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Market Driven Standardization: Everyone Can Win

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Introduction

Technical standards are basic to the exploitation of all technology. For almost 100 years, national and international standards development organizations (SDOs) have developed voluntary, consensus-based standards and reduced the need for government dominated standardization and state regulation. Voluntary, consensus technical standardization has provided flexible economical standardization at less cost and with greater flexibility than government control throughout the 20th century. Now at the beginning of the 21st century, a new standardization trend has emerged: market-driven standardization.[1]

Consortia [2] are often seen as the standardization organizations that best practice market-driven standardization. Two simple reasons are often given to explain the success of consortia-driven standardization:

- Consortia have the ability to keep pace with rapid market change.
- SDOs need extra time to achieve the consensus necessary for the acceptance of SDO developed standards.

These simple reasons mask more than they explain. Consortia usually do complete standardization projects fasters than SDOs, but not for the reason noted. The reasons for the increasing success of consortia standardization are both more complex and more compelling. At least one consortium, the IETF[3], has even achieved and surpassed the status of the SDOs in the opinion of many Internet users[4].

Consortia may form to address any standardization project. This paper focuses on the consortia that have emerged in response to the need to standardize communications, local interfaces, or the interrelation of software systems. These standards function to define a level of compatibility, and therefore can be considered compatibility standards. Compatibility standards represent a new strata of standards distinct from similarity standards.[5] Because compatibility standards are more strongly affected by self-reinforcing effects[6] than similarity standards, rapid deployment is often deemed vital for their commercial success. Since compatibility standards are associated with the need for quick standardization, it is common that consortia are formed to develop and promote compatibility standards.

The Rise of Consortia

Technical standards development consortia are part of the expansion of Non Governmental Organizations (NGOs) that utilize some leverage, in this case commercial, to by-pass the authority of international organizations and nations[7]. Consortia-driven standardization is a growing challenge to the heretofore insular community of SDOs that pioneered voluntary, consensus-based standardization[8]. Like any successful, well-established organization, SDOs do not find new competition a welcome visitor. However, the SDOs recognized the new competition quickly and are making changes in their standardization process. The SDOs are right to be concerned. The consortia are emerging and achieving significant success in providing standardization services to the same markets and technologies that the SDOs address. Consortia are usually distinguished from SDOs by their lack of accreditation from an independent government related body. However another distinction is also true: SDOs represent one or more nations, consortia do not.

Today, individual commercial companies are the drivers, and winners or losers, in the development of compatibility standards. When two or more commercial companies support different technologies for a specific standard under development in a nation, a national SDO may not be able to reach consensus. Thus the national SDO might not bring a unified position to the international SDOs. Consortia on the other hand can gather like-minded companies together to present a unified position wherever they wish. An example of just such a case is the lack of a single US position on third generation cellular communications technology. Yet European companies with a tradition of respect for standardization have developed a common European position supporting GSM cellular communications. In markets with enhanced levels of self-reinforcing effects[9], the European tradition of respect for standardization appears more effective than the US desire for market determination. In markets with less enhanced levels of self-reinforcing effects, the US process appears more successful (e.g., personal computer operating systems). The trend in compatibility standards seems to be towards more markets with enhanced levels of self-reinforcing effects. The migration of regional ADSL (Asymmetric Digital Subscriber Line) standards toward a single technology worldwide, as defined in ITU G.992, is an example of this trend.

Consortia support the promotion of a specific commercial agenda through the consortium members' agreement on common goals as a requirement for consortium membership. The more clearly this agenda is defined, the more likely the consortium is to achieve it. The clarity and acceptability of its mission statement are a key indicator of the future success of a new consortium. If the goal is clearly stated and acceptable to the significant companies in the desired market or technology (e.g., Microsoft, Intel, Compaq, etc.), then successful completion of the goal is quite likely. However, the acceptability of the consortium's goals is often a coerced decision. When industry leaders form a consortium, they may identify a set of goals that are not always in the best interests of other companies in the industry, however the remainder of the industry has little choice but to accept the goals presented by the leaders. Resistance from smaller companies would be unproductive, expensive and possibly damaging to business relationships with the industry leaders. Such coercion represents the most socially undesirable aspect of the rise in consortia standardization. It is true that larger and more powerful organizations have always attempted to coerce the smaller organizations in every standardization committee. But many consortia require acceptance of the consortium's agenda for admittance. This is a more powerful means of coercion, as admittance and the information consequently received may be necessary for product planning or development.

