventor must first apply for it by disclosing the CII to the patent-granting body (and subsequently to the public at large).

As is common in complex industries, a developer seeking to make use of a successful and/or widely-accepted technology would ordinarily secure a license from the patent-holder in order to adapt it. When interoperability is sought with a piece of software that has become a standard, compulsory licensing and competition law may be applied if the patent holder refuses to license it or attaches abusive conditions.[46]

It must be kept in mind that the CII Patent Directive was conceived by the Commission as a means to codify and harmonise the disparate laws and jurisprudence regarding the subject matter across the EU Member States, to bring Community practice closer to the European Patent Office (EPO) regime (which to date has been developed by intergovernmental rather than supranational means), and to fulfil patent commitments made by the TRIPS Agreement.[47] The EPO and Member States independently issued thousands of patents for computer-implemented inventions, but discrepancies in the way legislation is interpreted leads to legal uncertainty and hamper the development of the Single Market. The lack of a CII Patent Directive that maintains effective protection for computer-implemented inventions while safeguarding already existing interoperability exceptions in copyright law jeopardises the attainment of these goals.[48]

Intellectual Property Rights and Standardisation

In 1992, the Commission published its Communication entitled "*Intellectual Property Rights and Standardisation*"[49]. In this Communication, the Commission considered the use of industry standards and recognised that there was a public interest in promoting both intellectual property rights and the use of industry standards. It recommended that democratic and pro-competitive processes were followed in drafting standards and set out a number of "best practice" guidelines, as follows:

- no standard should include an intellectual property right which the owner is not prepared to license;
- standards must be available for use on fair, reasonable and non-discriminatory terms from intellectual property right owners; and
- the standards body and intellectual property right holder should each use best efforts to identify relevant intellectual property rights applicable to any standards.

[46] Case law concerning refusal to deal, and more specifically refusal to license, provide some guidance for a dominant firm's duty to interoperate. The Court of First Instance (CFI) took the view in *IMS Health* that an obligation to grant interoperability through licensing can only be imposed on a dominant firm where such interoperability is necessary to operate in a *separate* market. If the European Court of Justice (ECJ) confirms this view, then the issue of market definition will become crucial in determining the scope of any duty to interoperate. The Commission's opinion is that if such a duty is imposed under Article 82 of the EC Treaty, the subsequent compulsory license should be granted on a "non-discriminatory basis" for a "reasonable royalty".

[47] Article 27(1) of the World Trade Organisation (WTO) Agreement on Trade-Related aspects of Intellectual Property rightS ("TRIPS Agreement") states that "patents shall be available for **any inventions**, whether products or processes, **in all fields of technology**, provided that they are new, involve an inventive step and are capable of industrial application". Article 30 also provides "limited exceptions to the exclusive rights conferred by a patent, provided that such exceptions do **not unreasonably conflict with a normal exploitation of the patent** and do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties".

[48] Further interoperability-related IP studies will be made available by forthcoming CompTIA IPR reports

[49] COM (92) 445 final.

The Commission stressed the fact that the right holder must be free to grant or refuse licenses on whatever exclusivity or territorial basis he wishes:

"Therefore Article 86 cannot permit the expropriation of rights for the purposes of using the technology as the basis of a standard where no other circumstances establish abuse of a dominant position, and taking into account particularly whether there are other viable technologies available.

The problem should therefore be addressed before the technology on which to base the standard in question had been definitively selected. If the standard in question had been adopted, and made mandatory by a Community instrument, refusal to license the technology necessary to use the standard would, a fortiori*, create problems."*[50]

When defining 'open standard', account should be taken of the rights of intellectual property rights holders. As explained above, the inherent interoperability logic brings with it that any definition of 'open standard' adopted, will necessary not only have important consequences for the organisation adopting the definition but will also to a large extent impact anyone who interacts or exchanges information with the organisation adopting the 'open standard' definition.

