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FACE THE FACS (FORMAL WORLDWIDE, REGIONAL AND NATIONAL AGENCIES FOR COMMUNICATIONS STANDARDIZATION)

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"Formal worldwide, regional and national Agencies for Communications Standardization" (FACS) such as the International Telecommunications Union and related formal agencies that standardize communications interfaces are losing standardization market share to consortia (any non-accredited standardization organization). This loss of market share has occurred due to the change in technical standardization participation from public carriers (as nominal public representatives) to developers and private service providers. Without the influence of the public over the standardization process, user requirements are being poorly served, as the dramatic drop in the telecom market growth over the last few years may suggest. The change from "public" standardization to private company participation in standardization also reduces the openness of communications standards by increasing IPR costs. This paper proposes a fundamental new approach for the FACS to better address these issues.

From 1865 to 1947, predecessors of the International Telecommunications Union (ITU) worked to coordinate the operation of telecommunication networks and services and advance the development of communications technology. In 1947, the ITU became a charter organization of the United Nations, and now supports communications standardization worldwide. Supporting the ITU in this task are a range of national (e.g., TIA [USA], ATIS [USA], TTC [Japan], TTA [Korea], ACIF [Australia]) and regional (e.g., ETSI [Europe])^[1] standardization authorities accredited by individual nations or groups of nations. Another worldwide structure of standardization agencies that also address some communications related standardization is represented internationally by ISO/IEC JTC1.^[2] We term all accredited organizations that standardize aspects of communications systems *Formal worldwide, regional and national Agencies for Communications Standardization* (FACS).

It is widely understood that the FACS are losing standardization market share to consortia (any non-accredited standardization organization with paid membership) and other non-formal standardization organizations (e.g., the Internet Engineering Task Force [IETF]).^[3] A recent well received book aimed at technology company managers states, "If you can follow a control strategy or organize an alliance outside the formal standards-setting process, you may be far better off..."^[4] This paper suggests approaches for the FACS to better serve the communications standardization markets.

Several examples exemplify the premise that FACS are losing standardization market share to consortia:

- The Worldwide-Web Consortium, W3C ("a forum for information, commerce, communication, and collective understanding"^[5]) has developed Extensible Markup Language (XML). This is a simple, very flexible text format derived from SGML.^[6] XML and related standards have an increasingly important role in the exchange of a wide variety of data on the Web and elsewhere. The W3C is a consortium that offers membership to those who can pay for it. Yet XML and related standards are beginning to play an important role in application-to-application communications. Why has the W3C been successful in defining these worldwide communications standards?
- The IETF ("a large open international community of network designers, operators, vendors, and researchers") has become the standardization body for the protocols used in the Internet worldwide. Based on the success of the Internet, many organizations, even governments, now address their related standardization requirements to the IETF. Yet the IETF is not a government accredited organization, and the standardization procedures used in the IETF are not considered fair and non-discriminatory (by the FACS) even though membership is free. Why has the IETF been successful in defining worldwide Internet standards?
- The IEEE ("a non-profit, technical professional association of more than 377,000 individual members in 150 countries") has developed several very successful worldwide communications standards including the Ethernet (802.3) and WiFi (802.11) standards. Yet in the formal standardization world, the IEEE, which is a FACS, is only a US national standardization organization. Why has the IEEE been successful in formulating worldwide communications standards?

Many of the most successful communications standards (e.g., Ethernet and WiFi [IEEE], Internet [IETF], XML [W3C], Bluetooth [Bluetooth SIG]), and cable modems [CableLabs]) have been developed outside FACS by non-accredited standardization organizations controlled by private companies. In some cases (e.g., cable modems), this consortia work is then taken to one of the FACS for their imprimatur. In 1998 an agreement was approved between Subcommittee 24 of ISO/IEC JTC1 and W3C that allowed JTC1 to accept W3C

standards as JTC1 standards.[7] Similar agreements have occurred between other FACS and consortia. This may be a desirable way to expand the "brand" of the FACS but the FACS is not the formulating committee for such standards. This paper takes the view that standardization is the process of creating a standard and has not occurred in a FACS when a FACS re-brands standardization work from another source.

A significant example of FACS success is GSM, Global System for Mobile communication (cellular), which occurred in ETSI where the European governments retain direction of the standardization process and provide significant funding. Conversely some major communications standards directions within the FACS such as ISDN, OSI network management (X.700) and IMT-2000[8] have not achieved the worldwide market acceptance originally anticipated. Since all these cases represent standardization process where significant resources were expended, it is worth considering why the GSM effort was successful and what changes in the standardization process might have reduced the inefficient use of resources in the other cases.