Technical standardization consortia emerged in the 1980s[10]. Initially they functioned to standardize technologies that were not the natural providence of the existing SDOs. Soon, consortia standardization work began to overlap work in SDOs. In the early stages this led to conflicts. However, standards are only useful to the extent they are utilized. This single fact often changes standardization combatants to bedfellows. Prior to the widespread use of the Internet, standardization antagonists in different committees could posture and publish overlapping standards for extended periods of time before the market recognized the foolishness that was occurring. Now every standards-making organization seems to have a web site

which describes their standardization work. By examining such web sites, standardization conflicts are seen quickly. When the commercial organizations which are funding this standardization work see such conflicts, and the possible market confusion that may occur, changes are made quickly. For this reason, competing SDOs and consortia have been learning to work together.

The IETF along with World Wide Web Consortium (W3C) are responsible for the standardization of the Internet. The enormous success of the Internet has forced the existing SDOs to recognize the standardization efforts of the IETF. In turn, the recognition of the IETF, considered a consortia by SDOs, is opening the way for the recognition of other consortium by the SDOs. The process of consortia recognition by an accredited SDO effectively creates a new class of standardization organization: a Recognized SDO (RSDO). This distinguishes the IETF as an international RSDO, while the ITU, ISO and IEC are international SDOs.

Designating or describing the operation of fast changing consortia or SDOs is similar to describing the operation of Internet companies. New forms emerge quickly. The table below and the following discussion identifies the significant differences between consortia and SDOs as seen at the beginning of 2000.

Issue	Consortia	Formal SDOs
Funding Source	Often project or product line	Often overhead
Standards Development	Varies widely	Trained and well defined
Intellectual Property	Negotiation often required	Identified, but not negotiated
National Focus	Multi-national	Often regional or national
Brand Identification	Not well know	Well known
Standards Promotion	Promotion is often funded	Promotion is usually not funded
Compatibility Testing	May be offered	Usually not offered
Collusion	Legal risks not well tested	Legal risks well tested

Funding Source

The funding source is perhaps the most significant difference between consortia and SDOs. Direct commercial income sources (e.g., standards document sales or trade shows) are usually well less than 50% of revenues for SDOs[11] and consortia. Consortia receive almost all their funding from dues-paying, commercial organizations while SDOs vary in the amount of funding received from commercial organizations and may receive significant government support.

Most SDOs also receive funding from commercial companies. However, SDOs tend to be funded from the overhead of commercial organizations while consortia are usually funded from commercial project or product line sources. This is a powerful distinction: when the funding is provided based on the value of the standard to a specific project or product, the work is both short-sighted and focused (e.g., Frame Relay Forum, Asynchronous Transfer Mode Forum, ADSL Forum, Universal ADSL Working Group). When the

funding is from commercial overhead or from non-project government sources, the standardization work may be farsighted but the end results may not be as originally anticipated (e.g., ISDN, OSI, TMN[12]).

The funding source is a significant driving force on any project. Funding from project sources demands very rapid completion of the standardization work. Funding from overhead sources in most cases does not make an equivalent demand. Overhead funding from large organizations does not adapt quickly to changing market demands or the advent of new technologies. This is a serious disadvantage when markets and technologies move at "Internet speed." Of course, there are counter examples: the very focused SDO, ITU Question 4 Study Group 15, achieved rapid completion of standards for Digital Subscriber Line systems; the now ten year old consortium, Object Management Group is still working on CORBA[13]. But such counter examples seem to prove the point: the funding source of the committee and its participants has the most significant effect on the rapidity of standards development.

Standards Development

Standards development as practiced by consortia varies widely. Technical standards development is a contribution-driven process in almost all consortia and SDOs. The standard is developed by evaluating the merit of alternative technical approaches embodied in the contributions. Committee members experienced in this process and knowledgeable in the technology under discussion often lead these efforts. Some consortia in their early stages may have few participants practiced in technical standards development and few formal procedures. As the consortium continues, both practice and more formal procedures develop. SDOs and RSDOs often have the advantage of providing both practiced participants and developed procedures from the beginning of a standardization project.

