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FEATURE ARTICLE

STANDARDS, CYCLES AND EVOLUTION: LEARNING FROM THE PAST IN A NEW ERA OF CHANGE

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Abstract: *History includes times of both gradual evolution, as well as sudden revolutionary change. Standard setting experienced a burst of revolutionary change in the late 1980s that led to the development of a new type of standard setting organization (the consortium) when the information technology industry found the traditional, global standard setting infrastructure to be inadequate. Today, the consortium infrastructure is proving to be inadequate to the demands of a modern, networked world, and new structures will need to evolve in order to meet those needs.*

Introduction: By 1985, a century-long process of rapid evolution in standard setting culminated in an orderly, hierarchical, global infrastructure – a mature and respected industry in its own right. This infrastructure was as broad as it was deep, covering not only every type of manufacturing industry, but food, telecommunications, safety, and most other aspects of modern life as well.

Twenty years later, that infrastructure continues to serve traditional industry well, but has been challenged, and in some cases abandoned, by those wishing to enable new information technology (IT) standards. What happened?

No single factor caused this fragmentation in standard setting. Instead, a number of new market dynamics contributed to the result. Those factors included a desire for greater process speed to match the rapid evolution of technology; increasing national and regional economic competition; the recognition that standards could often convey strategic advantage for those that had the greatest influence on the results; the recognition that success in some types of standard setting would also require marketing support; and efforts to confront the dominance of early market leaders in discrete products areas, such as operating systems.

The most obvious resulting challenge to traditional standard setting was presented in the late 1980s by the rise of consortia. As time progressed, many consortia became indistinguishable from accredited organizations, and their standards enjoyed increasing respect, often being referenced even by the traditional, global standards organizations that they were challenging.

Today, the global standard setting infrastructure (including these newer organizations) is finding itself once again confronted by a host of new challenges, including:

- The convergence of information and communication technologies (ICT)
- The rise of open source as a development model
- Ongoing testing of the effectiveness of WTO agreements to prevent the use of standards as technical barriers to trade
- Desires to reap the full potential of a globally networked world
- Rising political recognition of the importance of the Internet and the Web and society's dependence upon it

- Spam, phishing and other Internet abuses that perhaps may only be satisfactorily defeated through coordinated, global government action
- A new convergence of life sciences and IT

When the last wave of challenges confronted the standard setting infrastructure, new solutions evolved organically, allowing the marketplace to adapt in an adequate, if chaotic fashion. Much was gained in the process, but perhaps some benefits of the old system were lost as well. How will our world, which is even more dependent on standards today than it was twenty years ago, fare as the system is called upon to rise to these new challenges?

In this article, we review the standard setting infrastructure that existed in the late 1980s, and examine how that infrastructure failed to adequately accommodate that first wave of IT based innovation. We conclude by presenting a similarly critical review of the standard setting infrastructure of today, and offer some thoughts on how that system must once again evolve to meet the new challenges of tomorrow.

The old world order[1]: In one of the less appreciated accomplishments of modern society, the developed nations and industries of the world created an extremely sophisticated, global, consensus based process that successfully created a bewildering array of standards – and continues to do so today.

More impressively, these same stakeholders recognized at an early stage that all would benefit if many kinds of standards were implemented globally, rather than nationally or even regionally. The result was the creation of a number of international organizations that were joined voluntarily by scores (and in some cases, even by the majority) of the world's nations. Those that became central to the eventual IT industry were the following:

The International Organization for Standardization (commonly referred to as ISO; a Greek derivative, rather than an acronym): Established in 1946, ISO was formed to enable the creation of industrial standards of every type through voluntary participation by national representatives ("Member Bodies," where a national standards body exists, and "Correspondent Members," in the case of countries that lacked a nationally chartered body). In 1985, ISO had more than 80 Member Bodies, some 70% of which were actual government agencies, or entities created by law.

In the late 1980s, the formal structure of ISO involved a General Assembly that met on a triennial basis, overseeing a Technical Board, Council and Executive Board. The Council in turn supervised a Central Secretariat (with a large staff, resident in Geneva, Switzerland), six standing Committees of the Council, and, at the bottom of the organizational structure, over 160 Technical Committees and joint Technical Committees.