Why are the FACS in decline?

Beginning in 1984 with the divestiture of AT&T the economics of and participation in the formal standardization process have changed dramatically. This transition from a world-wide public telecommunications network to a private telecommunications network instigated three external effects that have significantly impacted the FACS process:

Public utility changes. Before 1984, the public carriers were the leaders in communications technology. Their research, development and deployment capabilities were beyond anything independent developers and users could achieve. Then the public communications carriers worldwide were the dominant organizations participating in the FACS. After the privatization of public carriers, research and development migrated from the carriers to the private companies (developers). And users (consumers) via commercial distribution systems have become the major means for deployment of new communications services in North America. The economic trends away from public carrier dominance of development and distribution that have impacted the North American communications markets have also changed the rest of the world's public communications carriers.[9]

Market changes. The personal computer revolution and the Internet explosion empowered the consumer. The personal computer revolution brought computer power to the individual, creating new distribution and support systems (e.g., help desks, computer stores, value added resellers, walk-in computer repair facilities, Internet sites) to serve the personal computer user's needs. No longer is the computer user dependent (whether they liked it or not) on a public utility for acquisition, installation and technical support of communications equipment.

Process changes. The Internet supports communications between computer users (e-mail) and provides access to the largest library imaginable - the worldwide-web. These facilities have the ability to dramatically change any standardization process, making it more efficient, more inclusive and more effective. Now any group looking to develop communications standards can form, attract members, and begin a standardization process that appears to match the FACS in offering a broad and open process.

In sum, these changes have redrawn communications standardization. With the public carriers no longer the leaders of communications technology, the private developers of communications technology are emerging as the driving force in the development of new communications systems and equipment. Since the mid 1980's and the beginning of privatization of the national carriers, the organizations that provide the leadership of the FACS standardization committees have shifted from public carriers to developers. AT&T was once the largest US carrier and the organization that provided the leadership of almost all U.S. related FACS committees. Today AT&T and all the other US carriers provide less than one third of the leadership of ATIS TI committees and far less of the TIA committees. This change in influence can also be seen in the drop in ITU standardization committee leadership by the European public carriers.[10]

Prior to these changes, standardization of communications systems was the purview of the public carriers who internally developed specifications for their national requirements and coordinated their specifications (with national government approval) in the ITU to develop worldwide recommendations (the ITU term for standards). The public carriers, as representative of the national government, had implicit governmental approval, and as public carriers, they were expected to represent the user/consumers' interest as well. Thus this standardization system brought together the developers, government and consumers in a single organization, the public carrier and created a form of balanced participation in the standardization process. In hindsight this was an efficient way to develop public standards, but a cumbersome system to introduce new communications technology.

Over the past 15 years, the FACS have been streamlining cumbersome standardization procedures,[11] but perceptions change slowly and many still do not recognize the changes the FACS have made. Such erroneous perceptions are still a reason to avoid proposing new technology to the FACS for standardization. But these errors in perception are only a part of the problems the FACS face.

Now new communications technology emerges very fast. An amazing aspect of market driven standardization is how quickly consortia emerge.[12] Whenever an existing standardization process is not available to fill a perceived need, a new standardization organization emerges. Thus new standardization consortia have sprung up (e.g., IETF and W3C). While many of these new consortia have been successful, the author believes this has not created a more balanced standardization system, but rather a different, unbalanced system. Now the promise of new technology seems better represented and developers interests better served, but service providers' and consumers'/users' needs and desires have less influence. This effect may be seen in the rise of service provider oriented consortia (e.g., FS-VDSL).

Given the technical nature of communications standards development, its expanding impact on all parts of society, and the rapidity of development of new technologies, it is not likely that a reasonable cross section of consumers or even developers and governments can participate in such standards development. So, if balanced participation of all stakeholders is important, the standardization system itself must now provide the balance.

Proposal: Balance requirements as well as participation

Up until now, the objective of balancing a standardization system was perceived as a need to balance participation. ANSI rules state, "The standards development process should have a balance of interests. Participants from diverse interest categories shall be sought with the objective of achieving balance."[\[13\]](#) In a world where almost everyone uses communications standards and public carriers no longer dominate the FACS, this is not practical, and attempts to practice balanced participation have been less than successful.

