"Interoperability," *Not* "Interchangeability"

The Importance of a Proper Approach to Defining and Achieving "Interoperability" to Enhance Competition, Innovation, and Consumer Choice in the Information Technology Marketplace

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In today's highly dynamic information technology (IT) marketplace, businesses and other organizations routinely deploy heterogeneous IT networks consisting of hardware and software from multiple vendors. In such an environment, interoperability is a technical and business imperative. It is also a desired goal for government in the context of both public policy (promotion of a healthy, competitive, and innovative IT-ecosystem) and in the government software procurement process.

But What Is "Interoperability"? How Should It Properly Be Defined?

Although interoperability has different meanings in different contexts, in the area of information technology the term is generally understood to mean the ability of disparate IT products and services to exchange and use data and information in order to function together in a networked environment.

For example, consider the following different sources' definitions of this important concept:

• *Newton's Telecom Dictionary* defines interoperability as "the ability to operate software and exchange information in a heterogeneous network, *i.e.*, one large network made up of several different local area networks." [1]

• *The E-Government Act of 2002* defines interoperability as "the ability of different operating and software systems, applications, and services to communicate and exchange data in an accurate, effective, and consistent manner[.]" [2]

• *The Digital Millennium Copyright Act (DMCA) of 1998* defines interoperability as "the ability of computer programs to exchange information, and of such programs mutually to use the information which has been exchanged." [3]

• *The European Interoperability Framework*, an initiative to facilitate, at a pan-European level, the interoperability of IT services and systems, defines interoperability as "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." [4]

Interoperability is best defined as the ability of heterogeneous information systems, components, and services to exchange and use data and information.

"Interoperability" Must Be Distinguished From The Concept Of "Interchangeability" Or "Cloning"

While the essence of interoperability (*i.e.,* the ability of heterogeneous information technology systems, components, and services to exchange and use data and information, *i.e.*, to "talk") is very well understood across different sectors of the world, until recently there remained some pockets of confusion that are now beginning to get cleared up.

A key contributor to the confusion is that certain parties have at times tried to infuse a more radical meaning into the definition of interoperability which focuses on the "cloning" of systems as the putative lynchpin of this concept. For example, the plaintiffs in the U.S. antitrust case against Microsoft proposed to define the required interoperability as "the ability of two products to effectively access, utilize, and/or support the full features and functionality of one another." [5] However, the court

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rejected this definition as overbroad, finding that "Plaintiffs' definition of 'interoperate' … equates interoperability with 'interchangeability' [or 'cloning']." [6] By cloning, the court explained that it meant "the creation of a piece of software which replicates the functions of another piece of software." [7]

In crafting a remedy intended to promote interoperability between Microsoft's PC operating system software and third-party products, the lower court defined interoperability, much like the definitions above, as the ability of "two devices or systems … to … exchange information and use the information that has been exchanged." [8] The court further stated: "The kind of "interchangeability" requested by plaintiffs exceeds the normal industry usage of the term "interoperate." … From a technical perspective, the fact that there are many different ways to accomplish any given task means quite basically that different vendors will often accomplish the same task, however complex, in a different manner, such that the differing solutions are not typically interchangeable. … From a business perspective, there is an incentive to develop a product with features that are distinct from other products, such that the new features appeal to consumers and generate sales. … In addition, differences in consumer demand often lead to the creation and success of a product with strengths and weaknesses different from those of another product. … *Uniformity in features among the products of various firms and complete interchangeability defeat these aspects of competition." [9]

The court elaborated on the benefits associated with avoiding an overly broad definition that equated interoperability with interchangeability or cloning: "In general, the protection of intellectual property rights encourages innovation by rewarding the innovator's investment in creating something new, while making the innovation available to the public. To enable the cloning of Microsoft's products sets this scheme askew by denying Microsoft the returns from its investment in innovation and effectively divesting Microsoft's intellectual property of its value. … Such a scheme inherently decreases both Microsoft's incentive to innovate as well as the incentive for other software developers to innovate, since they can simply create clones of Microsoft's technology." [10]