Consequently, defining 'open standards' in a way that excludes standards including royalty-bearing technology held by commercial entities in fact would force such intellectual property rights holders to give up their rights, which would amount to an **indirect expropriation**. Such would not only be contrary to the overall policy of the Commission to strengthen intellectual property rights protection, but would moreover be found contrary to the EU's obligations under the **WTO Agreement on Trade-related Intellectual Property Rights** (TRIPS Agreement).

Article 31 of the TRIPS Agreement provides for specific safeguards in case of compulsory licenses and states, amongst others, that (a) authorisation of such use shall be considered on its individual merits, (b) such use may only be permitted if, prior to such use, the proposed user has made efforts to obtain authorisation from the right holder on reasonable commercial terms and conditions and that such efforts have not been successful within a reasonable period of time, (c) such use shall be non-assignable, except with that part of the enterprise or goodwill which enjoys such use and (d) the right holder shall be paid adequate remuneration in the circumstances of each case, taking into account the economic value of the authorisation.

When defining 'open standard', **a balance between standardisation and intellectual property rights** has to be struck. Key to achieving balance are the principles of *transparency* (the existence and identification of intellectual property rights should be known before the standard is voted upon) and *non-discrimination* (e.g. the insurance that licenses are going to be available at fair and non-discriminatory conditions).

Conclusion: legal limits to 'open standards' definitions

An 'open standard' is basically a set of rules and specifications that collectively describe the design or operating characteristics of a program or device and is published and made readily available to the technical community in order to enable interoperability.

When further defining 'open standard', the impact of any 'open standard' definition should be carefully assessed, taking into account the inherent interoperability logic. Moreover, when defining the term 'open standard', the EU should take into account **the legal limits to any 'open standard' definition as delineated by public procurement and intellectual property law.**

In the light of the above, the definition of 'open standard' as put forward in the EIF Working Document calls for clarification in several respects. While the requirement that in order to be

[50] COM (92) 445 final, para. 5.1.11.

'open' a standard should have been published appears to be fully in line with the very nature of an 'open standard', some other requirements are more troublesome.

For instance, the requirement that the costs for the use of the standard are low and are not an obstacle to access to it may be interpreted to exclude copyright or patent protected code licensed under a royalty-bearing model from being incorporated in an 'open standard'[51]. As stated above, the EIF 'open standard' definition has been borrowed from the Dutch Programme for Open Standards and Open Source Software in Government (OSSOS). Interestingly, however, the above requirement is explained in more detail in the OSSOS definition by explicitly mentioning that "*intellectual property [possibly present] that is fundamental to an open standard, is being made available on a royalty-free basis*".

The requirement according to which there should be no constraints on the re-use of the standard, also appears to exclude copyright or patent protected code licensed under a royalty-bearing model from being incorporated in an 'open standard', although it is not entirely clear what is to be understood by the words "*no constraints*".

Lastly, the requirement according to which the intellectual property rights to the standard should be vested in a not-for-profit organisation, would prevent intellectual property rights owners from participating in standard-setting, unless they would be willing to relinquish their intellectual property rights, thus leading towards a ***de facto* expropriation** as most undertakings in the computing industry would be forced to give up their rights in order to be able to further compete in the 'interoperable world' as defined by the EIF.

Balance between standardisation and intellectual property is struck by respecting the principles of *transparency* and *non-discrimination*.

Moreover, because the EIF will impact upon public procurement within the EU and the Member States, **any definition of 'open standard' within the EIF should comply with the fundamental principles of non-discrimination and equal treatment, which underlie the EU public procurement policy**.

Defining 'open standard' through categorical preferences for or references to particular business or licensing models would favour or eliminate certain suppliers or products and thus violate the fundamental principles of non-discrimination and equal treatment. It would moreover prevent contracting authorities from utilising the full panoply of possible technical solutions.

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[51] This also seems to flow from the requirement that the not-for-profit organisation which holds the intellectual property rights to the standard "*operates a completely free access policy*". What is to be understood as "*a completely free access policy*" is not clarified in the EIF Working Document, but may imply that no royalties are due, thus excluding copyright or patent protected code licensed under a royalty-bearing model from being incorporated in an 'open standard'.

