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## SOFTWARE INTEROPERABILITY AND OPEN STANDARDS

### INTRODUCTION

Information and communication technologies (ICT) are a rapidly developing and growing industry that involves a large number of players, including multimedia content providers and software developers. Software, in particular, is a driver for this rapid development and acts as the glue between the various elements that ultimately deliver the required services to end users and consumers. The usefulness of software is closely related to its ability to work with other software. It needs to share common data formats and be able to communicate through mutually compatible information transportation protocols.

Software interoperability – or the ability to communicate or transfer data effectively between different programs and applications – is a topic that has received much policy and media attention in the context of digital rights management (DRM) technologies and music online distribution. However, interoperability is of high relevance in all technical developments. For example, it is essential for the development of ID management systems, online payment systems, web services, and e-communications such as consumer instant messaging applications, content shared over mobile devices, and the syndication of (primarily) user-generated content on the Internet and all office applications. The recent controversy over ISO approval of Microsoft's Office Open XML has been well publicized.

A lack of software interoperability can result in serious negative consequences for consumers, including:

- Lack of access to better/more suitable software products or online services;
- Difficulty benefiting from and easily adopting the latest technological innovations;
- Increased costs and reduced choice through lack of competition;
- Switching costs and ability to transfer data to different programmes and devices;
- Inability to safeguard data (documents, pictures, videos) over a long period of time;
- Unsustainable discards of still usable equipment;

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<sup>1</sup> This paper was commissioned by TACD in order to provide a deeper understanding of the importance for consumers of policies and practices relating to software interoperability and open standards. The paper reflects the views of the authors and does not necessarily represent the views of TACD.

- Imposition of possible unfair contract terms; and
- Being 'locked-in' to one system or type of device.

Interoperability is a key policy objective of the EU and an important element in the World Summit on the Information Society (WSIS) Declaration of Principles. However, due to the fundamental challenge of formulating policies that are technology neutral, it can be difficult to assess when there is a need for governments to legislate or interfere in other ways in the free market development. Open standards, which are an essential tool in the creation of a common language to achieve interoperability, are a necessary part of this discussion.

The purpose of this paper is to provide an overview on interoperability and open standards, and the policy issues associated with them for consumer organisations, and to outline some of the policy tools and approaches available to foster interoperability and open standards.

## **1. DEFINITIONS**

### **1.1 SOFTWARE STANDARDS AND OPEN MARKETS**

In the software world, standards are everywhere. They govern every aspect of our digital life. We use them to surf the web, to exchange phone calls, to send emails, to buy online, etc. Standards set the rules that define how software functions. For example, HTML is a standard that can be understood by web browsers. A word processor is only able to understand a given file format. Sometimes browsers and word processors can work together and translate a text file format into the HTML standard and *vice versa*. But this is a rare situation that requires a lot of work to achieve; this becomes more difficult when there is a need to translate more than two or three file formats.

Standards can originate from various sources. They can be defined by one company or software developer, an industrial community, researchers, a standardization body, adopted *de facto* through massive use, etc. It is important to understand that standardization is an ongoing process involving hundreds of participants. For example, text file formats, such as Word or Page08, are often designed solely by the word processor vendors. In contrast, HTML 4.01 was designed by the Internet Engineering Task Force (IETF) and the World Wide Web Consortium (W3C), a large open international community of network designers, operators, vendors, and the public. It became a global standard, adopted by the International Standards Organisation (ISO) and the International Electrotechnical Commission (IEC).

Most often, consumers are not aware of technical standards; they are just an integral part of the products that consumers use. But since they define the technical rules that producers will follow, they are in effect a form of policymaking or can be described as shadow governance.

To control a standard often means to control a market, especially when a company owns patents or copyright over elements of a given standard. Such standards, owned by a given company, are commonly known as proprietary standards.

Having intellectual property rights over a given standard gives the owner the means to forbid other players from using it or to impose on them arbitrary licensing conditions.

This can limit interoperability. Combined with an efficient marketing strategy, this can lead to the control of a given software market, vertical integration of software and hardware, and consequently market dominance or monopolies.

## **1.2 WHAT IS INTEROPERABILITY?**

Put simply, interoperability means the ability of systems to inter-operate, to work together seamlessly. It is closely related to their capacity to exchange information and to treat it in a similar way.

For the Institute of Electrical and Electronics Engineers (IEEE), the body behind such open standards as Ethernet and Wifi, interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged.