The appeals court recently agreed with the district court:"The extremely broad scope of the States' proposal bears out the district court's concern. First, 'interoperate' is defined in a way that makes it essentially synonymous with 'interchange.' … [T]he district court found the broad scope of the APIs required to be disclosed under the States' proposal would give rivals the ability to clone Microsoft's software products; … and cloning would allow them to 'mimic' the functionality of Microsoft's products rather than to 'create something new.' … The effect upon Microsoft's incentive to innovate would be substantial; not even the broad remedial discretion enjoyed by the district court extends to the adoption of provisions so likely to harm consumers.[11]

In short, these decisions highlight the importance of not going too far in the definition or requirements of interoperability – to, in essence, require a carbon copy of the functionality and features of a particular piece of software or system – which will only result in *reduced* innovation, competition, and consumer choice.

A Market-Driven Approach To Achieving Interoperability Makes The Most Sense

Recognizing that technology often moves at a much faster pace than legislators and regulators, the U.S. government generally has taken a hands-off approach towards emerging and high-tech industry regulation, and instead has encouraged the private sector to develop and implement interoperable technologies. For example, in a 1999 U.S. Senate hearing on the development of global electronic commerce, the Department of Commerce made clear that: "[T]he needs and dynamics of the marketplace, and not governments, must guide standard development and implementation activities.

IT Industry Circa 2004 – Significantly Increased Interoperability on All Levels

Client Applications
Adobe Creative Suite, AOL, Intuit, McAfee, Microsoft Office, Mozilla, Netscape, Open Office, Picture IT, Star Office, Symantec Norton, Turbo Tax

Server Applications
Apache, Baan, JD Edwards & Co., Oracle, PeopleSoft, SAP

Databases
IBM, Microsoft, Oracle

Operating Systems & Middleware
Apple, HP, IBM, Microsoft, Sun

Systems Vendors
EDS, Fujitsu, HP, IBM, ICL, SNI

Networking Vendors
3COM, Cisco, Lucent, Nortel, Redback

Processors
IA64, PPC, X86-32, X86-64, Sparc

Storage
Dell, EMC, HP, Network Appliance

Governments should refrain from issuing technical regulations and instead should rely, to the maximum extent possible, on the private sector to self-regulate, using standards developed by voluntary, industry-led, open, consensus-based organizations at both the national and international levels. Because interoperability and reliability of the Internet are crucial for the success of e-commerce, the private sector has a strong incentive to develop needed standards and to self-regulate ... The best results are achieved when the market – not governments – determines how best to achieve the goal of different systems working together on a global basis." [12]

There Is A High Level Of Interoperability In The IT Industry

The above discussion about the proper definition of interoperability is more than just semantics. Rather, the concept of interoperability as it has been properly defined and implemented by the U.S. and other countries has engendered a significant level of interoperation among heterogeneous IT systems and components. To put this in proper context, circa 1980, very little interoperability existed across various vendors' IT solutions. Rather, large IT vendors like Digital, HP, IBM, and NCR each offered proprietary hardware and software solutions that, while comprehensive, afforded little interaction with one another. A consumer or organization had to choose one of these companies and acquire all or virtually all of its IT solutions from it.

By stark contrast, in today's highly dynamic IT marketplace, businesses and other organizations routinely deploy multi-vendor networks of interoperable hardware and software. The table above provides a glimpse into this robust level of interoperability.

The results of such widespread interoperability among vendors have been increased competition, innovation, and consumer choice on the one hand, and lower prices on the other. One need only look to the dramatic *expansion* in functionality and interoperability and the corresponding *reduction* in price of the personal computer over the last 10 years as evidence of this phenomenon.

IT vendors have strong commercial incentives to promote interoperability, and they accomplish interoperability through a variety of means, such as voluntary disclosure and licensing of proprietary technology and the development of standards, including open standards (*e.g.*, TCP/IP, HTML, 802.11, MPEG, SNMP, 1394).