Part IV – Conclusions

- **Technical interoperability has been, or is very close to being, achieved through open standards**. Semantic and organisational interoperability are more problematic. The ICT Industry, by adopting, and promoting the adoption of, foundational level, open standards-based infrastructure technologies such as GSM, Ethernet, TCP/IP, SMTP, XML, ebXML and Web services, has made great strides in recent years towards technical interoperability and has laid a solid foundation for interoperability. From our perspective, the national interoperability frameworks, and EIF, appear to provide government officials a solid foundation and roadmap to selecting appropriate technical infrastructure standards.

- Although the ICT industry expects these standards to continually evolve, and supports their continual evolution, the ICT industry's attention, and that of our end-user customers such as the various governmental entities, should now shift to primarily **focusing on accomplishing semantic and organisational interoperability** while maintaining and enhancing the technical infrastructure technologies and framework guidelines.

- Semantics interoperability is generally discussed in terms of software, particularly enterprise application integration and B2B e-commerce exchanges. Semantics interoperability is more problematic both in terms of who should be responsible for interoperability and how to accomplish interoperability. On the face of it, **responsibility for semantics interoperability would appear to rest primarily with the software designer**, as they should make their semantics interoperate with other software. In some cases the software designer is the ICT industry (independent software vendors) delivering packaged software solutions, in other cases the software designer is the government either in developing custom software or designing customisations to packaged solutions.

- Government needs to **examine and analyse the various data vocabularies being standardised** and decide which of these vocabulary efforts could form the basis for a solution that specifically addresses the requirements of e-Government .

- The next level of interoperability, organisational interoperability, needs to be addressed at every level: Citizen/consumer; Private enterprise (both as a supplier to and as a consumer of e-Government services); Inter-Government; and Intra-Government.

- Infrastructure technology frameworks, such as mobile communications standards, portal technologies and business process execution infrastructures (e.g., BPEL4WS, ebXML CPP/CPA), can assist in aligning e-Government services to make the governmental organisations interoperate and be more citizen/consumer centric. To the extent that e-Government adopts commercial software, such as the popular ERP systems and CRM solutions, e-Government will benefit from the business process alignments that private industry is requiring of the major software vendors. **Government entities could gain significant benefits from working together to develop extensions and modifications to existing standardized private industry business processes that meet governmental business requirements.** By using existing standardised business processes, government will become more interoperable with private industry and will leverage private industry experience and technology developments. E-Government software architects should also examine and analyse newly developing software architectural elements, such the "enterprise service bus"[52], and "service oriented architectures" for technological assistance in aligning business processes.

- Even with implementing software infrastructures such as enterprise service buses and service-oriented architectures to assist in aligning e-Government services/business

[52] Also known as "**canonical models**", enterprise service buses are publish/subscribe technologies that reduce the number of application interfaces required for enterprise application integration and B2B integration, see http://www.infoworld.com/article/03/06/13/24FEesb_1.html for further explanation

processes, **the real work is at the detailed level to align both the data semantics and business process/services choreography** (sequences of execution) while dealing with the non-service oriented architectures of legacy systems and a changing business environment.

- **Private industry and the public sector must seek ways to leverage their existing ICT investments.** The process of architecting, and re-architecting, enterprise software environments has been described as being analogous to trying to build a boat while being put out to sea – the enterprise software architect does not have the luxury of a "clean slate" to architect the enterprise systems from the ground-up but rather must deal with a myriad of legacy systems and interconnections with outside systems that may, or may not, have the target technical infrastructure of the enterprise/government and typically do not have their business process/service architecture aligned with newer technologies and other legacy systems.

- To help achieve interoperability, the European Union needs to remain agile by **adopting pervasively used (and voluntarily adopted) standards and by leveraging the ICT competitive marketplace for software.** Policies that dictate specific hardware/software infrastructures, types of ICT solutions, ICT development, business, or licensing models, or hard preferences for standards compatibility should be avoided.