In an ICT environment, the main challenge is to transport information between various types of computers, and allowing them to treat the information in a similar way.

In the software world, interoperability relates to the capability of different programs to exchange data via a common set of exchange formats, to read and write the same file formats, and to use the same protocols.

## **1.3 WHAT ARE OPEN STANDARDS?**

Given the often arbitrary conditions under which standards owned by a single company (or proprietary standards) can be licensed for use by others, and thus can be used to dominate or control the market, there is a growing world-wide movement to promote new forms of standardization. Organizations such as W3C and many others, including governments and civil society, stress the need to recognize and adopt open standards in preference to proprietary ones.

But finding a universal definition for open standards has proved to be difficult. Instead, there are multiple definitions. Some of the most notable are:

- The Open Standards definition in the European Interoperability Framework, an EU led initiative for ensuring pan-European accessible e-government services. According to this a standard is open if: it is adopted and maintained by a not-for-profit organisation and its ongoing development is based on open decision-making procedures available to all interested parties; it has been published and the specification document is available and can be copied and distributed freely or at a nominal fee; and any intellectual property linked to the standard is made irrevocably available on a royalty-free basis. A similar definition has been adopted by the Parliament in Denmark, as part of its motion B 103<sup>2</sup>. These definitions have achieved some good success and have consequently come under heavy criticism from Microsoft and its interest groups<sup>3</sup>.
- The Open Standards definition by Bruce Perens, which includes practical implementation recommendations, based on the understanding that a definition is worthless without the practice to uphold it. The principles on which this is based

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<sup>2</sup> <http://www.ft.dk/Samling/20051/beslutningsforslag/B103/index.htm>

<sup>3</sup> <http://europa.eu.int/idabc/en/document/3761>

include availability, maximising end-user choice, no-royalty, no-discrimination, extension (or subset), and [anti] predatory practices<sup>4</sup>.

- The French definition as part of the Law n°2004-575 on the “Confidence in the Digital Economy”, of June 21<sup>st</sup> 2004.<sup>5</sup> This defines an open standard as being “any communication, interconnection or exchange protocol, and any interoperable data whose technical specifications are public and available without limitations to their access nor their use.”

But there are also many others definitions. Based on practical experience, the understanding of open standards continues to evolve in various fora, including the Dynamic Coalition on Open Standards (DCOS) at the United Nations Internet Governance Forum, where governments, industry and civil society discuss Open Standards in an open and inclusive way<sup>6</sup>.

## **2. HOW OPEN STANDARDS AND INTEROPERABILITY RELATE TO EACH OTHER?**

As stated above, interoperability is the ability for systems to inter-operate. For example, interoperability between mobile phones is created through the use of common standards by vendors and manufacturers, such as GSM in Europe and CDMA in the US. They were created as open standards by standardization bodies, the European Telecommunications Standardisation Institute (ETSI) in Europe and ITU in the US.

Other institutionalised standardisation bodies include the Committee for Standardisation (CEN) or the European Committee for Electrotechnical Standardisation (CENELEC).

But more and more standards have also been crafted by private standardisation bodies like the Internet Engineering Task Force, (IETF – TCP/IP for Internet communications), World Wide Web Consortium (W3C – HTML for website formats) and industry consortia like the Organisation for the Advancement of Structured Information Standards (OASIS - ODF for text file formats).

Practically speaking, these standards are a list of features detailing how devices or software must behave. For example with mobile phones and GSM, the standards drafted by ETSI or ITU describe what frequency they must use, how they can be detected and identified by networks, if they can use SIM cards or not, etc.

These lists were commonly established through a dialogue between manufacturers, policy-makers, vendors, etc. For years, they came together in standardization bodies where they exchanged their inventions and their technical solutions. Finally, they agreed on a given set of specifications, and they decided to publish it.

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<sup>4</sup> <http://perens.com/OpenStandards/Definition.html>

<sup>5</sup> [www.legifrance.gouv.fr/texteconsolide/PCEBX.htm](http://www.legifrance.gouv.fr/texteconsolide/PCEBX.htm)

<sup>6</sup> [igf-dcos.org](http://igf-dcos.org)

Then it was up for other IT players to use these specifications in order to implement them in their own devices. Since they had been written in the context of ETSI and ITU, the rules for the re-use of these standards were known from the beginning.