Under the ISO system, new technical committees may be formed, but only if no existing committee is deemed to be suitable for the task. As of 1989, there were approximately 2,400 committees, subcommittees, working groups and study groups in ISO.[2]

International Electrotechnical Commission (IEC): While its scope is limited to electrical and electrotechnical disciplines, the importance of the IEC is nevertheless large in the modern world. Besides having a more narrow focus than ISO, the IEC's methodology is also somewhat different: it creates "specification standards," or minimum requirements, rather than interoperability standards.

Like ISO, the IEC is headquartered in Geneva, Switzerland, includes national bodies as its members, and has a similar organizational structure. Unlike ISO, however, every member nation is entitled to have a vote on every Technical Committee – even those in which it has not opted to actively participate. Formed in 1906, the IEC had some 40 full members (with additional informational members) in the late 1980s. In

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[1] For a more in-depth history of the organizations discussed below, see Carl F. Cargill, Information Technology Standardization: Theory, Process, and Organizations, Digital Press, 1989. Vintage factual data included in this article that is not otherwise attributed is derived from pages 125 – 148 of this book.

[2] Today, SIO has 99 Member Bodies, 41 Correspondent Members, and 10 Subscriber ("small economy") members. ISO's current organizational structure may be viewed at: <www.iso.org/iso/en/aboutiso/isostructure/isostr.html>

1988, the IEC hosted 82 Technical Committees (including two shared with ISO), and more than 100 subcommittees.[3]

International Telecommunications Union (ITU): Unlike ISO and the IEC, the ITU is the creation of an international treaty, rather than a body in which interested nations voluntarily participate. Similarly, it creates regulations, which are mandatory, rather than mere standards, which are voluntarily utilized (or not). Perhaps not surprisingly, the ITU has the largest membership of the three "Big Is," with some 160 members during the period in question. Like ISO and the IEC, its headquarters is in Geneva, Switzerland.

The purview of the ITU is radio, telegraph and telephone regulation, and its work plan extends beyond standardization to coordination and planning. The ITU traces its origins to 1865, making it the most venerable of the three Big Is. At the top of the ITU organizational stack is the "Plenipotentiary Conference," which during the period in question met at infrequent and irregular intervals. Below the Plenipotentiary Conference (in order) were an Administrative Council, followed by a layer of "Conferences," a General Secretariat, two Plenary Assemblies, two Secretariats, and (finally) multiple Study Groups.[4]

Supporting and participating in these three global organizations were scores of national standards bodies. With the notable exception of the American National Standards Institute (ANSI)[5], virtually all of these national organizations host most, or all, of the standard setting activities that are conducted within their respective national borders.[6]

On the cusp of change: In 1985, then, God was in his heaven, and all was largely right in the standard setting world, securely headquartered in Geneva, that most comfortingly neutral of all locations. The hallmarks of this highly evolved system were order, coordination, control, and predictability. All of which was hardly surprising, given the concurrent efforts to create the League of Nations, and then the United Nations, the needs for which this infrastructure had been developed, and the concessions to be expected in order to create consensus.

But there were also costs to this centralized system, suggested by the multiple layers of hierarchy and the default mode of participation at the national level. These costs included the dilutive demands of consensus, and the length of the development and adoption process. In 1988, for example, the average process in the IEC took eight years to complete. In the case of screw threads (the subject matter of ISO TC 1, the first of the sequentially numbered ISO Technical Committees), such a gestation period was considered to be tolerable.

In the beginning, those seeking to set information technology standards took the existing process for granted and in stride. Technical Committee 97 ("Computers and Information Processing") was formed by ISO in 1960. At about the same time, the European Computer Manufacturers Association (ECMA) was also launched. Partially in response, the Accredited Standards Committee for Information Processing Systems (X3) was formed by ANSI to address similar technical matters in the United States.[7]

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[3] As of this writing, the IEC has 52 full and 13 Associate Members. The current organizational structure of the IEC may be viewed at: <www.iec.ch/about/struct-e.htm>

[4] The ITU today has 189 member states. Like ISO and the IEC, its structure is now somewhat different, and may be viewed at: http://www.itu.int/aboutitu/structure/

[5] ANSI follows a "federated" model of approving "American National Standards" created by individual United States standards development organizations with processes approved by ANSI. Despite being a non-profit entity independent of the United States government, ANSI is acknowledged as the national representative of the US in ISO and the IEC.