- Public sector software procurement should focus on **meeting government business requirements** on a best value for money basis. Government should fund research, pilot projects, etc. on a universal basis and should provide a strong set of intellectual property protections so as to enable the continual advancement of technology and standards.

- The Public Sector continues to face a series of challenges:
    - Process improvement frequently requires revision to legislation, regulations, etc. . Interoperability with the private sector is a potential major source of improvement.
    - Government agencies are not all alike. They face many of the same problems as the private sector.
    - Government must be customer centric and interoperate with the private sector.

- There should be a **joint public/private commitment** to help facilitate the public sector's taking full advantage of technological advances and the rapid responses by the private sector. This commitment should be continual with a bi-directional flow of information between the private sector, in particular the ICT industry, and the public sector. Government needs to clearly commit to open standards by recognising and participating in the technology industry international standards-setting bodies. Governmental officials responsible for implementing e-Government should participate in the standards-setting process as technology end-users stating business requirements, ensuring that government-specific requirements and national viewpoints are embodied in technical standards such as privacy requirements and security standards.

- There is a need for **commitment at all levels** (global and international, European, national, regional and local) if interoperability is to become a reality. This means that European or national policies need to be adjusted in a coordinated fashion. It will also require enhanced cooperation between EU and Member States initiatives, with the enterprise sector, with standardisation initiatives and research activities in the area of interoperability.

Part V - Policy Recommendations

General

- Governments should continue the attention and funding of interoperability framework definitions, such as EIF, e-GIF, and the other national efforts, so these frameworks are kept up-to-date with technological progress and so they can continue to be refined and advanced.

- Governments should fully adopt open standards as an evaluation criterion in acquiring ICT assets and actively support the ICT standards setting process by directly participating in organisations such as OASIS, W3C, and others. Government should support strong intellectual property protections so the ICT Industry continues to have strong incentives to develop new technologies and processes.

- Governments should collaborate with cross-industry efforts to develop common semantics and business processes choreographies (e.g., UN/CEFACT Core Components work, OASIS UBL, Open Applications Group OAGIS) to ensure these efforts include e-Government requirements to the extent they are common with other industries. E-Government should form government industry workgroups to determine the specific semantics and business process elements that are not common to other industries to develop extensions to the cross-industry vocabularies and business process choreographies. E-Government should also participate in industry efforts to develop means of resolving cross-industry data semantics, such as the UDEF Project.

- Governments should avoid mandates of the types of ICT solutions that government may acquire and avoid mandating types of ICT solutions and research receiving public funding. Such mandates would slow progress towards interoperability and inhibit government's ability to select the most cost-effective, best-of-breed solutions. Governments' ICT procurement policies should be focused on acquiring ICT assets that are open standards compatible and meet current and future government business requirements.

- Governments should fully leverage ICT industry technological progress and the competitive marketplace for ICT technologies by taking advantage of new and emerging technologies such as portal technologies, enterprise service buses, service-oriented architectures, and other similar technologies. Governments should partner with the private sector to ensure it avoids adopting technologies that will quickly become outdated or standards that will not interoperate with the private sector.

- Governments should fund research on a non-discriminatory basis and should provide a strong set of intellectual property protections so as to enable the continual advancement of technology.

Technical standards

- Governments should rely on ICT industry and standard bodies such as W3C, OASIS, IEEE to develop technical standards thereby ensuring interoperability with private sector.

- There needs to be public recognition of global and international industry standards.

- Governments should participate in standard setting as an "end-customer" stating requirements.

- Governments should only support the use of particular technical standards only when the private sector, as a whole, has widely adopted standards (e.g., TCP/IP, HTTP).

- For less widely-used technical standards, governments should remain agile by recommending, but not supporting their use.

- Governments should endorse open standards that enable "loose coupling" of processes. Minimum standards for interoperability should be preferred as long as they meet government business requirements.