ICANN is an example of the difficulties of maintaining balanced participation in a standardization organization that supports millions of Internet users worldwide. The Internet Corporation for Assigned Names and Numbers (ICANN) was created in October 1998 by a broad coalition of the Internet's business, technical, academic, and user communities. ICANN is assuming responsibility for a set of technical functions (IP address space allocation, protocol parameter assignment, web addresses, and root server system management functions) previously performed under U.S. government contract by the Internet Assigned Numbers Authority (IANA) and other groups. The very long term impact of web addresses makes Internet users especially sensitive to issues related to long term maintenance and compatibility. ICANN has attempted to develop a governing board with a balanced cross section of members. It has not been very successful in either attracting such a balanced board or in having a diverse board make efficient standardization decisions. Interestingly, the concerns being raised about ICANN include the fact that it is not a government organization bound by the US laws and Constitution (which has been an excellent basic requirements document for a nation of users).[\[14\]](#)

ICANN is attempting to fairly balance the standardization process by balancing participation. Yet when the standardization process impacts many diverse and strong interests, a fair as well as efficient balance may not be practical. Rather than only balancing standardization committee participation to include all classes of users, the basic requirements of developers, consumers and government could be identified and included as specific goals of the standardization process. It appears that a number of more successful standardization committees are moving in this direction. But there is not yet a widespread understanding that successful standardization committees need to publicly set forth in their "constitution" the requirement to uphold the needs of their stakeholders and then have procedures to ensure that these requirements are followed.

The basic requirements of all stakeholders

The fundamental purpose of communications standardization is to define communications interfaces. All other communications standardization activities are in support of this purpose. Those affected by this standardization process are developers, users/consumers and service providers, and governments. They are the stakeholders, and each have legitimate requirements.

The developers' requirements:

1. A single process to create worldwide communications standards.
2. A means to negotiate intellectual property associated with a communications standard.

The users'/consumers' and service providers' requirements:

3. Compatibility (forward and backward).
4. Maintained standards.
5. Public (low or no royalty) communications interfaces.

The government's requirements:

6. A means to address the standardization aspect of political issues (e.g., pornography, rights of the disabled, privacy, security, taxation, sovereignty).

The requirements of all:

7. A fair, fast and efficient standardization system.

This list is one attempt to create a set of basic communications standardization requirements of each stakeholder group. Certainly more and far broader consideration should be given to defining these basic requirements. Perhaps the ITU, as a UN charter organization, would be an appropriate venue to initiate such broad consideration of the basic requirements of all communications standardization stakeholders.[\[15\]](#)

The desire for the three user/consumer requirements has been described in different terms. "Open standards" is the current user rallying cry for the basic requirements of users to be supported in the standardization process. The three requirements noted (3-5) are the three most directly user oriented requirements of ten total requirements developed in a separate paper that evaluated the principles underlying the concept of open standards.[\[16\]](#)

Table 1, below, examines how different standardization organizations address these seven stakeholder requirements. The x indicates which of these requirements the standardization organization generally meets (in the author's opinion).

Reqmts.	ITU	ETSI	IEEE	ATIS T1	TIA	IETF	Consortia
1			x			x	x
2							x
3	x (note 1)	x	x	x	x	x	
4 (note 1)	?	x	?	?	?	?	
5	(note 2)	x					x
6	x	x					
7	x	x	x	x	x	x	x

Table 1. How different standardization organizations meet seven stakeholder requirements.

Note 1: see requirements 3 and 4, below.

Note 2: see requirement 5, below.

Requirement 1, a single standardization process for world-wide communications standards. In the case of the IEEE and IETF, past successes (Ethernet and Internet, respectively) cause developers to believe these organizations offer the ability to create worldwide standards. In the ITU's case, the creation of worldwide standards is their remit. However, the ITU is fundamentally an organization of governments (or agencies accredited by governments), so technical positions must be taken first at a national or regional level and then submitted to the ITU. This creates a lengthy two stage standardization process that does not serve developers' needs for fast standardization for worldwide markets.[\[17\]](#)

Requirement 2, negotiated intellectual property rights. The FACS do not allow the negotiation of intellectual property rights as part of their standardization process. In many cases consortia require developers to agree to licensing terms as a condition of joining the consortia. Most consortia developing communications standards also serve developers by operating on a worldwide basis (requirement 1). The fact that consortia support requirements 1 and 2 is corroboration of these developers' requirements, as developers dominate almost all consortia.

