# Appendix

## APPENDIX 1: IEC TECHNICAL COMMITTEES-2008

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TC 193  Natural gas
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TC 195  Building construction machinery and equipment
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TC 198  Sterilization of health care products
TC 199  Safety of machinery
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TC 203  Technical energy systems
TC 204  Intelligent transport systems
TC 205  Building environment design
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TC 217  Cosmetics
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TC 225  Market, opinion and social research – PROVISIONAL
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APPENDIX 3: RESEARCH GATHERINGS


International Workshop on Smart Home. (served as invited speaker on “Patents and Standards: Do They Fit?”) 1394 Forum and Circuit and System Study Group of IEEK, Seoul, Korea, December 5, 2002.


Special Panel: “University Education and Research on Technical Standards,” organized by the International Center for Standards Research (ICSR), (served as organizer and presenter) supported by ANSI and NIST and hosted by the Columbia Institute for Tele-Information (CITI), at Columbia University, New York City, September 9, 2002.

EASST 2002 (European Association for the Study of Science and Technology), presented paper, workshops, etc., York, United Kingdom, July 30-Aug 2, 2002.


ISO/IEC JTC1 SC 25 WG1 Standards Meeting (Home Electronic System) (served as secretary), Massachusetts Institute of Technology, Cambridge, Massachusetts, January 21-25, 2002.


APPENDIX 4: THE "PAPER"

THE ROLE OF CONSORTIA STANDARDS IN FEDERAL GOVERNMENT PROCUREMENTS IN THE INFORMATION TECHNOLOGY SECTOR: TOWARDS A RE-DEFINITION OF A VOLUNTARY CONSENSUS STANDARDS ORGANIZATION

Submitted to the House of Representatives Sub-Committee On Technology, Environment, and Standards

Version 2.0 - 06/19/01

EXECUTIVE SUMMARY:

I. Standardization is an essential and growing element in the success of the Information Technology industry. The success of the Internet, the World Wide Web, e-Commerce, and the incipient wireless revolution are all predicated upon successful standardization. A majority of the standards that drive these evolving areas of technology are created in consortia, a form of standardization organization that falls outside the standardization regime prescribed by the American National Standards Institute (ANSI).

II. A definition of both “Information Process” and “consortia” is provided to limit the scope of this change to a precise set of problems.

III. The laws that govern procurement for Federal agencies within the Information Technology sector are written and interpreted in a fashion such that consortia specifications are excluded from consideration unless the procuring agency requests a waiver from the OMB to permit use of a “non-standard” specification.

IV. An amendment to the Section 12(d) of Public Law 104-113, the “National Technology Transfer and Advancement Act of 1995” can be used to redefine a “Voluntary consensus standards bodies” within the IT sector in order to allow agencies to select from a more complete and realistic set of offerings than can be offered under the current law.

THESIS OF THE PAPER

Standardization is essential to the growth of the IT industry. Within the IT industry, well-developed consensus consortia standards should be placed on an equal footing with standards developed by ANSI accredited organizations. The current Federal
procurement practices - as mandated by OMB A-119 discourage the use of consortia specifications. The paper concludes with a proposal for a legislative change to permit and encourage Federal use of consortia-created standards in procurement.

SECTION I: THE EVOLUTION AND ROLE OF STANDARDIZATION IN THE INFORMATION TECHNOLOGY INDUSTRY

Standardization is an essential element to the growth of the computer industry. Most new Information Technology (IT) industry initiatives center around the concept of interoperability, one of the fundamental goals of IT standardization (and most standardization, for that matter.) There are no more “homogeneous islands of computing” which marked the late 1980s; today’s environment is worldwide, fast paced, and completely heterogeneous. The impact of this changing environment on business, society, and culture cannot be overstated. Just as the common gauge for railroads changed the face of the United States in the last half of the 1800’s, the creation and growth of the standards-based digital economy will have a profound effect on the nature and future of life in the United States. Nearly a decade ago, The Economist published the following in its Survey of Information Technology:

The noisiest of those competitive battles (between suppliers) will be about standards. The eyes of most sane people tend to glaze over at the very mention of technical standards. But in the computer industry, new standards can be the source of enormous wealth, or the death of corporate empires. With so much at stake, standards arouse violent passions.¹

This statement – echoed in one form or another in most literature on the subject of standardization - is even more applicable today in the IT industry. With the advent of the Internet and the World Wide Web (WWW), open standards² are becoming more and more a part of the “infratechnologies”³, a term used by NIST to describe a superset of technologies (the technological infrastructure) which “…provide the technical basis for industry standards”⁴. As Martin Libicki of RAND notes, “(w)ith each passing month, the digital economy grows stronger and more attractive. Much, perhaps, most of this economy rests upon the Internet and its World Wide Web. They, in turn, rest upon information technology standards”.⁵

This fundamental change in the focus of information technology (from one of homogeneous computing to one of interoperable information sharing) has had a significant impact on the standardization activities of the IT industry. The initial standardization organizations were those that operated under the rules and orga-
izational constricts of the American National Standards Institute (ANSI), following in the footsteps of all the other industrial standardization activities in the United States. This was during the period that much of the fundamental hardware standardization activities were occurring - from common interconnections for the keyboard and mouse to printers and storage systems. The negotiations that created these standards which were complex and confined to a relative handful of providers - were usually under the aegis of one or two standardization committees in the United States. They usually dealt with things that would stay standardized for a long time. The formal national bodies under the aegis of ANSI in the U.S., and the international bodies under the International Organization for Standardization and the International Electrotechnical Commission (ISO and IEC) were referred to as Standards Developing Organizations (SDOs) and were the source of standardization for the IT industry.