Semantic Standards

- Governments should engage with, and study, existing semantics standardisation efforts such as OAGIS (Open Application Group), UBL (Universal Business Language), Core Components work group of ebXML, etc.

- Governments need to collaborate to identify, define and include government requirements within general semantics standards efforts.

- Governments entities need to work together to develop extensions of existing standardized business transaction schemas that meet governmental business requirements. By using existing standardized business transaction schemas, government will become more interoperable with private industry.

- Governments should work with the ICT industry standardisation bodies (e.g., W3C, CompTIA/eECSB) to provide specific interoperable solutions for semantics (e.g., Semantic Web efforts, Universal Data Element Framework).

Business Process "Organisational" Standards

- Government should leverage ICT industry business process standards and work to identify, define and promote government requirements within general business process standards efforts, so as to gain synergies with private industry.

- At a framework level, government needs to work with ICT standardisation bodies to define/refine business process "framework" standards (standards that define how business processes are described), e.g., ebXML CPA/CPP and BPEL4WS

- Governments entities need to work together to develop, to the extent possible, extensions of existing standardised private industry business processes that meet governmental business requirements. By using existing standardised business processes, government will become more interoperable with private industry and will leverage private industry experience.

- Governments should adopt technical systems architectures and underlying technologies that facilitate interoperability and specifically enable the "loose" coupling of processes. Examples include:

    - Portal technology for customer facing – portal layer providing web interface between government software applications and citizens-individuals-businesses.
    - Service Oriented Architectures that enable the delivery of software processing as services.
    - Enterprise Service Bus (also known as '**Canonical Models**') – publish/subscribe messaging model that eliminates n*n-1 problem of Enterprise Application Integration.

- Governments and European institutions, including the Commission, need to **preserve consistency with policy and legal positions taken, in particular with regard to European and international IP and public procurement law** which defends, amongst others, strong principles of technological neutrality, non-discrimination and equal treatment.

Annex I – European Interoperability Framework: Summary

Introduction

The eEurope 2005 Action Plan calls on the European Commission "to issue an agreed interoperability framework to support the delivery of pan-European eGovernment services to citizens and enterprises. In early 2003, further to this explicit invitation, representatives from the EU Institutions and Member States' Administrations initiated discussions on a framework that would soon be officially known as the European Interoperability Framework (EIF).

This notes provides an overview of the EIF, published on 20 January 2004, which is designed to support the pan-European delivery of eGovernment and to act as a reference document for Interoperability of the new IDAbc programme. The current version of the EIF is intended as a "working document" and published to inform all the stakeholders about the work that has been performed so far. Further reactions and contributions from external parties are requested. IDA will consider any input and adapt the EIF as necessary, whilst progressing with its internal reviews and updates. Comments should be submitted to IDA-Central@cec.eu.int, mentioning "EIF" as e-mail subject.

A second document is currently under preparation by the Commission. This will address the long-term implementation and maintenance of the EIF, as well as the actions supporting its promotion and the development of pan-European e-government services.

Aims and approach

The EIF focuses on supplementing, rather than replacing, national interoperability guidance by adding the pan-European dimension. It 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. These aim 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;
- supplement national Interoperability Frameworks in those areas that cannot be adequately addressed by a purely national approach;
- Provide a description of the elements which have to be addressed for the interoperability of pan-European eGovernment services.
- Support the activities and pan-European eGovernment projects to be launched, notably in the context of the IDAbc programme.
- Identify a number of actions to be carried out by the Member States and the EU Institutions and Agencies in order to achieve interoperability.

Underlying principles

The EIF proposes a list of principles to be applied when setting up eGovernment services at a pan-European level. This list includes accessibility, security, multilingualism, privacy, subsidiarity, use of open standards, **assessment the benefits of Open Source Software** (OSS), and use of multilateral solutions.

To define the word "open" in **open standards**, the EIF proposes that the following standards must be fulfilled (p. 11):

- 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.**

On **OSS**, the EIF states (p.11): "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**."