[6] Over time, an increasing number of regional bodies came into being, particularly in Europe, following the decision to move to private sector standardization as the single European market year of 1992 approached. See: http://www.consortiuminfo.org/links/cats.php?ID=29

[7] ANSI itself does not set standards. In consequence, X3 was managed by the Computer and Business Equipment Manufacturers Association (CBEMA), which later became the Information Technology Information Council (ITI). X3 itself became an organization in its own right: first called NCITS, and later INCITS, its current name. For a history if INCITS and the work begun in X3, see: Andrew Updegrove,

In 1987, ISO and the IEC recognized the need to avoid duplication and competition in the computer area. The result was the formation of Joint Technical Committee 1 (JTC 1), into which the activities of ISO TC 97 and two IEC subcommittees were merged. Given the superior amount of innovation in the computer field that was taking place in the United States at the time, ANSI was offered, and accepted, the role of Secretariat for JTC 1. ECMA in turn was offered a liaison relationship, and each of the significant organizational constituencies was, to one extent or another, thus accommodated. Most of the participants in the activities of JTC 1 were standards professionals, well versed in the ways of traditional standards development.

Superficially, then, the infrastructure needed to meet the standardization needs of IT vendors and customers had been provided for, just as those of other emerging industries had been met within the existing system. But then, things began to change.

The rise of a new world order: 1987 was the last year during which the old order held uncontested sway in the field of IT standard setting. By the end of the decade, a dramatic shift in the center of effort had begun with the launch of a trickle, and then an increasing flood, of new organizations that were neither governmental in membership, accredited in process, nor anticipating eventual endorsement by any of the Big Is of their output.

Speed in delivery has often been cited as a reason for this faulting in the world of standard setting, but that was hardly the only, or, especially in the beginning, necessarily even a major factor. One need only look to the initial organizations formed to discern a more compelling reason to find a different motivation.

For example, many of the early consortia focused on a single area: operating systems. And a disproportionate number of these organizations were formed and/or joined by a core group of U.S. hardware vendors, such as IBM, HP, Motorola, NCR, Sun, and Unisys.

Instead of speed, what concerned these companies most was the rising dominance of Microsoft[8], and, to a lesser extent, factors such as the increasing unanimity of European competitors, acting both regionally and through ISO. Other fears were in the air, including the success of "Japan Inc." in seizing market share from American semiconductor vendors. U.S. companies complained that they were unfairly hampered by domestic antitrust laws in comparison to their Asian competitors.

Congress responded with passage of the National Cooperative Research Act of 1984.[9] With the election of Ronald Reagan in the same year, a more business-friendly antitrust attitude settled in to Washington. In 1987, SEMATECH was created by 14 U.S. companies – and the U.S. government -- to collaboratively develop the wherewithal to turn the tide of trade in the semiconductor industry.

The stage was set, therefore, for American companies to think outside the traditional competitive box to envision other types of solutions (e.g., research and development), undertaken by a self-selected group of companies, to meet commercially identified challenges.

The result was the creation of an early crop of consortia striving to bolster UNIX in general, and the platform of one or more companies in particular. Examples included 88open (creating hardware and

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"INCITS: Then and Now" The ConsortiumInfo.org Consortium Standards Bulletin, Vol. II, No. 5. April 2003. <http://www.consortiuminfo.org/bulletins/apr03.php#trends>

[8] The author, who began helping create consortia in 1988, was in the habit of privately referring to each new organization as the "Not Microsoft Consortium." Under the bylaws of each of these organizations, Microsoft would have been eligible to become a member but (not surprisingly) never applied.

[9] The NCRA was amended in 1993 to protect development activities (resulting its name being changed to the National Cooperative Research and Production Act of 1993, or the NCRPA. Most recently, it was amended once again in 2004, to explicitly extend protection to standard setting – but only by standard setting organizations themselves, and not their members. See, Andrew Updegrove, "What Does 1086 Mean to Consortia?" The ConsortiumInfo.org Consortium Standards Bulletin, Vol. III, No. 6, June 2004. < http://www.consortiuminfo.org/bulletins/jun04.php#update>

software standards supporting and promoting the UNIX-based Motorola 88000 RISC microprocessor)[10], and SPARC International (supporting a competing Sun Microsystems RISC microprocessor). Each was an effort to break the tightening "WinTel" stranglehold that Microsoft and Intel were enjoying in the marketplace. Platform vendors viewed the wealth created by Microsoft's proprietary ownership of the core desktop operating system with envy. And as Microsoft planned to enter the server market, there was fear as well.