However, in the later 1980s, a different form of standardization activity appeared, beginning with an organization called “X/Open”. Providers began to move technology standardization away from the formal ANSI and ISO recognized SDOs to those of consortia, which did not have the intricate processes of the SDOs. The formal processes, which were both time consuming and often Byzantine, were necessary because “[m]ost delegates represent[ed] personal, professional, national, disciplinary, and industry goals…”, and managing this vast and sometimes contradictory set of expectations forced these groups to create intricate rules to make sure that all voices were heard. Consortia, on the other hand, because they usually consisted of groups of like minded participants (either for technical or market reasons), did not need to have the lengthy discussions over the mission and intent of the proposed standardization activity - an organization’s presence was, in many cases, proof of a general agreement. The archetypal consortium was the Internet Engineering Task Force (IETF), the group that manages the Internet. The success of this group in both keeping the Internet a leading-edge technical architecture leader as well as clear of greed, parochialism, and lethargy is a significant accomplishment.

This shift was amplified by the introduction and ensuing popularity of the World Wide Web in the early 1990s. The establishment of the World Wide Web Consortium (W3C) in October 1994 was a turning point within the IT industry; after this date, consortia were the logical place to develop joint specifications, while before they had been the “alternative place”. The generation of IT practitioners who are now leading much IT development, which is largely focused on Internet technologies, do not have an awareness of ANSI and ISO as sources for standards. Their world is largely bounded by consortia such as W3C and the IETF. They see no need for ANSI or ISO standardization - a message that they carry to their companies. With the maturity of the Web, an increasing number of consortia are being created to
standardize Web based technology. (Nearly all e-Commerce organizations develop their specifications in arenas that are either consortia or consortia-like.)

The reason for the use of consortia lays not so much in the speed of technical development, but rather in the willingness of the consortia to use expedited processes. The IETF has been using the Internet to communicate among interested parties, post specifications, achieve rough consensus on technical features and functions, and then move forward on standardization. The specifications that the IETF adopts are usually based upon extant practice, with at least two implementations required for specifications on the standards track, and are available for widespread public review and comment. This practice - using its own technology to permit faster standardization of follow-on technology - is another step that sets the IETF apart from its contemporary organizations of the 1980s. The use of its technologies as a basis for its standardization practices ensures workable and implementable specifications, but more importantly allows the IETF to develop into a truly international organization. When the specification is complete, it is posted on the IETF web site with free access for all.

The W3C operates in a similar, though somewhat more formal, manner. W3C is a good model for the operation of many other consortia. These consortia realize the key elements are speed and accessibility accessibility to those who are concerned about their work. As The Economist has pointed out, “…the Internet has turned out to be a formidable promoter of open standards that actually work, for two reasons. First, the web is the ideal medium for creating standards; it allows groups to collaborate at almost no cost, and makes the decision-making more transparent. Second, the ubiquitous network ensures that standards spread much faster. Moreover, the Internet has spawned institutions, such as the Internet Engineering Task Force (IETF) and the World Wide Web Consortium (W3C), which have shown that it is possible to develop robust common technical rules.”13 These features have made the IT community turn to consortia and similar structures for their standardization needs, in both hardware and software. The creation of highly open, highly visible specifications - widespread in their adoption and use - is essential to the continuing evolution of the IT sector and IT industry.

Another aspect of consortia that separates them from the traditional SDOs is their dependence upon the market, rather than institutions, for relevance. A consortium succeeds or fails by its ability to attract members to accomplish its technical agenda. It receives little or no funding other than what its membership is willing to pay; money received from the government is rare, and is usually in return for some exact service that the consortium renders to a specific government agency in the role of a contractor.14 While this dependence upon its members for financing can be seen as a limitation on the consortium’s freedom of action, it reflects the state of the market in formal SDOs as well, except that formal SDOs do not shut

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down if all of the commercially important members (those who would implement the specification) walk away. There is a delicate balance between an independence that leads to an unused standard and a financial dependency that produces a constrained specification.

SECTION II: DEFINITION OF THE INFORMATION TECHNOLOGY

Within the scope of this paper, the term Information Technology shall be the same as the definition found in “The United States Code, Title 40, Chapter 25--Information Technology Management, Section 1401. Definitions, (3) (A) and (B), to include “…any equipment or interconnected system or subsystem of equipment, that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the executive agency. For purposes of the preceding sentence, equipment is used by an executive agency if the equipment is used by the executive agency directly or is used by a contractor under a contract with the executive agency which (i) requires the use of such equipment, or (ii) requires the use, to a significant extent, of such equipment in the performance of a service or the furnishing of a product.