Some consortia create a well-developed, consensus-based standardization process not dissimilar from an SDO's. Some consortia (e.g., Advanced Television Enhancement Forum [ATVEF], the Plug and Play Consortium, and the Desktop Management Task Force [DMTF]) develop and publish their standards. Consortia that develop and publish their own standards are usually focused on markets with less significant self-reinforcing effects (e.g., local interfaces) and therefore a reduced need for broad consensus. Other consortia (e.g., ADSL Forum, Frame Relay Forum, ATM Forum, European Computer Manufacturers Association), which are often focused on markets with enhanced levels of self-reinforcing effects (e.g., remote interfaces), become RSDOs. Consortia that are recognized by SDOs have often been successful in achieving their goals. Thus it is likely that more RSDOs will develop. Even so, it appears likely that every possible variation of consortium standards development will be attempted. This is a fundamental strength of the species, even if specific consortia or their specific standards development approaches are unsuccessful.

Intellectual Property

Intellectual property rights (IPR, usually patents or potential patents) associated with compatibility standards is a problematic area for SDOs. IPR is becoming more pervasive and the traditional patent approval processes, created to address technology associated with similarity standards, is less able to identify overlapping claims or pre-existing art. Patents required to implement communications systems (where compatibility is required) represent a special problem[14].

Consortia often require that each participant organization accept an IPR agreement as a condition of participation in the consortium. This is a significant advantage over the SDOs' process where identification of IPR is required, but IPR negotiation is not permitted within the SDO. When the IPR negotiation is required to take place outside the SDO, the standardization work in the SDO can be delayed until negotiations are complete. This has produced significant delays in the standardization process or implementation of a number of completed standards (e.g., V.42, V.34, V.90, G.723.1, IMT-2000[15]).

Conversely, the Universal ADSL Working Group, a consortium, established pooling of IPR related to ADSL in advance so that the ITU Rapporteur Group (Question 4 Study Group 15, part of an SDO) could develop the ADSL standards with no delay for IPR negotiations. Unless SDOs develop ways to negotiate intellectual property issues in a timely fashion, the consortia's mechanisms for intellectual property resolution will continue to be employed.

National Focus

Global communications markets require global standards, yet most of the SDOs are regional and all are based on the geographic outline of one or more nations[16]. Currently only three SDOs are considered, by the SDO community, international in scope: International Telecommunications Union (ITU), an organization whose voting members are governments; The International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO) membership consists of nationally recognized SDOs. The ISO and the IEC join together in the Joint Technical Committee One (JTC1) to mutually address specific standardization projects (often associated with compatibility standards).

In many respects, the use of national or regional SDOs to generate standards for world-wide markets is an anachronism. SDOs such as ETSI (European Telecommunications Standards Institute), ATIS Committee T1 (Alliance for Telecommunications Industry Solutions, USA), TIA (Telecommunications Industry Association, USA), and TTC (Telecommunications Technology Committee, Japan) often operate as regional SDOs for compatibility standards. The regional or national standards that they develop are then brought to the ITU or ISO/IEC JTC1 for international standardization. This is the current lengthy and expensive two-stage standardization process. This process is already evolving as the regional SDOs become caucuses for the international SDOs. As example, the rapid completion of DSL standards in ITU Study Group 15 was in large measure due to the extensive standardization work that had taken place previously in ATIS Committee T1E1.4.

But regional caucuses can also be a disadvantage. Regional positions have had the effect of splitting an international standard into multiple variations. This occurred with the ISDN Basic Rate Interface which has a version for North America (using 2B1Q coding), a version for Europe (using 4B3T coding) and a version for Japan (using time compression multiplexing). Ostensibly these differences result from differing regulatory and operational environments in each region. However, the net effect of the differing regional requirements is to reduce commonality world-wide. The limited deployment of ISDN Basic Rate Interfaces world-wide lends weight to this concern.

Two-stage standardization is avoided by two relatively new world-wide standardization organizations. The success of the IEEE-SA (Ethernet standards) and the IETF (Internet standards) are examples of the trend towards a single, world-wide standardization process. The IEEE-Standards Association (IEEE-SA)[17] and the IETF provide similar standardization services as the ITU, ISO and IEC, but have a different stature in the SDO community than the ITU, ISO and IEC. These three international organizations trace their accreditation to multiple nations and the IEEE-SA and IETF do not have such "roots."