One strategy to meet this challenge through standards involved the concept of creating "open systems" that would be able to interoperate, regardless of the operating system upon each was based. The effort to create a set of Open Systems Interconnect (OSI) standards, however, resulted in a system that was too constraining, and was a business failure in consequence.

This meant that the focus needed to be on the operating system – and happily, there was an (more or less) appropriate alternative available upon which all could focus to stave off the WinTel juggernaut as it prepared to move above the desktop: the UNIX operating system developed and owned by AT&T.

Of course, at the same time that hardware and silicon vendors were concerned about the advance of WinTel, they were also continuing to compete fiercely among themselves. When AT&T and Sun entered into a cooperation agreement in 1987, other UNIX-dependent vendors banded together to form the Open Software Foundation, with the goal of creating a new, UNIX-based operating system of their own. Sun and AT&T responded with the formation of their own organization, called UNIX International, and the so-called "UNIX Wars" were on.[11]

None of this activity, of course, had anything to do with traditional standard setting in the sense of collaboratively seeking consensus-based solutions to common problems. Instead, a speedy solution between a limited group of like-minded companies, supported by a common marketing front, was the strategic goal – hardly the stuff of a traditional, accredited standard setting process.

While it would be too simplistic to attribute the rise of consortia solely to UNIX Wars strategies and an industry floundering in its efforts to avoid being steamrolled by Microsoft and Intel, the consortia formed for precisely such reasons were a significant factor in breaking with tradition, and creating a comfort factor and familiarity with this novel way of collaborating. Other organizations of significance, such as the Object Management Group, or OMG[12] (formed to facilitate the proliferation of object oriented programming through the development of appropriate standards), soon followed, each founded to pursue standards-related goals outside of the traditional, accredited standards development organization (SDO) infrastructure. Often, these new efforts were launched as independent, non-profit, tax-exempt organizations created to not only develop, but maintain standards throughout their effective life.

As would occur fifteen years later with the advent of open source (for different reasons), those interested in pursuing specific collaborative goals in the late 1980s found the existing system to be inappropriate, inadequate or unwilling to meet their purposes. Their solution was to simply opt out of the existing system and create one of their own.

Adaptation: The consortium genie was well out of the bottle by 1990, with consortia multiplying at the expense of JTC 1 and other SDOs active on IT matters. Rather than launch a new activity within an existing SDO, technology companies increasingly started a new organization to do the specific job at hand, with whatever degree of process, budget and help they desired. At one end of the spectrum, such an effort might involve a small, self-selected cadre of vendors engaged in a joint development project that they hoped would give birth to a de facto standard. Under this model, additional participants, if any, would be admitted only by unanimous agreement. At the opposite (and more common) end of the spectrum, as with OMG, the broadest international participation was the goal, and a formal process was created to achieve respected results.

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[10] 88Open was the first consortium that the author helped form.

[11] For a succinct history of UNIX, and the role of three consortia (X/Open, the Open Software Foundation, and their conjoined successor, The Open Group), see:
http://www.unix.org/what_is_unix/history_timeline.html

[12] OMG was the second major consortium the author helped to create (the total now numbers over sixty).

As the IT industry became more important and traditional SDOs lost market share to consortia, SDOs adapted in various ways to make their process appear more competitive. These adaptations included the creation of the "publicly available specifications" (PAS) process by the IEC, under which a specification created by a consortium could achieve a degree of recognition by the traditional standards infrastructure (and by means of which the IEC, in turn, could become associated with more cutting-edge IT standards). However, the response to the PAS alternative was tepid.

The advent of the Internet and the Web dealt a further blow to the traditional SDO process, as speed truly became an issue. Even consortia were deemed to be too slow to be useful for a time, and de facto standards that could be seized upon with no process at all became (briefly) more attractive than those that were more open.

But even before the advent of the Internet bubble years, an "Animal Farm" like process had set in, with many consortia becoming progressively more like their SDO brethren in process, scope, self-image (and, at times, process speed as well). Today, governmental agencies and universities as well as commercial entities are significant participants in many consortia, and the standards that the more significant consortia create are often referenced, and even solicited for adoption, by many SDOs. Consortia, in turn, are more often being urged by their members to seek formal acceptance of their standards by global standards organizations in order to facilitate the sale of products in those parts of the world (such as China) where a "Big I" imprimatur continues to carry a higher value even in the IT space.