(B) The term “information technology” includes computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources.”

SECTION III: DEFINITION OF A CONSORTIUM

The definition of a “consortium” used in this submission derives from several taxonomies developed in the previous decade, all of which were focused on the Information Technology sector. Weiss and Cargill (1992) identified three separate types that focused on implementation, application, and proof-of-technology; Updegrove (1995) identified research consortia, specification groups, and strategic consortia, while Ketchell (2001) identified specification creating consortia and “fora” (consortia whose function was to define user and market requirements for further technical development). The three taxonomies share enough common definitional concepts to constitute a basis for development of a model for this paper.

Of the varieties of consortia enumerated, only two general types meet the requirements of the proposal to modify the Federal procurement process. Both of these types share a common characteristic - the creation of specifications from which products can be developed and implemented in the larger industry. The first
type can be identified as a group that is focused on creating a specification that acts to bridge a gap left by other standards or which fills a small niche market. These groups are “…often formed to develop a standard to fill an important niche-industry technical gap that is not large enough to merit the attention of an industry standard setting body…”\(^\text{18}\). These groups include consortia such as the 10 Gigabit Ethernet Alliance, Frame Relay Forum, the Small Form Factor Committee, and the WEB3D Consortium, all of which are focused on creating specifications that address a niche problem or small portion of a larger problem. These consortia are usually small and very focused in the solutions they provide - typically producing robust and implementable specifications in a short time. The players in these groups are usually organizations, which have an interest (product or service offering) that relies upon completion and wide acceptance of a specification. This type of consortia is especially widespread among providers of hardware interfaces and point software solutions. They are characterized by a relatively restricted field of application, and tend to be short lived. The work that they do is published and implemented in products relatively quickly, where it either will gain adherents and survive or will find no market and disappear.

The other type of consortia, which Updegrove labels “strategic”, deal with systems, architectures, or new emerging markets where there is a need for a large number of interrelated and/or continuous specifications. These consortia, typified by W3C, the IETF, and The Object Management Group, are usually larger, concerned with a broad spectrum of specifications, and tend to be more long lived. Many of the consortia in this space are attempting to create, grow, and stabilize a market. They also have a more diverse membership, often making consensus harder to attain. As they succeed in obtaining consensus and in moving forward, however, their results can be impressive and cause a major shift, sometimes revolutionary, in the IT arena.

As noted above, both types of consortia share a common attribute - the creation of specifications from which products or services can be developed and sold. The first and primary requirement of consortia, as they are defined for the purposes of this proposal, is they must create useable specifications. This leads to a description of other attributes that a consortium must have.\(^\text{19}\) Appendix A, Section 2, provides an overview of consortia, their rationale, and practice. However, as Updegrove notes “Effective, efficient, and representative evolution of standards by consortia is impossible without an appropriate structure of administration and technical decision making. When the authors law firm first began representing consortia, it performed a wide examination of possible forms under various jurisdictions, and settled eventually on the Delaware not-for-profit, non-stock membership corporation…. This structure has stood up extremely well in practice.”\(^\text{20}\)

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This then, would appear to be a potential second criterion by which a consortium may be judged. In the case of a non-U.S. consortium, however, such a ruling would be inappropriate. What may be sought, however, is a structure that indicates some form of reality in law - something that would indicate that there is a legal basis under which the consortium operates and which subjects it to some form of governmental oversight. The intent is to ensure that the consortium is serious by its commitment to achieve legal standing.

“The heart and soul of any consortium may be found in a humble home: its bylaws and charter. Although a few important rules may come to rest in a membership application, most of the regulations and rights of the organization will be found in these legal documents. Whether or not they are carefully conceived will determine whether or not the organization is easily managed, whether it incurs needless exposure to its members under antitrust laws, whether its members feel themselves fairly represented and therefore renew their membership, and whether or not the organization is sufficiently flexible to evolve and flourish.” This is another important criterion - the organization must have a set of governing rules that explain how the consortium works, how its members are treated, and the rights and responsibilities of the members. Definition of how the consortium creates its technical specifications - including the methodologies of the creating committees - should also be present. While it is acceptable to have various levels of membership, the criteria for gaining these levels must be clear and unambiguous. There is also the necessity to ensure that there is no exclusivity on joining the consortium; anyone meeting the requisite entry requirements must be allowed to join and participate under the same terms and conditions as other members.

Examination of the intellectual property (IP) regime of the consortium is also necessary. The consortium must have clear IP Rules (IPR) no less rigorous than those of the ISO - since most consortia operate in the international arena. ISO patent policy mandates, as a minimum, commitment to reasonable and nondiscriminatory (RAND) licensing by participants. How RAND is implemented is a matter left to the organization, as are any other rules governing IPR. However, the rules must be complete, spelling out the requirements of members, the penalties for non-compliance, and remedies available to members for such non-compliance. Basically, there must be clear assurance that the holder of IPR will not attempt to treat other consortium participants and users of the standard unfairly.