Requirements 3 and 4, ongoing compatibility and maintained standards.[\[18\]](#) The FACS, when they were dominated by public carriers, demonstrably supported these requirements. Certainly FACS continue to maintain their standards (requirement 4), but with less input from users and carriers this is a requirement that bears watching. Currently no FACS (to the author's knowledge) use the Internet (or other active means) to notify users prior to each transition among the four stages of standards maintenance (fixes, updating, availability and recision). Consortia often avoid addressing the requirements for future compatibility and standards maintenance for reasons discussed further below.

The ETSI web site states: "ETSI is a not for profit organization whose mission is to produce the telecommunications standards that will be used for decades to come throughout Europe and beyond." "Used for decades" suggests active support of requirements 3 and 4 of the users' and carriers' interests.

Requirement 5, public interfaces. Now that public carriers no longer do the bulk of the development and provide the fruits of their development (intellectual property rights) as part of their public service, the use of FACS standards no longer means that associated intellectual property is available at little or no cost. This was not a FACS policy decision but a fact created by the transition in the FACS technical committees from public carriers to service providers and developers. Interestingly, consortia often recognize that competitive pricing is necessary for market development and demand licensing arrangements that allow economical communications interfaces.

During the GSM standardization process, ETSI attempted to force the GSM developers to provide free worldwide licenses for GSM technology. Although exceptional, this action does demonstrate ETSI's interest in promoting the users' interest in very low cost intellectual property rights. Political pressure from the US government and Motorola's unwillingness to license its essential GSM patents on nondiscriminatory terms, prevented ETSI from requiring GSM developers to offer such licenses. However, a number of the European public carriers required their suppliers to agree to cross-licensing. This effectively enforced ETSI's interest in low cost intellectual property rights for GSM.[\[19\]](#)

Requirement 6, address political issues. ETSI provides a direct means to address the European Union governments' requirements. The ITU provides a direct means for national governments to address national standardization issues. The other organizations do not.

Requirement 7, fast, fair and efficient standardization. Every honorable standardization committee attempts to be fair, fast and efficient, although often, fairness is only taken to apply to the participants of that standardization committee. ANSI Essential Requirements on due process support this requirement. This requirement no longer offers any observable differentiation between the major standardization organizations.[\[20\]](#)

Identified issues

Requirement 1, a single process. The governmental representation system of the ITU does not serve developers' requirements, or the market requirements, for a fast standardization process, as it requires a two stage standardization process (first national or regional, then international).[\[21\]](#) The ITU is shifting to greater direct developer participation and control, but getting the UN members countries to reduce their control is not easy. The lack of a formal single stage world-wide standardization process appears to be another significant reason for the increase in the use of consortia by developers. All developer sponsored consortia provide for single stage world-wide standardization.

Requirements 3, 4 and 5 (ongoing compatibility, maintained standards and low cost IPR) are where there is a legitimate conflict between the rights of users/service providers and developers. Backward compatibility (requirement 3) may not be desirable to developers proposing a new technology direction. Backward compatibility is often costly for developers to create and maintain. Yet backward compatibility may be critical for users and carriers to allow the effective use of their capital investment and a smooth efficient transition to new communications technology. Maintenance of standards (requirement 4) by developer organizations represents an economic burden that does not increase their sales. Conversely, maintained standards allow users and carriers to optimize the value of their capital investment. Consortia do not often devote significant efforts to the maintenance of standards as developers have an economic disincentive to maintain standards. Developers would much prefer if users purchased the latest version and not use a well-maintained previous version (e.g., telephone handsets). Currently most FACS also make little attempt to involve users in standards maintenance decisions, likely for the same reason. Yet users have the largest stake in well maintained standards.

The rapid expansion of new technology has obsoleted and replaced older communications technology, dramatically reducing the need to maintain older communications standards. Now that the worldwide telecommunications markets are in a period of economic consolidation, weakly maintained communications standards place a greater burden on users and service providers. Currently the effects

of limited standards maintenance are most noticeable in third tier markets (third world countries and charitable organizations) where older communications equipment is often used.