At the same time, many traditional SDOs in the United States, such as the International Electrical and Electronics Engineers Computer Society (IEEE) and ASTM International (formerly the American Society for Testing and Materials), each of which is accredited by ANSI, have come to accept foreign as well as domestic members.

In consequence, the result of the first wave of change in the IT area has been not so much a permanent schism, but a blurring of edges and a gradual convergence of the two parallel systems. This blurring has resulted from new consortia as well as venerable SDOs learning from each other, competing with each other, and dynamically evolving to better address the needs and expectations of their respective stakeholders.

New challenges: Of course, while SDOs and consortia were each adapting to the initial dynamics that led to the creation of consortia in the first place, new (and equally profound) changes in the marketplace were emerging. Today, the collective weight of these new stresses on the SDO/consortium standards infrastructure are once again (in this author's view) reaching the type of tectonic tension comparable to that which existed in the 1980s. Already, the advent of open source has opened a third road to the creation of "commonalities"[13], and further revolutionary, as well as evolutionary changes may be in prospect.

These new challenges include the following:

ICT convergence: While the quest for interoperability in IT has always been challenging, the advent of the Internet, the Web and mobile devices have multiplied the challenges enormously. Not only must hardware and software interoperate within a local area network, but they are now being called upon to do so over a global telecommunications backbone. Similarly, a single wireless device is now expected to host virtually any type of activity that heretofore would have been undertaken solely on a camera, desktop computer, play station, DVD player, or a telephone.

Historically, most IT challenges could be addressed in a fairly narrow technical and economic context. Convergence of this magnitude, however, gives rise to a host of new issues, of which the following are only a sampling:

[13]A commonality, as coined and defined by this author, is "whatever tool we need; that we need to agree on; to do the job that needs to be done." Speaking of commonalities instead of standards allows emphasis to be placed on problem solving rather than methodology, and reminds us that standards are tools, and not ends in themselves. For more, see: Andrew Updegrove, "A Look into the Future: Not Standards, but 'Commonalities,'" The ConsortiumInfo.org Consortium Standards Bulletin, Vol. III, No. 2. February 2004. < http://www.consortiuminfo.org/bulletins/feb04.php#editorial>

- The standards required to permit such a range of activity involve multiple industries, each with its own standard setting, intellectual property and economic customs. Often, each industry assumes, or demands, that others conform to its expectations. Obviously, only one camp can win at this game, resulting in a difficult route to resolution.

- Power structures are also at risk: not only are hardware and software vendors meeting telecommunications players at the standards table and having to deal with their concerns, but telecommunications carriers are confronting the fact that Voice over IP (VoIP) services – based on IT technology rather than classic CT technology -- have now become commercially viable, creating new stresses on an industry that already is struggling with fierce competition and razor-thin profit margins.

- With thousands of patents potentially being infringed by a single mobile device, the tolerance for payment of royalties becomes increasingly slim. In industries where gaining revenue from insertion of proprietary technology into a standard has historically been a strong motivation for parties, this reality is unwelcome. Similarly, in industries where patent pools have not historically been used, addressing the problem through this (otherwise useful) mechanism is unfamiliar. Finally, differences in the patentability of software between the United States and other countries creates further strains.

- Standards may become more difficult to create when what they enable must work on more types of devices (e.g., how do you fit a browser on a mobile phone? How do you display content that will be usable on both a 2-inch display and a 20-inch monitor?)

- Due to recent court cases, intellectual property rights (IPR) policies have become both contentious in development and tedious in implementation. Harmonizing rules between two organizations sharing a liaison relationship is difficult enough. Coordinating a joint development process with discordant policies is much more so.

- Most IT standards are set by consortia, while most telecom standards are set by SDOs. The intellectual property policies of each type of organization, while they have similarities, are less alike across this divide than between two organizations of the same type.

One virtue of the traditional standard setting system was that its centralized, multi-layered structure made issues such as the above more likely to be identified in advance, and provided mechanisms whereby multiple efforts could be coordinated and conflicts resolved. The consortium system, instead, relies on a sort of neural network of liaison relationships of varying degrees of efficiency. Each of these liaison relationships, many of which are ad hoc or dependent upon a single volunteer member representative for maintenance, represent a potential point of weakness as well as an opportunity for communication.

Open Source: The rise of open source as a development model has challenged consortia in something of the same way that consortia challenged SDOs. Instead of SDO members striking off on their own, however, this time it is the employees of the members themselves that became the pioneers. Unresolved issues in this area include the following:

- As open source methodology becomes more commercially important, vendors are investing ever-greater resources and strategic reliance on the future of open source. With this increasing investment will come (presumably) a greater desire for control that will run counter to the individualistic, democratic roots of open source, perhaps sapping its creative energy.