With respect to participation, ANSI-accredited SDOs cite “balance of participation” (parity between the various affected parties, usually providers, users, and others) as one of the criteria for judging whether an organization is legitimate. By definition, a consortium tends to be biased towards those who are interested enough to “pay to play”, which may be enough to violate the ANSI rule of balance. What must be assured is that no party is denied the right to participate based upon the
nature of the would-be participant, unless the participant is unwilling or unable to meet the common entrance requirements of the consortium.

The key to judging the “openness of the consortia” is one of the major differentiators between the consortia and the SDO forms of standardization. Openness has traditionally been viewed as the willingness to admit all concerned parties to the table. Consortia typically do not do this. Only consortium members may be allowed at the table to discuss specifications. This is why the members are willing to pay - they are trading money or other resources for the ability to determine the specification. This is not substantially different than the SDOs, where participants trade resources (time and travel budget) for the right to participate. Both groups traditionally charge fees - the difference is the amount of the fee charged. Therefore, it is necessary to create new criteria for “openness” among consortia.

The primary test for openness should be the outcome of the consortia – (1) the specification should provide an open (RAND minimum) reference implementation, (2) two or more competing implementations should exist, and (3) there should be, if appropriate, a testing regime to ensure interoperability among the various implementations. This approach focuses on the rationale for standardization - that is, there should be a mechanism by which the users have a choice of implementations from which to choose, providing guaranteed alternative sources for critical products.

In summary, the criteria for a “good” consortium, for the purposes of this paper, includes:

1. The consortium must develop technical specifications.
2. The consortium must be some type of legal entity.
3. The consortium must have a well-defined, legally acceptable set of procedures and processes.
4. The consortium must have a clear and legitimate IPR policy that requires, at a minimum, RAND licensing of all IPR included in its specifications.
5. The membership of the consortium must not be arbitrarily restricted. The consortium must not restrict participation based on non-economic criteria (e.g. competitors, organizational origin, or purpose for joining).
6. There should be reference implementations, competing implementations, and test methods to validate conformance as appropriate.

SECTION IV: THE ROLE OF NATIONAL POLICY WITH RESPECT TO THE IT SECTOR

In a major Congressional Office of Technology Assessment (OTA) study completed early in the 1990’s, the following comment commands attention:
Other goods, like education and standards, are impure public goods. These combine aspects of both public and private goods. Although they serve a private function, there are also public benefits associated with them. Impure public goods may be produced and distributed in the market or collectively through government. How they are produced is a societal choice of significant consequence. 24

The major contention of this paper is that current legislation regarding governmental procurement is weighted in favor of the SDOs and does not encourage consideration of the production of standards and specifications produced by consortia - except in special circumstances.

The basic law covering Federal Procurement with respect to standardization is Public Law 104-113, the “National Technology Transfer and Advancement Act of 1995”. 25 The applicable section of PL 104-113 is “Section 12 (d) Utilization of Consensus Technical Standards by Federal Agencies; Reports”, passed by the Congress in order to establish the policies of the existing OMB Circular A-119 in law. The first subsection, 12 (d) (1), states:

In general. — Except as provided in paragraph (3) of this subsection, all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies (emphasis added), using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments.

This section sets the intent and establishes specific guidance to the National Institute for Standards and Technology (NIST) to ensure that the Federal agencies and departments are not creating their own standards, but are using commercially developed standards to carry out their missions. Sections (2) offers guidance on the participation in or the joining of a standards organization, and section (3) provides an exception clause, through which agencies can explain why they have chosen not to use commercial standards. Section (4) provides a definition of standards as:” the term ‘technical standards’ means performance-based or design-specific technical specifications and related management systems”.

The determination of what is a “voluntary consensus standards body” has been left to OMB. In OMB Circular A119, we find the following explanation:

4. What are Voluntary, Consensus Standards?
   a. For purposes of this policy, voluntary consensus standards are standards developed or adopted by voluntary consensus standards bodies, both
domestic and international. These standards include provisions requiring that owners of relevant intellectual property have agreed to make that intellectual property available on a non-discriminatory, royalty-free or reasonable royalty basis to all interested parties. For purposes of this Circular, “technical standards that are developed or adopted by voluntary consensus standard bodies” is an equivalent term.

1. Voluntary consensus standards bodies are domestic or international organizations which plan, develop, establish, or coordinate voluntary consensus standards using agreed-upon procedures. For purposes of this Circular, “voluntary, private sector, consensus standards bodies,” as cited in Act, is an equivalent term. The Act and the Circular encourage the participation of federal representatives in these bodies to increase the likelihood that the standards they develop will meet both public and private sector needs. A voluntary consensus standards body is defined by the following attributes:
   i. Openness.
   ii. Balance of interest.
   iii. Due process.
   iv. An appeals process.
   v. Consensus, which is defined as general agreement, but not necessarily unanimity, and includes a process for attempting to resolve objections by interested parties, as long as all comments have been fairly considered, each objector is advised of the disposition of his or her objection(s) and the reasons why, and the consensus body members are given an opportunity to change their votes after reviewing the comments.

b. Other types of standards, which are distinct from voluntary consensus standards, are the following:
   1. “Non-consensus standards, “Industry standards,” “Company standards,” or “de facto standards,” which are developed in the private sector but not in the full consensus process.
   2. “Government-unique standards,” which are developed by the government for its own uses.
   3. Standards mandated by law, such as those contained in the United States Pharmacopeia and the National Formulary, as referenced in 21 U.S.C. 351.26

This definition - specifically with the requirement for “(ii) Balance of interest” would appear to limit standards to formal (non-consortia) standardization, since, by definition, the participants in a consortium are self-selecting for a particular
technology specification. At the same time, consortia standards do not fall under the conditions set forth in Section 4.b.(1), as they are developed in full consensus and then are actually implemented by the industry. Section 4.b.(1) seems to speak to “proprietary standards”, which are usually implementation standards - that is, standards based upon a single vendor’s implementation, and usually described as “de facto” standards.