Types of interoperability

The EIF also identifies three types of interoperability: organisational, semantic, and technical.

Organisational 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.

The EIF recommends that the requirements for pan-European eGovernment services be jointly determined by the participating Administrations via a demand driven approach[53]. This should lead to the **identification and prioritisation** 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) and also from the investigation of the practical problems that occur when citizens and enterprises try to relocate or trade across Europe's borders.

Further, it recommends that in addressing the requirements of citizens and businesses, 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. Where the provision of a pan-European eGovernment service requires contribution from several public administrations, 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.

Semantic 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.

The EIF recommends that for each eGovernment service considered at a pan-European level, the **data elements to be exchanged should be made interoperable**. This requires responsible administrations to:

- publish information on the corresponding data elements involved at national level;
- 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-

[53] 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

specific eGovernment data elements (i.e. depending on that given eGoverment service) should then be defined and agreed upon;

- draft proposals for and agree on multilateral mapping tables between the various national and pan-European data elements.

And, 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.

Technical 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. A distinction is made between **four sophistication levels**, the first two essentially concerning "front-office interoperability", while the latter two also cover "back-office interoperability". The most challenging requirements for electronic interoperability are at the fourth level, where services are integrated and transactions between administrations and enterprises and citizens are fully automated.

At **front-office level**, technical interoperability should be considered mainly in relation to **data presentation and exchange**, for instance accessibility (principles for interface design), multi-channel access, character sets, file type and document formats, and file compression.

At **back-office level**, technical interoperability includes both the issue of **data integration and middleware**, and of **interconnection services**. This covers, for example, XML-based standards, EDI-based standards, web services, file and message transfer protocols, message transport and security, message storing services, and network services.

At all levels, technical interoperability should also cover **security aspects**, such as general security services, web service security, firewalls, and protection against viruses, worms, Trojan horses and e-mail bombs.

The EIF recommends, further, that 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[54] 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. **In particular, the common guidelines should be based on recognised open standards** (p. 22)**.**

Finally, several recommendations are made to enhance the usability of pan-European services by ensuring **multilingualism**, notably through increased used of machine translation software. Where **OSS** is used, the EIF states that "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." (p. 22).

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

Annex II - Open Standards Directory

Generically, an open standard is a set of rules and specifications that collectively describe the design or operating characteristics of a program or device and is published and made readily available to the technical community. Open standards are publicly available specifications that describe the characteristics of a technology. The objective of open standards is to promote interoperability.

Individual definitions attempt to establish those characteristics or criteria which should be met for a standard to be described as 'open'. It follows that the definition applied in any given context will directly influence the degree and kind of interoperability achieved.

This section provides an overview of the various alternative definitions for the term "Open Standards" currently in circulation.

Initiative for Software Choice

(www.softwarechoice.org)

"Open standards should be developed through consensus processes, that are publicly available, and that can be implemented by any party on reasonable and non-discriminatory terms.

Standards should specify objective performance requirements rather than the use of particular technologies. They should allow for implementation using alternative, equally suitable technologies that can be implemented across a wide range of technology platforms.

- Where interoperability is fostered through voluntary industry compliance with open standards that can be implemented in multiple technologies and platforms, IT vendors have incentive to develop products and services that encourage innovation, enhance competition and expand consumer choice.

- Software developed under an open source model is no more or less conducive to interoperability or standards compliance than software developed under other models.

Whether a specific standard qualifies as "open" has nothing to do with the software development model used to implement that standard. It is equally possible for an open standard to be implemented in commercial software as in open source software. Thus, regulatory efforts to promote interoperability should be clearly separated from advocacy for open source software. "

TechWeb

(http://www.techweb.com/encyclopedia/defineterm?term=open+standards&x=31&y=7)

"Specifications for hardware and/or software that are publicly available. Open standards imply that multiple vendors can compete directly based on the features and performance of their products. It also implies that the existing open system can be removed and replaced with that of another vendor with minimal effort and without major interruption. Contrast with proprietary standards. See open system and open source. "

Websters New World Dictionary of Computer Terms

(http://www.arkanar.com.by/33/Webster_New_World_Dictionary_Computer_Terms_01.htm)

"Open standards, according to Webster's New World Dictionary of Computer Terms, 7th Edition, are a set of rules and specs that collectively describe the design or operating characteristics of a programme or device and is published and made freely available to the technical community."