Balancing intellectual property rights issues (requirement 5) among the stakeholders presents a more difficult conflict. Structural solutions have been previously proposed.^[22] It is possible that where the users' interests are maintained, the markets are more likely to grow and more value may be created for all the stakeholders. Further study is needed in this area. The current FACS approach to intellectual property rights supports only identification of intellectual property holders, not negotiation of intellectual property to identify and control costs. This is not sufficient to support the developer's basic right to control the costs of the goods they plan to sell and appears to be another significant reason for the increase in the use of consortia by developers.

Three FACS standardization examples were noted previously which did not succeed as anticipated (ISDN, OSI network management [X.700] and IMT-2000). ISDN, the first planned worldwide data network, was not offered with backward compatibility to the existing analog data networks. ITU X.700 and related standards offered a very extensive and costly approach to network management which was incompatible with existing equipment and systems. IMT-2000 is actually three different cellular technologies and two variations. Complicating the issue of compatibility even further, a new cellular technology is emerging in China. Full worldwide compatibility among these cellular technologies has not been developed or deployed. In each of these three examples it appears that user requirements, in particular compatibility, were not given sufficient consideration. Without backwards compatibility to existing technology or compatibility among different new technologies, the risk of market failure appears to become higher.

The point is that no current standardization organizations fully address just these seven requirements. Some are better than others and it seems that the more successful standardization organizations address more of the basic communications standardization requirements. However, currently no communications standardization organization serves the requirements of all the likely legitimate participants. This is the root cause of the dramatic rise in consortia standardization of communications. New standardization consortia emerge in the hope that they will better meet the requirements of a specific set of standardization participants. It appears that this situation will continue until some communications standardization organization meets at least these seven requirements.

What changes are needed?

The FACS are changing. But most of the FACS' more recent efforts to change have been directed towards emulating and aligning more closely with consortia. Even if the FACS can overcome any errors in perception and offer the key advantages of consortia, negotiated IPR and one-step world-wide standardization, without additional differentiation each FACS would only be another consortium. Throughout their history the basic goal of FACS has been to offer a level playing field for all those impacted by standardization (the stakeholders). Achieving this goal is what has built each FACS brand. This achievement has slipped and now needs to be reasserted.

Consortia address developer requirements that FACS do not. For a long time the FACS have addressed requirements that most consortia do not.^[23] Now important user requirements are not being met by consortia standardization owing to the natural conflict between developers' and users' goals. By balancing user, developer and service provider requirements, the FACS have something unique and desirable to offer. As the FACS become more developer driven, it becomes more important for them to actively support user requirements. Finding and maintaining a balance between the diverse and sometimes conflicting interests of all the communications standardization stakeholders is a very difficult task. How this balance is achieved, whether by government control, public carrier control, broad participation, or defined basic requirements, is the root issue the FACS must face. This paper suggests that a balance may be achieved by the development of a FACS "constitution" that defines the basic rights of the desired stakeholders and the procedures necessary (i.e., checks and balances) to ensure that the basic rights of these stakeholders are maintained.

The seven basic requirements presented above are not prioritized. Serving one of these requirements in a specific situation might not serve others. But it has always been the task of each standardization committee to determine how to strike technical and operational balances. The thesis of this paper is that the basic communications standardization requirements must be identified for each standardization committee's constituency and made an overt part of that organization's procedures to ensure that active efforts will be made during the standardization process to address these requirements. Perhaps some standardization oversight committees will wish to audit how well each constituency's requirements are being met. Such an audit could be part of the procedures of an oversight organization such as ANSI in the US. But these are implementation details which may be considered after the basic concept of specifically addressing the requirements of each constituency has been accepted.

Focusing on stakeholders' basic requirements will better serve today's standardization market

Successful communications standardization has occurred in the past when governments and public carriers have assumed responsibility for supporting the basic rights of all the stakeholders. Now that developers have emerged as the leaders of the communications standardization process, there is some conflict between the legitimate economic goals of developers and the basic rights of other stakeholders. Defining and striving to balance the rights of all stakeholders in a standardization committee appears to be one way to maintain the balance of the communications standardization committee even when it is developer supported. Achieving such a balance is not altruistic. Without it, many costly standardization projects have not achieved the success desired.

The world of public carriers leading FACS is gone. If there is a strong desire for the open standards that the public carriers were capable of creating, then each FACS should place greater emphasis on defining and actively supporting the basic requirements of all its stakeholders.

