

“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.

Interoperability is best defined as the ability of different IT networks, applications, or components to exchange and use information.

But what is “interoperability”? How should it properly be defined?

Although interoperability has different meanings in various contexts, in the area of information technology the term is generally understood to mean the ability of different IT networks, applications, or components to exchange and use information.

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
- ❖ The U.S. Federal Communications Commission (FCC) has defined interoperability as a link between communications systems that “permits units from two or more different entities to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results.”⁵

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 47 C.F.R. § 90.7 (2004).

“Interoperability” must be distinguished from the concept of “interchangeability” or “cloning.”

While the essence of interoperability (*i.e.*, the ability of different IT networks, applications, or components to exchange and use information, *i.e.*, to “talk”) is very well understood across 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.”⁶ However, the court rejected this definition as overbroad, finding that “Plaintiffs’ definition of ‘interoperate’ ... equates interoperability with ‘interchangeability’ [or ‘cloning’].”⁷ By cloning, the court explained that it meant “the creation of a piece of software which replicates the functions of another piece of software.”⁸

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.”⁹ 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.*¹⁰

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.¹¹

The appeals court fully 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 prod-

⁶ *State of New York, et al. v. Microsoft Corp.*, 224 F. Supp. 2d 76, 227 (D.D.C. 2002).

⁷ *Id.*

⁸ *Id.* at 176.

⁹ *Id.* at 227.

¹⁰ *Id.* at 228 (emphasis added).

¹¹ *Id.* at 176.

ucts; ... 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.¹²

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. 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—determine how best to achieve the goal of different systems working together on a global basis.¹³

Indeed, the well-established policy of the U.S. government is that all federal agencies must use voluntary, industry-developed consensus standards in lieu of government-unique standards in their procurement and regulatory activities, except where inconsistent with law or otherwise impractical.¹⁴

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 below provides a glimpse into this robust level of interoperability.

¹² *Massachusetts v. Microsoft Corp.*, 373 F.3d 1199, 1224 (D.C. Cir. 2004).

¹³ 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).

¹⁴ See <http://www.whitehouse.gov/omb/circulars/a119/a119.html>.

IT Industry Circa 2005 - 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	

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 complementary means, including: (1) development of software that is “interoperable by design” (e.g., inclusion of XML technology in software to facilitate the easy exchange of data across different applications, or the creation of software, such as a “translator” or

“gateway,” that runs on one product and implements communications with another), (2) licensing / cross licensing of proprietary technologies and essential intellectual property (IP), (3) collaborations with partners, competitors, customers, and governments, and (4) implementation of industry standards (including open standards, such as TCP/IP and HTML, and proprietary standards, such as PDF and PCL) in products and services.

Governments should rely on the following principles to define and achieve interoperability in their procurement decisions, in order to enhance innovation, competition, and consumer choice.

As shown above, a proper definition of interoperability that focuses on the ability of different 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” that is focused on the *exchange and use* of information among different systems, rather than the *cloning* or *interchangeability* 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 mandate or extend preferences to specific technology solutions, platforms, or business/licensing models, or that mandate particular means of achieving interoperability to the exclusion of others. Rather, pursue a neutral policy focused on *choice* as the best approach to enhance interoperability.

This last point merits some expansion. Governments’ purchasing decisions have a substantial impact on the IT marketplace. Procurement mandates or preferences for particular technologies or licensing model — such as open source software over proprietary software, or vice versa - arbitrarily force product uniformity, which will impede the competition and innovation benefits shown above that flow from technical solutions from multiple interoperable sources. Such preferences also unfairly favor one vendor or IT

business and/or licensing model over another, impose unnecessary micro-management that prevents a government agency from securing the best technical solution available, hurt local IT companies, and may be inconsistent with international trade rules on government procurement.¹⁵

Ideally, therefore, policymakers should develop procurement policies that are *neutral* with respect to specific technologies and business/licensing models and that are based on reasonable, objective criteria, such as the following: (1) interoperability/reliance on industry standards, (2) total cost of ownership/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 is increasingly being embraced by governments around the world,¹⁶ as well as in recent reports by such leading institutions as the Harvard Berkman Center and the International Chamber of Commerce.¹⁷

Likewise, efforts by governments to mandate a particular path to interoperability to the exclusion of others may wind up curtailing the flexibility of government agencies to use alternative means that could have produced even *greater* levels of interoperability had they been pursued.

For example, if a government mandates reliance on a particular open standard that is immature and unproven, and that ultimately turns out to be costly and ineffective, it may have foregone significant interoperability advances that could have been obtained had the government instead been more flexible in allowing broadly accessible proprietary standards, industry collaborations, and/or other means to chart its interoperability course.

Accordingly, to avoid the foregoing pitfalls and to maximize the level of interoperability, governments should promote “choice” by their procurement agencies seeking interoperability solutions - *choice* as to which one or more of the above four complementary options is/are the best means of achieving interoperability in a given situation; *choice* regarding which open standard(s) and/or proprietary standard(s) to rely on under the circumstances; and *choice* between open source software and proprietary software. This flexible approach predicated on choice and the avoidance of preferences is particularly appropriate in the rapidly converging IT world, in which customers and governments increasingly rely on a *combination* of proprietary and open source software, as well as open standards and proprietary standards, to develop ideal interoperability solutions.

¹⁵ 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).

¹⁶ See, e.g., **United States** (OMB memorandum (<http://www.whitehouse.gov/omb/memoranda/fy04/m04-16.html>)) reminds agencies that the policies 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.”); **Italy** (recent report (<http://europa.eu.int/ISPO/ida/jsps/index.jsp?fuseAction=showDocument&parent=whatsnew&documentID=1454>)) concluded that software should be chosen based on quality and value for money); **New Zealand** policy (<http://www.e-government.govt.nz/docs/open-source-200303/>) on software procurement states, “‘Value for money’ and ‘fitness for purpose’ principles should continue to underlie any software procurement decisions made by government agencies,” as well as issues of functionality, interoperability, and security).

¹⁷ “Roadmap for Open ICT Ecosystems” (Berkman Report) (*available at* <http://cyber.law.harvard.edu/epolicy/>), at 25; International Chamber of Commerce, “Policy Statement on Open Source Software” (*available at* http://www.iccwbo.org/uploadedFiles/ICC/policy/e-business/Statements/373-466_open_source_software.pdf), at 5.