## **2.1 HOW STANDARDS AND INTEROPERABILITY RELATE TO MARKET DOMINANCE?**

Given that controlling a standard means controlling a market, the implications for interoperability in everyday's life are often not fully appreciated by the general public. However, policy makers have considered interoperability as an important public policy issue for a long time.

As a result, there have always been regulations forcing vendors to comply with different levels of interoperability, and to open proprietary standards to competitors. That was especially true for industrial and telecommunications standards.

The rise of ICT and Software are bringing this issue to the attention of policy makers who worry about the control of ICT and software markets. They are using various legal tools in order to obtain the level of interoperability that they feel is necessary to meet the public interest.

The case of Microsoft is a good example of how the EU is beginning to address software interoperability through competition law. In 2004, the European Commission found that Microsoft had abused its market power by deliberately restricting interoperability between Windows work group servers and non-Microsoft work group servers. By doing so, Microsoft was able to protect its dominant market position for work group server operating systems, the heart of corporate IT networks. Microsoft was ordered to disclose complete and accurate interface documentation, which will enable rival vendors to compete on an equal footing.

## **2.2 DO OPEN STANDARDS AND INTEROPERABILITY HAVE LEGAL RELEVANCE?**

Interoperability is a well-known legal concept. It originated in transportation regulation and was later adapted to telecommunications. Thus, references to interoperability can be found in European regulations as well as in national regulations. And their strength can vary from mandatory interoperability to copyright exceptions.

Several countries have enacted interoperability frameworks which describe software and standards for public procurement purposes. Some of these frameworks are mandatory, and some are recommendations. But they are very important in the sense that vendors that would like to answer public calls for tenders would have to comply with them, and implement them in their software.

For example the interoperability framework from UK is called e-GIF and has been mandatory since 2000<sup>7</sup>. It is defined as "A set of policies and standards to enable information to flow seamlessly across the public sector and provide citizens and businesses with better access to public services."

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<sup>7</sup> <http://www.govtalk.gov.uk/schemasstandards/egif.asp>

On the other hand, the European interoperability framework in support of the delivery of pan-European e-government services to citizens and enterprises is a set of specific recommendations to member states, focused on adding a pan-European dimension to national interoperability frameworks, assuming that such frameworks exist or are being developed<sup>8</sup>.

To illustrate how important these issues are, the French framework, the *Référentiel Général d'Interopérabilité*, was intended to be mandatory, but due to strong lobbying from software vendors, the Government has not been able to publish it yet.

Mandatory or voluntary interoperability can also apply to specific areas, as it is the case with software reverse engineering and content DRM. For example the French intellectual property law contains a copyright exception allowing software reverse engineering to ensure interoperability with other software.

In the specific case of DRM, this provision has been further extended by the French revised copyright act, the DADVSI, which adopts into national law the European Union Copyright Directive. French Law now requires access to DRM information that is "essential for interoperability." DRM owners cannot refuse to divulge their codes. A new regulatory body was created in order to mediate refusals by DRM owners to comply with requests for source code information.

### **3. DATA IS BECOMING KEY**

In the software world, the challenges for achieving interoperability are further increased by the importance of the relationship between software and data. Software is rarely useful by itself. It must usually be combined with other software in order to be used as a product. Microsoft Word would be useless without Microsoft Windows or Apple OS X. Controlling one layer of software grants some control over its dependencies.

In the same way, software is rarely useful without the data it's associated with. Owning an mp3 player without mp3-formatted music to play means little. Controlling the data standard grants control over two things.

First, it allows control of the software that will use it. Not all players are able to read Apple's own digital music standards.

Second, as long as consumers need to re-use their data over time, it allows control of the next generation of software and data that will follow. Microsoft Word users are more likely to buy Microsoft Word products because their data are stored in the Microsoft .doc standard file format.

From a consumer point of view, the ability to allow software and data to talk together is vital. It would be inconceivable now that a mobile phone user could not call his friend because their mobile phone providers use different standards. But this is exactly the case in the instant messaging world today where it is impossible to send messages from, for example, the MSN network to the GTALK network. Similar difficulties occur with word processors, social network websites, audio and video files, etc.

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<sup>8</sup> [cite <http://europa.eu.int/idabc/>

But this battle over data formats is extending rapidly. It now also links to identity management standards, instant messaging, online payment systems, personal data standards, etc.

### **3.1 FILE FORMATS INTEROPERABILITY**

The relation between ability to transfer data and interoperability is key. “Interoperability means the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable the sharing of information and knowledge.”<sup>9</sup>

The battle over DRM and music downloading has widely demonstrated the importance of file format interoperability and the public interest for non-DRM music formats. But this battle over formats is extending rapidly, and now links also to identity management standards, instant messaging, online payment systems, personal data standards, etc.