European Interoperability Framework
(http://europa.eu.int/ISPO/ida/export/files/en/1673.doc)

"A standard that satisfies the following requirements:
a) the costs for the use of the standard are low and are not an obstacle to access to it;
b) the standard has been published;
c) the standard is adopted on the basis of an open decision-making procedure (consensus or majority decision etc);
d) the intellectual property rights to the standard are vested in a not-for-profit organisation;
e) which operates a completely free access policy;
f) there are no constraints on the re-use of the standard."

Bruce Perens
(http://perens.com/OpenStandards/Definition.html)

"An Open Standard is more than just a specification. The principles behind the standard, and the practice of offering and operating the standard, are what make the standard Open.

Principles
1. Availability: - Open Standards are available for all to read and implement.
2. Maximize End-User Choice - Open Standards create a fair, competitive market for implementations of the standard. They do not lock the customer in to a particular vendor or group.
3. No Royalty: - Open Standards are free for all to *implement,* with no royalty or fee. *Certification* of compliance by the standards organization may involve a fee.
4. No Discrimination: - Open Standards and the organizations that administer them do not favour one implementor over another for any reason other than the technical standards compliance of a vendor's implementation. Certification organizations must provide a path for low and zero-cost implementations to be validated, but may also provide enhanced certification services.
5. Extension or Subset: - Implementations of Open Standards may be extended, or offered in subset form. However, certification organizations may decline to certify subset implementations, and may place requirements upon extensions (see *Predatory Practices*).
6. Predatory Practices: - Open Standards may employ license terms that protect against subversion of the standard by *embrace-and-extend* tactics. The licenses attached to the standard may require the publication of reference information for extensions, and a license for all others to create, distribute, and sell software that is compatible with the extensions. An Open Standard may not otherwise prohibit extensions."

Oregon (USA) House Bill 2892
(http://pub.das.state.or.us/LEG_BILLS/PDFs/HB2892.pdf)

" 'Open standards' means specifications for the encoding and transfer of computer data that:
a) Are available for all to read and implement;
b) Do not lock the user into a particular vendor or group;
c) Are free for all to implement with no royalty or fee except for a fee or fees required
d) by the standards organization for certification of compliance;
e) Do not favour one implementer over another for any reason other than the technical
f) standards compliance of an implementation; and
g) Do not prohibit the implementation of extensions, but may employ license terms that prevent subversion of the standard through predatory practices."

(other US States, like Texas and Delaware, tabled similar draft legislation)

Brussels (Belgium), draft decree concerning the use of open source software in the administrations of the French speaking Community Commission of Brussels (COCOF)

(In April 2003, this draft decree was declared un-constitutional by the Belgian 'Council of State' (Supreme Court) and, in September 2003, changed and adopted as a non-binding resolution)

" 'Open standard' is understood as any communication protocol for which:
a) the complete technical specification is published and accessible without restrictions;
b) the license to use does not impose restrictions on the development and the use of software able to exchange information via this protocol;
c) there is at least a reference implementation available as open source software. "

France: Draft law on 'Trust in the digital economy'

Article 1er bis B
"By open protocol, format or standard is meant any protocol for communication, interconnection or exchange, and any data format, for which the technical description is public and which are freely usable."