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Footnotes

- [1] TIA: Telecommunications Industry Association; ATIS: The Alliance for Telecommunications Industry Solutions (Committee T1); TTC: Telecommunications Technology Committee; TTA: Telecommunications Technology Association; ACIF: Australian Communications Industry Forum; ETSI: European Telecommunications Standard Institute.
- [2] International Organization for Standardization/International Electrotechnical Committee Joint Technical Committee 1. The ISO and IEC are two formal standardization organizations which operate jointly in JTC1.
- [3] "Much of the key standardization activity in Information and Communication Technologies is carried out by industry consortia rather than in formal standards organizations such as CEN and ISO." CEN/ISSS survey of standards-related fora and consortia, October, 2002, <http://www.cenorm.be/iss/Consortia2/default.htm>.
- [4] Carl Shapiro and Hal R. Varian, *Information Rules*, Harvard Business School Press, 1999, page 239.
- [5] The description of each organization is quoted from that organization's web site.
- [6] Standard Generalized Markup Language, ISO 8879, initially 1986.
- [7] Roy Rada, Consensus Versus Speed, *Information technology Standards and Standardization: A Global Perspective*, edited by Kai Jacobs, Idea Group Publishing, 2000.
- [8] ISDN: Integrated Services Digital Network; OSI: Open System Interconnection; IMT-2000: ITU recommendations for the third generation cellular network.
- [9] This point is made in several submissions to the ITU - TSB Informal Consultation Group, Martigny, February 28-29, 2000, including Document No. 8, AT&T, C. Dvorak and M. Armstrong, <http://www.itu.int/ITU-T/tsb-director/martigny/martigny1/index.html>.
- [10] 13 out of 14 Study Group Chairmen (including TSAG) are from Sector Members [commercial organizations], slide 21, Houlin Zhao, Director ITU-T, ITU Standardization and its new Environment, Stanford University, July 23, 2003.
- [11] Ibid, slide 9.
- [12] Ken Krechmer, Market Driven Standardization: Everyone Can Win, *Standards Engineering*, Vol. 52, No. 4, July/August 2000, p.15 - 19. Papers by Krechmer are available at <http://www.csrstds.com/klist.html>.
- [13] ANSI Essential Requirements: Due process requirements for American National Standards, issued March 30, 2003.
- [14] A. Michael Froomkin, Wrong Turn in Cyberspace: Using ICANN to Route Around the APA [US Administrative Procedures Act] and the [US] Constitution, 50 *Duke Law Journal* 17 (2000).
- [15] This suggestion was first developed in: Ken Krechmer, Recommendations for the Global Information Highway: A Matter of Standards, *ACM StandardView*, March, 1996 Vol. 4, No. 1.
- [16] Ken Krechmer, The Principles Of Open Standards, *Standards Engineering*, November/December 1998, Vol. 50, No. 6., p. 1-6
- [17] "When the marketplace is global, so must be the standards." Richard B. Gibson, *The Global Standards Process: A Balance of the Old and the New, Standards Policy for Information Infrastructure*, MIT Press, 1995.
- [18] "First, standardization should help avoid technological dead ends, where incompatible options trap users in a doomed technology." George Ferne, *Information Technology Standardization and Users: International Challenges. Move the Process Forward, Standards Policy for Information Infrastructure*, MIT Press, 1995.
- [19] R. Bekkers, G. Duysters, B. Verspagen, Intellectual Property Rights, Strategic Technology Agreements and Market Structure: The Case of GSM. Eindhoven Center for Innovation Studies, September 2000, <http://www-edocs.unimaas.nl/files/mer00030.pdf>.
- [20] "The findings show that, according to paper procedures, formal standards bodies and standards consortia roughly work in the same way." Tineke M. Egyedi, Consortium Problem Redefined: Negotiating 'Democracy' in the Actor Network on Standardization, *International Journal of IT Standards and Standardization Research*, Vol. 1 No. 2, July-Dec 2003.
- [21] "National rules governing contribution approval sometimes introduce excessive delays and constrain technical debates." Alcatel Position on ITU, TSB Informal Consultation Group, Martigny, February 27-28, 2001, page 6.
- [22] Ken Krechmer, Communications Standards and Patent Rights: Conflict or Coordination?, Telecommunications Industry Association, *Standards and Technology Annual Report (STAR)*, 1997.
- [23] Some consortia do better than others: The W3C lists "evolvability" (consisting of simplicity, modularity, compatibility, and extensibility) as one of its standardization goals. Evolvability addresses a very similar requirement to requirement 3 (compatibility).

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