It should be made clear, however, that interoperability is different from compatibility. The latter applies when a software company ensures its own software and data works only with equipment and software that it has licensed. For example, you can play an mp3 music file format on both Windows Media Player and the Apple iPod (they are interoperable through the common use of the mp3 standard), but you can only use the WMA music format on Windows Media or other MS-licensed players (because only they are compatible).

As was demonstrated during the DRM debate, the consumer interest relies heavily on the ability to exchange data from one software program to another, and from one consumer to another. The ability to transfer music from one player to another player is one example.

The file formats situation is not dissimilar. The .doc file format developed by Microsoft resulted in a lock-in situation for consumers. The XML-based ODF (Open Document File) format was developed by OASIS as an answer that could allow various vendors to develop interoperable word processing software. In response, Microsoft decided this issue was so important, that it rapidly developed a competitor called OOXML (Office Open XML).

The same problem is currently occurring online. For example, consumers cannot transfer their accounts between different social networking sites.

Vendors themselves now understand the importance of data interoperability. Being able to transfer data from one platform to another is becoming an important issue between such platforms as Facebook and Netvibes. Thus, they have decided to launch different standardisation projects, such as open ID or dataportability.org.

But these initiatives are essentially private projects. It is important that consumers should be involved at every step of these processes. It is also essential that the development of new personal data transfer standards should not result in the lowering of privacy protection.

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<sup>9</sup> European Interoperability Framework for e-government services <http://europa.eu.int/idabc/en/document/3761>

#### **4. PROMOTING CONSUMER RIGHTS THROUGH INTEROPERABILITY AND OPEN STANDARDS**

Interoperability is closely related to the nature of the standards being used in the market, whether they are proprietary standards that are vendor specific and can only be used by their inventors or their licensees, open standards which – regardless of their definition – can be used without prior authorization.

From a consumer perspective, the advantages of interoperability include greater choice and lower prices through increased competition, access to software products and services better tailored to individual needs, the ability to benefit from the latest technological innovations, ease of switching between products and services, the ability to keep personal data over a long period of time without being locked into one system or service, and the ability to ‘plug and play’ without costly discards of still usable equipment.

Interoperability is also strongly linked to the public interest, seen as fostering innovation, allowing more autonomy and diversity in the market, and achieving a more user friendly information and communication technologies ecosystem.

There are degrees of interoperability and several ways to achieve it. Governments can:

- Regulate the market, by imposing standards of their choice;
- Prescribe interoperability frameworks;
- Foster the use of open standards rather than vendor specific standards;
- Allow people to circumvent intellectual property by, for instance, enabling reverse engineering of software;
- Challenge proprietary standards under antitrust regulations;
- Require the disclosure of interoperability information; and
- Mandate transparency rules.

Interoperability can vary from mandatory interconnection to loose interoperability through reverse engineering copyright exceptions.

It is very difficult to evaluate software interoperability and open standards from a policy-oriented perspective. Many would like to defend the idea that they are a means and not an end. Truly, they lead to innovation and competition. But open standards and software interoperability are also legal concepts of their own, and they can be therefore achieved for themselves, both through public policy and by private players.

#### **5. CONCLUSIONS**

##### **5.1 DEFENDING INTEROPERABILITY AND OPEN STANDARDS THROUGH PUBLIC ACTORS**

###### **MANDATING STANDARDS**

The EU Technical Standards and Regulations Directive (98/34 EC) aims at ensuring a smooth functioning of the Internal Market, by fostering transparency on national activities in the area of technical regulations and standards, and promoting the harmonization of such technical regulations and standards at European level. The Directive contains a

definition of a standard by stating that it must be “a technical specification approved by a recognized standardization body for repeated or continuous application, with which compliance is not compulsory and which must be adopted and made available to the public.” It covers information society services, though it does not define or mention ‘open standards’ as such.

The main purpose of this Directive is to prevent technical barriers to trade within the European internal market. So it has an information exchange procedure for national standardization activities, and provides the legal basis for addressing some requests called mandates to the European standardization organizations (CEN, CENELEC and ETSI). When these organisations are mandated to develop standards, the EU Member States have standstill obligations with regards to national standardization activities in those areas when European mandates have been entrusted to these organizations.