• In section 6 g., however, we read: “Does this policy establish a preference between consensus and non-consensus standards that are developed in the private sector? This policy does not establish a preference among standards developed in the private sector. Specifically, agencies that promulgate regulations referencing non-consensus standards developed in the private sector are not required to report on these actions, and agencies that procure products or services based on non-consensus standards are not required to report on such procurements. For example, this policy allows agencies to select a non-consensus standard developed in the private sector as a means of establishing testing methods in a regulation and to choose among commercial-off-the-shelf products, regardless of whether the underlying standards are developed by voluntary consensus standards bodies or not.”

This section, by reading in light of the previously examined sections, seems to state that “proprietary standards” or “de facto standards” are permissible, meaning that the use of consortia based standards, which are open, consensus driven, and lack only the “balance” described in 4.a.(1)(ii) are the equivalent of proprietary or de facto standards, which they are not. Consortia standards represent standards that have been developed in an atmosphere that is as rigorous - if not more so - than most SDO standards, yet it is deprecated because it does not meet the five voluntary criteria.

The intent of A119 appears to be clear - standards developed in an open process are preferable to those that are not. Yet, because of the definition of a voluntary consensus standard contained in Section 4, the use of consortia developed standards is specifically disallowed, while standards developed in proprietary environments, or standards that are derived from a product (implementation standard), are permitted (Section 6.g.).

In a larger sense, however, for the IT sector the exclusion of consortia developed standards in Section 4.a. is flawed. A majority of standards that are driving the next generation of computing - specifically, those from the IETF (the standards of the Internet), those of the W3C (the standards of the Web and of e-Commerce), the wireless phone standards (those created by the WAP Forum and by ETSI), as well as the standards of the spatial industry (Open GIS Consortium), the Object
Oriented technology movement (Object Management Group), and of Linux - are all excluded.

We do not agree with those who argue that the problem is not significant. Appendix B provides background on one of these issues, while Appendix C argues that the use of proprietary standards in procurements appears to be the result of a policy that recognizes that the formal standards process has broken down and that proprietary offerings are as good as, if not better (in the eyes of the purchaser) than the currently mandated standardization regime.

We disagree with the defense that the current system addresses the problem, and that there is no real issue here. This is a serious and substantial issue to participants in the standardization process. The following quote, from a leading European standardization site, explains the issue succinctly: “To us formal ICT standardizers, sometimes consortia are a pain in the neck. We recognize they are quick, industry solutions to produce necessary specifications, which they call “standards” but we don’t. These bodies don’t always take full account of the real needs of end users, and it is difficult to find information on them and what exactly they are doing.”

While it can be argued that this is not the perception of ANSI, ANSI’s strategic plan includes the following: “In successful standards processes:

- Decisions are reached through consensus among those affected.
- Participation is open to all affected interests.
- Balance is maintained among competing interests.

... 

- Governments use voluntary consensus standards in regulation and procurement.
- U.S. Government should encourage more use of the principles embodied in accreditation by recognizing the ANSI process as providing sufficient evidence that American National Standards (ANS) meet federal criteria for voluntary consensus standards;
- Non-traditional standards organizations should review their objectives to determine where closer interaction with the formal system will help add value to their efforts;”

All of these assertions, if read from the perspective of a consortium, would seem to indicate that ANSI is focused on maintaining its hegemony and expanding the use of its definition of the “voluntary standards process”. It does not indicate that there is an attempt to make all standards equal; rather, the above text would seem to indicate that ANSI is attempting to position its process as superior - something that consortia frequently take strong exception to.
The role of the government - within the IT sector - should be to equalize the activities of all of the standards players, so that all legitimate interests are fairly represented in the IT arena. The next section proposes legislation to achieve this end.

SECTION V: TOWARDS AN EXPANDED DEFINITION OF A VOLUNTARY CONSENSUS STANDARDS BODY

To unify U.S. standardization activities in the IT sector, a specific amendment to the Public Law 104-113, the "National Technology Transfer and Advancement Act of 1995" should be proposed.

1. The proposed legislation would have to contain specific language limiting the intent of this change to only the IT community (as defined in Section II).
2. It would deal only with voluntary, market driven IT standardization, and would not impact regulatory standards (such as health, safety, or the environment).
3. It would have as criteria for a "legitimate consortia" the items listed in Section III as attributes of a "good consortium".
4. It would not exclude anyone or any organization from seeking either the ANSI or the ISO imprimatur.
5. It would make exceptions to the legislation difficult to obtain.
6. It would put in place and enforce a tracking mechanism to monitor the use of non-open standards.
7. It may be appropriate to include a directive to NIST to expand the role of the National Voluntary Laboratory Accreditation Program (NVLAP) in an effort to "train the trainers" if the private sector demands consortia accreditation.