W3C Patent Policy Framework
(http://www.w3.org/TR/2001/WD-patent-policy-20010816/)

Section 4 – Definition of a RAND License
"RAND stands for 'reasonable and non-discriminatory' terms. A 'RAND License' shall mean a license that:
a) shall be available to all implementers worldwide, whether or not they are W3C Members;
b) shall extend to all Essential Claims owned or controlled by the licensor and its Affiliates (except as described in section 8.2 concerning licenses relating to Contributions);
c) may be limited to implementations of the Recommendation, and to what is required by the Recommendation;
d) may be conditioned on a grant of a reciprocal RAND License to all Essential Claims owned or controlled by the licensee and its Affiliates. For example, a reciprocal license may be required to be available to all, and a reciprocal license may itself be conditioned on a further reciprocal license from all (including, in the case of a license to a Contribution, the original licensee).
e) may be conditioned on payment of reasonable, non-discriminatory royalties or fees;
f) may not impose any further conditions or restrictions on the use of any technology, intellectual property rights, or other restrictions on behavior of the licensee, but may include reasonable, customary terms relating to operation or maintenance of the license relationship such as the following: audit (when relevant to fees), choice of law, and dispute resolution. "

EICTA (European Industry Association for Information Systems, Communication Technologies, and Consumer Electronics)

(source: "eEurope - EICTA's recommendations for a way out of the ICT/CE sector crisis", p. 15, no date)

EICTA recommends:
…
"to secure the public interest inherent in the goals of standardisation, it is important that the standards meet <u>four criteria of openness</u> to an extent that guarantees the feasibility of independent multi-vendor implementations:

- <u>Control</u>: the evolution of the specification should be set in a transparent process open to all interested contributors

- Completeness: the technical requirements of the solution should be specified completely enough to guarantee full interoperability
- Compliance: there is a substantial standard-compliant offering promoted by proponents of the standard
- Cost: fair reasonable and non-discriminatory access is provided to intellectual property unavoidably used in implementation of the standard."

Interoperability Clearinghouse Glossary of Terms
(http://www.ichnet.org/)

"The ability of information systems to operate in conjunction with each other encompassing communication protocols, hardware software, application, and data compatibility layers."

Institute of Electrical and Electronics Engineers - Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries. New York
(http://standards.ieee.org/)

"The ability of software and hardware on different machines from different vendors to share data."

About CompTIA

CompTIA is a global trade association representing the business interests of the information technology industry. For 22 years, CompTIA has provided research, networking and partnering opportunities to its more than 19,000 members in 89 countries. The association is involved in developing standards and best practices, and influencing the political, economic and educational arenas that impact IT worldwide. More information is available at www.comptia.org.

About PPC-E

CompTIA's European Public Policy Cluster (PPC-E) participates in the development of sound public policy to encourage and build on the success of Europe's information and communications technology (ICT) industries. The PPC-E members are drawn from industry across Europe and are representative of the broad and varied CompTIA European membership. The PPC-E is part of CompTIA's efforts to address technology issues in a worldwide context, recognising the global nature of the ICT markets. For more information visit the European Public Policy homepage.

About HTW

The European High-Tech Workforce Coalition (HTW) is a European industry initiative promoting medium and short-term solutions to significantly accelerate the uptake and implementation of horizontal and cross-sectorial eSkills in Europe. HTW is established as a network of representatives from the information and communications technology (ICT) industries and ICT-related companies, including ICT user companies, with active business operations in Europe (including accession countries), committed to promoting professional eSkills training and industry-led eSkills certifications.

About eSCC

The eSkills Certifications Consortium (eSCC), an initiative launched under the aegis of the HTW brings together members of the European ICT training industry to call upon public and private stakeholders actors to establish a political framework which will allow recognition and/or endorsement of the important role and competence of the commercial ICT training industry in bridging the e-Skills gap in the EU.

About ISC

The international Initiative for Software Choice seeks to advance multiple competing software markets unimpeded by government preference, and to advise policymakers about the benefits of unimpeded software choice. The four key principles of the campaign are (i) Procuring software on merits, not regulatory preference (ii) Broad availability of government-funded research (iii) Interoperability through platform neutral standards and (iv) Maintaining intellectual property protection.

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