SDOs are certainly capable of adapting to changing needs. The ITU has made very significant changes in the last few years, moving from a completely government controlled organization to a more commercially responsive organization. The ITU can now directly reference IETF, Committee T1 and TIA documents and is taking steps to include commercial companies as members with voting rights on technical standards issues. ISO has developed procedures to accept "publicly available specifications (PAS)", which may be consortia-produced, as ISO standards. The IEEE-SA has also developed a system to support consortia standardization. The TIA and the EIA (Electronic Industries Alliance), both American SDOs, have been quite active in merging consortia into their organizations.

The use of consortia, as well as the IEEE-SA and the IETF does function to bypass the existing slow and expensive two-stage SDO standardization process. This alone is a powerful reason for communications companies to support consortia and RSDOs.

Brand Identification

Market-driven standardization will require the SDOs to increase their marketing skills. ITU/CCITT, IEC, ISO, and ANSI have become well known standards "brands." This is not the case for the more transient consortia. Telling users that a product conforms to ISO or ITU standards has more impact than saying that a product conforms to an ADSL Forum document. SDO brands should be treated as a strategic asset of each SDO. Unfortunately, many SDOs seem to operate otherwise. Examples include: the change from CCITT to ITU and the confusing use of ITU-T; the usage of TIA/EIA, EIA/TIA and ANSI/EIA/TIA to designate similar standards. The RSDOs also have brand identification problems. The IETF calls its standards "Request For Comment" (RFCs) and does not differentiate between information and implementation RFCs by title. These, and many other faulty brand management practices seem to offer evidence that SDOs and RSDOs have focused on internal standardization issues rather than the perceptions of their customers - a significant error in the emerging, market-driven standards world. Usually consortia market their standardization products better than SDOs and RSDOs even though the RSDOs and SDOs have better known brands.

Standards Promotion

The focused funding that drives a consortium makes for a good source of promotional funds. When the standard is nearing completion, the consortium participants have funds to promote their standard-based products, and it may be quite economical for consortium participants to pool a small portion of their funds to promote the standard their products utilize. Gaining such funding from an SDO requires a new funding request to the organizations that fund the SDO. Such a process is likely to be to slow and cumbersome. For this reason, formal standards from an SDO rarely are promoted by the SDO. Promotion of SDO standards only occurs by virtue of the products that are sold that identify the SDO standards brand (e.g., ITU standard modem designations such as V.90 or V.34). Standards promotion is a definite advantage of consortia.

Compatibility Testing

Testing of complex communications systems is necessary to ensure compatibility. Communications standards have become very complex to support multimedia multi-point communications; testing to ensure interoperability is necessary. More recently, such testing is often accomplished with inter-vendor or multi-vendor cooperation ("bakeoffs" and "interops").

Now that multi-vendor testing is becoming more prevalent, the question is being asked, "How does the end-user customer of equipment or systems conforming to a standard or set of standards know that it has been tested?" The concept of a "Good Housekeeping Seal" emerges quickly . But a seal indicating that tests have been passed needs to be widely recognized. More transient consortia may not provide the best venue for such a compatibility seal. This represents an opportunity for SDOs and RSDOs, nationally, regionally and internationally. ETSI is an example of one regional SDO that is implementing compatibility testing.

Collusion

Collusion among participants of a standards committee to illegally restrain trade is a possibility. The formal procedures of SDOs are designed to prevent such abuse. The possibility of legal action based on restraint-of-trade is dependent on the aggressiveness of the government in identifying and prosecuting such action.

As was noted, coercion, potentially a trade restraint, is a more serious problem in consortia, but this issue has not yet been raised in a court, to the author's knowledge. SDOs with formal rules based on court-tested decisions offer a safer haven for multi-company standards discussions. But consortia also appear to offer little risk of government legal action for the same multi-company standardization discussions, as long as the government is not active in pursuit of restraint-of-trade violations.

Conclusions

Consortia are capable of developing world-wide standards quite quickly. But, in fact, so are international SDOs if intellectual property rights are not an impediment and the SDO has the same focused funding as the consortium.

Consortia generally appear to have four advantages over most SDOs:

- Focused funding
- One stop international standardization
- Negotiated IP
- Better marketing.

SDOs also offer four advantages:

- Responsible to one or more nations
- Existing people and procedures
- Develop very wide consensus
- Better known brands

Clearly, consortia are here to stay. They address significant standardization issues that the SDOs have not. Along with consortia, the rise of the IETF and the IEEE-SA's expanding standardization efforts fundamentally represent new challenges to SDOs and the related nations. However, there are important advantages to SDOs and they are not as staid as commonly thought.