The purpose of the legislation would be to make the formal and structured informal processes equal for the voluntary, market driven IT sector and to reunify the quarreling parts of the standardization discipline to permit the continued growth of the IT sector in the United States.

APPENDIX A: THE EVOLUTION AND HISTORY OF STANDARDS SETTING ORGANIZATIONS (SSOs)

This section provides background on the differences between the various standardization organizations, why they evolved the way that they have, and reviews the strengths and limitations of each within the context of the Information Technology sector.
There are five basic variants of standards setting organizations within the IT sector. Each variant has a place in the IT sector because there is no single optimal choice for development of standards for the entire industry. This section of the paper looks at these five organizational variants, and provides some history and background on all of them as they relate to the unique aspects of IT standardization.\textsuperscript{31} ANSI is examined in particular detail, since it is the primary stakeholder for the U.S. in all formal organizations (national or international), that currently are the primary providers of specifications used in procurement in the United States.

The five types of organizations are:

- (1) Trade associations, (2) formal Standards Developing Organizations (SDOs)
- (3) Consortia, (4) Alliances
- (5) The Open Source software movement

1. Trade Associations and Standards Developing Organizations (SDOs)

These two types of organizations are linked because they both belong to the formal school of standards that is, a standards process that is heavily focused on maintaining due process, openness of participation, and a comprehensive appeals process. As will be seen, the process that these organizations have created within the U.S. is a result of legal challenges to their work, and is absolutely necessary for the regulatory or similar arenas, where there is an implied legitimacy ascribed to a specification labeled as an official standard.

The trade association activities in standardization take the place of pride for being the oldest form of standardization activity of those listed here, dating as it does from the late 1800’s. Generally, the associations were gatherings of professional men who were experts in a particular field (boilers, fire prevention, mechanical engineering). Their intent in setting up these groups was to create a professional discipline and to preserve this discipline by creating specifications embodying their wisdom for the sake of their colleagues. Hence, societies like the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), and the American Society For Testing and Materials (ASTM) came into being. In most cases, the primary mission of these groups is the education of members in their professional discipline, with standards as a secondary activity to fulfill some of the training requirements.\textsuperscript{32} These groups were directly responsible for technical practices that could impact public safety, and needed to ensure that their specifications were correct. Peer review was not only desirable, it was necessary and expected.
In many cases, the specifications developed by the trade organizations have become the basis for codes and statutes, and have acquired a regulatory patina that permits them to be used as defense in liability cases. By definition, if you follow the specifications published by the National Fire Protection Code, you are using techniques and practices that have been tested, tried and proven to be safe. This makes trade associations excellent for codifying successful past practices - things that are stable, structured, and time insensitive. Within the IT industry, in areas that do not touch upon, for example, safety issues, looking to past practices for future guidance is usually a prescription for failure.

It is necessary to note that the regulatory use of standardization has another and darker side. In two Supreme Court cases, American Society of Mechanical Engineers vs. Hydrolevel \textsuperscript{33} (1982) and in Allied Tube and Conduit vs. Indian Head \textsuperscript{34} (1988), the standards bodies were found to have abused their ability to impact the market. While the cases varied with respect to details, the economic power of the organization was cited as a major point of contention. In both cases, there were process violations on the part of the organization. It is the necessity to have a process - and the need to adhere to that process - which makes the association a subset of the formal process, since the formal process for developing standards, in the U.S. is created, maintained, and administered by American National Standards Institute (ANSI). The U.S. government has not created a national standards body. Instead, ANSI is the “first among equals”, the rule setter, the interface to ISO and the IEC, and currently the only organization that can give the \textit{imprimatur} of an American National Standard (ANS) to the specifications produced by most U.S. standards organizations. It does not, however, create standards. It has no expertise in the subject matter of standards; it has expertise only in the maintenance of its process.

A brief examination of the history of standardization within the U.S. is necessary to put an organization like ANSI into its proper perspective. Following the First World War, there was a national standardization initiative sponsored by Herbert Hoover to make sense of the chaotic state of standards in the U.S. Voluntary cooperation between the organizations was a goal; it was initiated in the Twenties and then stopped as the Depression began. However, following the Second World War, the initiative took off again and eventually the organization that was to become the American National Standards Institute (ANSI) came into prominence.\textsuperscript{35} While not a governmental entity, ANSI was meant to regularize standardization in the U.S. Several serendipitous legal incidents happened to strengthen ANSI’s hand (an antitrust case, a Congressional investigation), and eventually ANSI came out as the first among equals in U.S. formal standardization. It alone (of the myriad of standards organizations in the United States) has the right to publish standards which bear the appellation “American National Standard”; because ANSI does itself not create standards, it acts as a publishing arm for the more than 170 organizations which have
sought ANSI accreditation. At the same time, other nations (especially Germany, France, the U.K., and Japan) began to strengthen their nationally chartered bodies to pursue standards as a part of their national industrial policies.