### FOSTERING INTEROPERABILITY FRAMEWORKS

Recent policy initiatives have brought interoperability to the centre of governance framework. Policy-makers write interoperability frameworks where they chose formats, standards and applications that they want to promote. They also foster open standards through various means. And finally, they elaborate guidelines to describe the way in which organizations have agreed, or should agree, to interact with each other.

In all these actions, policy-makers address interoperability at different levels, including technical interoperability and data interoperability. The existence of a strong interoperability framework is now considered to be the central key point of architecture in their e-government applications.

The development of an interoperability framework can be done at a national level, or at an international level. For example, the European Interoperability Framework was developed under the Interchange of Data between Administrations program. As stated in its first draft, it focused on “supplementing, rather than replacing, national interoperability guidance by adding the pan- European dimension.”

Interoperability frameworks can be a tool for national and international use. They offer several levels of regulation and can be updated regularly.

### PROTECTING NET NEUTRALITY

The Internet is built upon open standards that create a neutral place where information is exchanged, regardless of what it is. It is open to anyone and it allows anyone to build on it, whether they just want to send an email, or whether they want to create a full range of web services.

There is a need to defend the open standards that define internet today, and to fight vendor-specific standards that could replace it. The Internet has not encompassed the whole ICT sector but has changed dramatically its economics and its models. The impact of TCP/IP, HTML and other open standards is creating new challenges for both private and public players.

Although these standards have positive social implications, they are continuously under attack by vendors who would like to impose their own communication protocols. They

usually assert that new protocols could decrease Internet criminality and help fight internet piracy. Just recently, similar proposals came from players as important and as different as AT&T and the Italian Government.

In reality, this would result in different communication standards that would discriminate between the types of information they are used to transport. Some communications would get blocked, others would be prioritised under rules that would be established privately, and the Net would no longer be neutral.

## **5.2 DEFENDING INTEROPERABILITY AND OPEN STANDARDS THROUGH THE MARKET**

People often think that private players work mainly by developing their own personal specifications and by licensing their IP rights. But this strategy is balanced by the need to work together and the necessity to develop standards when trying to develop the market with a business perspective in mind. One good example would be the development of ICT protocols such as GSM or ADSL that are not vendor-specific but developed and distributed as open standards after having been developed through standard bodies like ETSI or ITU. Other solutions include the protection of exceptions to IP licensing and fostering the use of open source licensing.

### DEFENDING EXCEPTIONS TO IP LICENSING THROUGH IP AND COMPETITION LAW

The debate over DRM showed the importance of intellectual property exceptions to avoid lock-in situations. Consumers should not be kept prisoners over the limitations of the file format chosen by their music player vendor. That issue is addressed by reverse engineering provisions that allow competitors to develop interoperability. Such exceptions that protect consumers should be defended.

But this is not always sufficient and it won't protect from players who developed a monopolistic situation. In that case, competition law can also force them to enact IP exceptions. For example, Microsoft was recently forced by EU competition authorities to disclose information to allow interoperability with some of its most important software. In the same way, the French competition authorities decided that Virgin was not allowed to access interoperability information on Apple's DRM, but only as long as Apple was not in a monopolistic situation over the online music market.

In every case, the solution was to order vendors to give access to information that would be necessary for interoperability.

### DEVELOPPING AND FOSTERING OPEN SOURCE LICENSING

As explained above, most vendors develop their own software and license it. Open source and free software is simply a way to grant license authorizations in advance with a given set of conditions. In that sense, open source and free software can warranty that other vendors will be able to understand how to interoperate with the original software.

The vast range of conditions offered by the various open source and free software licenses makes them an attractive solution to achieve interoperability and create open standards.

## OBTAINING A STAKEHOLDER POSITION ON DATA INTEROPERABILITY

Many modern applications heavily rely on the reuse and exchange of data.

- Regarding data storage, consumers should be entitled to a right to data portability. They should not lose their emails when they switch between providers. They should not lose their list of friends when they stop using a social networking site.
- Regarding file formats, discussions over ODF and OOXML showed how software standardization is also of consumer interest. Today, standardization bodies do not limit themselves to designing communication protocols. Consumers are important stakeholders and should be part of the debate.
- Regarding privacy, consumers want to have stronger control of their personal information. The development of new services should enhance privacy protection. From this point of view, interoperability-based architectures should be balanced by strong privacy regulations.

Consumers should be invited to participate in the ongoing debates about interoperability and open standards, and their demands should be taken into account.