- Open source as a methodology is still in its infancy from a process perspective. Significant challenges remain to be worked out, such as how inadvertent infringement of IPR will be avoided, how open source and open standards organizations can and will work together, whether the "benevolent dictator" model personified by Linus Torvalds will perpetuate (and if so, how issues such as dependency, succession and trust will be resolved on a particular, as well as a systemic, basis).

Public policy: The potential of the Web has attracted political attention at the global level. How will technical process values and the perceived interests of society be balanced?[14]

Regulatory power: In recent years, governments have focused more on the improper use of standards to erect barriers to trade more than the lack of effective world standards. But the ability of standards-based efforts to control email abuses such as spam and phishing may be ineffective unless those solutions can be deployed universally. Ultimately, the power of an organization such as the ITU, rather than the apolitical powers of a consortium, may be needed to achieve an effective solution.

New areas for standardization: New technical areas such as nanotechnology and bioinformatics are beginning to require standards. Will existing methodologies be adequate, and if so, which ones? How will cultural and other issues be addressed with the convergence of such disparate disciplines as IT and genomics?

Conclusions: In many ways, the way to ease the tension between current market forces and the extant standard setting infrastructure may be to hearken more to the lessons of the past. Many of the challenges described above derive from the need to achieve consensus among broader constituencies. Like a teenager that rebels against authority and then returns to many of the values that seemed most constraining when she becomes a parent herself, it may be that the pendulum in IT standard setting will swing back towards a greater degree of global coordination.

To date, however, consortia have shown little desire to form a common organization, or to formalize any other sort of analogue to the SDO hierarchy. The result has been a greater degree of duplication (sometimes productive and sometimes not), less interoperability in output, and greater opportunities for individual companies (or groups of companies) to have disproportionate influence on technical outcomes.

All of which is not surprising, since consortium staffs are both small and preoccupied with the challenges of accomplishing their internal tasks. More significantly, the largest technology companies seem to be largely untroubled by this situation. Without pressure from those that pay the bills, it is unlikely that consortium managers will take the initiative to form any new congress of consortia.

And, in truth there is a great deal of flexibility in the consortium model, and this flexibility has allowed solutions addressing the weaknesses in the current infrastructure to be created in particular cases, if not systemically. Examples include the evolution of consortium-like platforms (such as the Open Source Development Labs (OSDL) and the Eclipse Foundation) to support further progress with open source, as well as the creation of "MetaStandard Consortia" (see this month's Trends article) to address complex technical/business challenges through the creation of profiles and roadmaps of standards created by other consortia.

Whether such evolutionary innovations will be adequate to meet the need remains to be seen. But there is a greater likelihood that this may happen for several reasons. First, the non-SDO system is less rigid, and therefore more able to address new challenges without the need to create an entirely new system outside the existing infrastructure. Second, the non-SDO system is more results-oriented, and is perfectly happy to create not only standards, but reference implementations, test suites, open source software, registries, and whatever other commonalities are needed to accomplish a given goal. In truth, a new consortium concept is far more likely to come from the less constrained imaginations of the marketing and sales side of the corporate house than an engineering lab.

Third, with a consortium, victory is not assumed (especially when more than one consortium has been formed to address the same challenge), as it was by SDO members twenty years ago, when everyone knew exactly which technical committee of which Big I would be assigned to create a given standard. Consequently, consortium efforts tend (at least at times) to be more attuned to customer needs.

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[14] The multi-year World Summit on the Information Society (WSIS), conducted by the ITU under the auspices of the United Nations, is addressing this topic. See: Andrew Updegrove, "Who Should Govern the Internet?" The ConsortiumInfo.org Consortium Standards Bulletin, Vol. III, No. 7. July 2004. <http://www.consortiuminfo.org/bulletins/july04.php#feature>

Still, one cannot help but look back with some nostalgia to a time when the IT industry was a fully committed member of an acknowledged, global system, created for the express purpose of developing non-competing, rationally related, universally adopted standards. Perhaps a way can be found to create structures that would allow the IT industry to enjoy more of the benefits of such a system in the future, without once again becoming constrained by the lack of flexibility that led to the fragmenting of the IT standard setting world some twenty years ago.

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