A European-style national standards body makes sense in the context of the post-World War II industrial environment. Nations were trying to strengthen their individual industrial capacity; many were rebuilding after a devastating war. The creation of “standards” allowed an industrial policy that could be controlled (to varying degrees) by the nation. The U.S. chose instead to lead by encouraging the private sector to enter into standards partnerships. This allowed the trade associations to continue to act as “standards organizations”, while encouraging the formation of new organizations devoted only to standardization. Examples of this last include the Accredited Standards Committees (ASC) X3 (IT), X9 (Banking), X12 (EDI) and so on.

As national and regional economies became more interdependent, however, it was necessary to establish an international standardization authority. Following WWII, and with the growth of the internationalism, ISO was established and the IEC and ITU had more credence given them, so that there could be truly international standards. However, there is a cultural sensitivity that was overlooked at times - the concept of “international” did not necessarily mean “good” to a country, unless it was that country’s specification being carried forward. And since the basis of the international formal activity was the national body, the biases of the various national bodies were brought forward. Within the IT industry, the balance of power turned to the U.S., since U.S. based IT companies were more successful than their counterparts worldwide, due in some part to the larger size and homogeneity of the U.S. market, which made economies of scale possible for U.S. firms. With the economies of scale came the ability to innovate more quickly, which in turn fed the need and use requirements of users, leading to more innovation, an increased market, and increased sales. By 1985, the U.S. dominance in IT - in market share, in intellectual property, in research and development, and in deployed base - was firmly established. Because of this market dominance, the dominance of the U.S. in formal standards was also established; a majority of IT standards were those proposed or initiated by U.S. companies, either through the U.S. standardization bodies (e.g. ASC X3 or the IEEE Computer Society) or through U.S. company representatives acting in foreign standards bodies (such as the Deutsches Institute for Normung [DIN], the German national body where U.S. subsidiaries exercised heavy influence).

In the early 1990s, the European Community began to coalesce. One of the favored methods of creating a “single European market” was to require the various nations to abandon “unique” national standards in favor of “Pan-European” (or regional) standards. By eliminating a multitude of competing and conflicting
standards, a British manufacturer, for example, would not have to make multiple separate products or go through national conformance test regimes. By adhering to a single “pan-European” standardization regime, it was felt that European providers could begin to realize economies of scale, similar to those of the U.S. manufacturers. To further this purpose, the European Union recognized (or created) three Regional standards organizations - the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC), and the European Telecommunications Standards Institute (ETSI).

The mission for all of these groups was to “… promote voluntary technical harmonization in Europe in conjunction with worldwide bodies and its partners in Europe.” The key to understanding the activities of the EU is to remember that European National Body standardization activities were often a barrier to the unification of European economic activity. By requiring the unification of standards (and a common acceptance of a single standard), the EU was seeking to unify its markets and to provide for economic growth as a unified Europe.

This was not, however, the way that the activity was seen in the United States. The unfortunate appearance of ISO 9000 Quality Management series of standards in 1989 gave the impression that the Europeans were creating a “Fortress Europe” by using standards and certification schemes as non-tariff trade barriers. The debate was exacerbated by the use of common standards phrases with substantially different meanings, depending upon which side of the Atlantic Ocean you lived. The involvement of ANSI - at the behest of some of its members - began a long, torturous, and losing battle to stop the pan-European standardization activity. The requirement that the European national standardization bodies must accept a CEN standard, and that CEN has a “special” relationship with ISO gave rise to U.S. concerns that the vote in ISO could be rigged in favor of the Europeans, since the Europeans might vote in concert with one another.

However, the accusations by ANSI that the Europeans were block voting became (and remains) shrill. While this may be necessary for national positioning, it is not helpful to the IT industry, which has a substantial international market for its products. The appearance of a “National Standards Strategy for the United States” has placed IT companies with a significant presence in European standardization bodies in an awkward position - they must either accept the concept of an overriding U.S. national position or they must be willing to dismiss the statements of an organization in which many of them are members.

At the same time, the lack of clarity within the U.S. standardization regime has made many of its counterparts in ISO uneasy with ANSI. Because ANSI is only the “first among equals” in the U.S., it has no absolute mandate as the sole international representative of the U.S. at ISO. ANSI sits at ISO and the IEC because it is the single “most representative” body on all standardization, and because it
has the singular right to grant the title of an American National Standards (ANS) to a specification. This right is enforced by ensuring that those who wish to publish an ANS follow the ANSI procedures for creating standards. As noted above, ANSI has as its only contribution to standardization the process and coordination between groups. ANSI’s mission statement reads “ANSI does not itself develop American National Standards (ANSs); rather it facilitates development by establishing consensus among qualified groups. The Institute ensures that its guiding principles -- consensus, due process and openness -- are followed by the more than 175 distinct entities currently accredited under one of the Federation’s three methods of accreditation (organization, committee or canvass)”.

The way that a group becomes “qualified” is to embrace ANSI’s development rules - which are the “formal process rules”.