Governments Should Embrace The Above Approach To Defining And Achieving Interoperability In Their Procurement Decisions, In Order To Enhance Innovation, Competition, And Consumer Choice

As shown above, a proper definition of interoperability which focuses on the ability of

diverse systems to "talk" to one another, coupled with reliance on the marketplace to drive the optimal level of features, functionality, innovation, and competition, has led to significant public policy and technology benefits. Governments and public officials should accordingly consider the following key principles in order to sustain and replicate these benefits:

1. Embrace a definition of interoperability focused on the *exchange and use* of information among heterogeneous systems, rather than the *cloning* of systems;

2. Allow industry to lead in promoting technical interoperability, including by developing voluntary, industry-driven, consensus-based standards; and

3. Avoid policies that would mandate or extend preferences to specific technology solutions, standards implementations, platforms, or business or development models.

This last point merits some expansion. Governments' purchasing decisions have a substantial impact on the IT marketplace. Procurement mandates or preferences for specific technology solutions or standards implementations – including for software associated with specific development or business models – arbitrarily force product uniformity, which will impede the competition and innovation benefits shown above that flow from technical solutions from multiple interoperable sources. Such mandates or preferences also unfairly favor one vendor or IT development and/or licensing model over another, impose unnecessary micromanagement that prevents a government body from securing the best technical solution available, hurt local IT companies, and may be inconsistent with existing trade laws on government procurement. [13]

Ideally, policymakers should develop procurement policies that are neutral with respect to specific technologies or platforms and that are based on reasonable, objective criteria, such as the following: (1) interoperability/reliance on open standards, (2) value for money, (3) reliability, (4) vendor support, (5) ease of use, (6) security, and (7) availability of warranties and indemnities for intellectual property claims. Such a neutral, objective approach – which is increasingly being embraced by governments around the world[14] – is the optimal way not only to ensure the interoperability of diverse systems, but also to maximize competition, innovation, and consumer choice.

[1] *Harry Newton*, Newton's Telecom Dictionary: The Official Dictionary of Telecommunications Networking and Internet (2001).

[2] *E-Government Act of 2002 § 3601 (1), 44 U.S.C. § 3601 (1) (2002).*

[3] *Digital Millennium Copyright Act, Pub. L. No. 105-304, 112 Stat. 2860 (1998), codified at 17 U.S.C. § 1201(f)(4).*

[4] *See http://europa.eu.int/ida/en/document/2033 (last visited, Nov. 15, 2004).*

[5] State of New York, et al. v. Microsoft Corp., *224 F. Supp. 2d 76, 227 (D.D.C. 2002).*

[6] Id.

[7] Id. *at 176.*

[8] Id. *at 227.*

[9] Id. *at 228 (emphasis added).*

[10] d. *at 176.*

[11] Massachusetts v. Microsoft Corp., *373 F.3d 1199, 1224 (D.C. Cir. 2004).*

[12] *Testimony of Andrew Pincus, General Counsel, Department of Commerce, before the Senate Commerce Committee's Subcommittee on Science, Technology and Space: Hearing on the Role of Standards in the Growth of Global Electronic Commerce (Oct. 28, 1999).*

[13] *See, e.g., http://www.softwarechoice.org/download_files/Brazil_SupremeCourt_Ruling.pdf (describing Brazil Supreme Court's unanimous decision ruling that a Rio Grande do Sol open source software preference law is unconstitutional, and blocking enforcement by regulators because the law interferes with open competition based on principles of non-discrimination, illegally preempts federal procurement prerogatives, and violates the state's own separation of powers).*

[14] *See, e.g.,* **United States** *(OMB memorandum (http://www.whitehouse .gov/omb/memoranda/fy04/m04-16.html) reminds agencies that the policies and procedures covering acquisition of software to support agency operations are intentionally technology and vendor neutral and, to the maximum extent practicable, implementation should be similarly neutral);* **Denmark** *policy (http://www.videnskabsministeriet.dk/cgi-bin/theme-list.cgi?theme_id=71406&_lang=UK) directs institutions to "procure the software solution that has the maximum value for money measured on the basis of merit and local business need irrespectively of whether this implies using proprietary software solutions or open source.");* and **Italy** *(recent report (http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showDocument&parent=whatsnew&documentID=1454) concluded that there should be no discriminatory rules for software purchasing, and that software should be chosen based on quality and value for money).*