The use of consortia and RSDOs instead of international SDOs represents the removal of any government direction of standards development. This continues the trend to reduced government involvement in standards development of the past 100 years. However, governments still must address issues of pornography, the privacy of personal information, wire-tapping and many similar issues that affect world-wide communications systems. For such reasons, governments will remain supportive of national and international SDOs in the future. And commercial organizations often recognize standards with enhanced self-reinforcing effects seem to benefit from the wider consensus international SDOs offer.

Consortia, RSDOs and SDOs each have advantages to offer and standardization committee alliances of all combinations will occur. National and regional SDOs will continue to evolve away from creating national or regional communications standards to developing reports and advisories to international SDOs and RSDOs. In the 21st century, market-driven standardization will become a fact world-wide. When market-driven standardization is practiced using voluntary consensus while recognizing the market's needs, everyone can win.

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Footnotes

[1] The European Committee for Standardization Information Society Standardization System (CEN/ISSS) has published a survey detailing the trend to consortia standardization at http://www.cenorm.be/isss/. Return to text

[2] Henk de Vries, Doctoral Thesis: "Standards for the Nation," published as *Standardization - A Business Approach to the Role of National Standardization Organizations,* Kluwer Academic Publishers, 1999. Section 2.2.3 defines consortia as a "form of co-operation between competitors to agree on standards." Return to text

[3] Internet Engineering Task Force is the standards development body of the Internet Society. The IETF is considered a consortium as it does not have a government related accredition or a fixed relationship to a nation-state. However, considering the IETF a consortium brings to mind the early European settlers in North America considering the indigenous people savages and then requiring the savages' technical assistance to survive the winter. Return to text

[4] Dave Crocker, Making Standards the IETF Way, ACM StandardView Vol. 1, No. 1, 1993. http://www.isoc.org/internet/standards/papers/crocker-on-standards.shtml. Return to text

[5] K. Krechmer Technical Standards: Foundations for the Future, ACM StandardView, Vol. 4, No. 1, 1996. Return to text

[6] Self-reinforcing effects are the combination of effects that cause product demand to increase with increasing market penetration possibly leading to a lock-in (where competition effectively ceases, e.g., Microsoft Windows Operating System). W. Brian Arthur, Self-Reinforcing Mechanisms in Economics, The Economy as an Evolving Complex System, SFI Studies in the Sciences of Complexity, Addison-Wesley Publishing CO., 1988. Return to text

[7] "After Seattle, A Global Disaster," *The Economist,* December 11, 1999. Return to text

[8] C. Cargill, *Open System Standardization,* Prentice Hall, 1997, pages 19-23. Return to text

[9] Self-reinforcing effects are enhanced by remote communications (where compatibility standards are necessary) and enhanced even more in markets that desire greater mobility (e.g., wireless communications). Return to text

[10]Andrew Updegrove, Consortia and the Role of the Government in Standards Setting, *Standards Policy for the Information Infrastructure,* MIT Press, 1995, provides a good view of the structure and operation of consortia. Return to text

[11]Henk de Vries, *ibid*. Annex 1 provides details of world-wide SDO funding sources. Return to text

[12] Integrated Services Digital Network, Open System Interconnection, Telecommunications Managed Networks. The work in the ITU and ISO on ISDN, OSI and TMN was quite far sighted and developed the concepts that became Frame Relay, Signaling Systems 7, the OSI model, TINA (Telecommunications Information Networking Architecture) and much else that followed, but the original goals of these long range standards projects were not achieved. Return to text

[13]The Object Management Group was founded in 1989. CORBA specifies a system which provides interoperability between objects (software) in a heterogeneous distributed environment and in a way transparent to the programmer. Return to text

[14] K. Krechmer, Communications Standards and Patent Rights: Conflict or Coordination?, *TIA STAR*, 1997. Return to text

[15] V.42 modem based error control, V.34 - 33.6kbit/s modem, V.90 - 56kbit/s modem, G.723.1 - audio compression, IMT-2000 - third generation cellular. Return to text

[16] G. T. Willingmyre, International Standards at the Crossroads, *ACM StandardView*, Vol. 5 No. 4, December, 1997. Return to text

[17] IEEE-SA is accredited by the American National Standards Institute (ANSI). However, IEEE-SA Ethernet standards, in practice, are not constrained to American use, they are used directly world-wide. The three international SDOs consider IEEE-SA to be a North American SDO, but in fact IEEE-SA operates as an RSDO. Return to text

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