It is this “formal process” which is the value of the “formal organization”, whether a trade association doing standards, ANSI, any of the ANSI accredited Committees, or the international organizations of ISO. The process is specified; variations are not allowed. The mantra of ANSI is:

- Decisions are reached through consensus among those affected.
- Participation is open to all affected interests.
- Balance is maintained among competing interests.
- The process is transparent — information on the process and progress is directly available.
- Due process assures that all views will be considered and that appeals are possible.

Absent any of these conditions, an organization cannot become accredited. And because their fundamental rationale for existence may not meet the ANSI conditions, consortia have always been outside of the pale of formally accepted standards.

2. Consortia and Alliances

Within the IT standardization context, consortia and alliances are collections of like-minded organizations and/or individuals who come together to act as advocates for a particular change. The desired change may be a new specification, a new way of approaching a problem, or a new research and development activity. The legal basis of the organizational style known as “consortia” or “alliance” is found in the National Cooperative Research and Production Act of 1993 (15 U.S.C. §§4301, et seq.), which has as its purpose “…to promote innovation, facilitate trade, and strengthen the competitiveness of the United States in world markets by clarifying the applicability of the rule of reason standard and establishing a procedure under
which businesses may notify the Department of Justice and Federal Trade Commission of their cooperative ventures and thereby qualify for a single-damages limitation on civil antitrust liability. The Act lists a lengthy series of activities which are prohibited if an organization wishes to take advantage of the Act; in many cases, the charter of an organization specifically writes these prohibitions into their charter to make sure that participants understand the purpose of the organization is to encourage innovation and commercialization of technology (two purposes of the act.)

Consortia initially were created to deal with the “clarity and time to market” problem that was seen as a major obstacle in the formal arena. Much of the problem in the formal arena lay with its arcane rules for openness and review; several of the formal review process steps required six months and could expand to even more time. The consortia, responding to the pressure of “time is money, especially when the product life cycle was shrinking”, wanted a faster system. The proponents and opponents of consortia have focused on this “speed issue”, not realizing that increased speed was achieved in a consortium by changing the process. The argument has never been about speed; it has been about the process needed to achieve the speed necessary to satisfy the market needs of the members of the organization.

In most of the cases, the consortia modified the traditional standardization process by formally imposing some limitation on participation. The limitation usually took the form of dues - that is, there is a requirement to “pay to play.” The payment could be modest or significant (from approximately $3,000 per year to the $50,000 that large corporations are often taxed.) The consortia also announced their intentions - when you have like minded companies, you can announce and drive to a solution with a greater degree of freedom than can a formal SDO, which usually has no way of controlling where its efforts will lead. Finally, a consortium does not have to be broad spectrum - that is, it can focus on and solve only those problems that it wishes to solve. There is no requirement for it to create committees to solve all problems; rather it should (by definition) be working on problems that its members need to have solved in order to produce products.

Finally, and perhaps most damaging to the formal standardization process, consortia specifications are usually turned into product offerings immediately by the participating companies. The rationale for playing (and paying) within a consortium is to create and then market a technology. To participate in a consortium (paying both dues and committing scarce human resources) and then to not implement the specification when it appears is definitely foolish and possibly irresponsible, and is the exception more than the rule. Additionally (depending upon the cohesiveness of the consortia), the specification usually has one or more implementations that validate the specification.
There are two schools of thought on when and what to standardize. One school believes that standardizing current practice - that is, abstracting an interface specification from existing products - is the preferred method, while another school of thought revolves around standardizing future technology in its predeployment phase. The “current practice school” rewards the innovator by allowing a time to market and market share advantage, while embracing stability in the market and rapid deployment of technology. The other (future technology) permits a group design, combining the best of breed (at times), but is usually slower and can produce a specification that is filled with compromise. Both have been used successfully within consortia, but the standardization of current practice, in which the innovator opens a proprietary specification in return for a possibly transient market advantage, is usually the most preferred. The classic case used to argue for “current practice standardization” is the failure of OSI (Open Systems Interconnect), which involved standardizing technology that was not deployed and which was being created in committee. On the other hand, there is a reluctance to take a widely deployed but non-standard technology to the formal organizations, since there have been instances where formal organizations have attempted to change the technology once it arrived in their committees. When this (the changing of a deployed technology) happens, the worst of all worlds results - a standard that does not reflect installed base usage of the specification, so that one or the other is declared invalid. With either outcome, both sides lose.

Consortia are also slightly more informal in the coordination of their efforts. Unlike the formal world, where all of the players are known to one another and tracked, the consortia/alliance arena has no central clearing house or authority to coordinate activities. There are efforts made to track consortia, but new consortia appear in the IT arena at the rate of about one every other week. There is nothing to prevent multiple organizations from tackling the same general topic (i.e. wireless internet communications). This is encouraged by the organizations that fund the consortia and alliances, since having multiple solutions sometimes mitigates the impact of catastrophic technical change. What the industry does not like is two Standards Setting Organizations (SSOs) solving the same problem using the same specifications (dueling specifications) or a specification being bifurcated and modified. This is where much of the concern about standardization comes in – and the old tired rubric of “The nice thing about standards is that there are so many of them” is brought up. It is duplicative standards – not duplicative standardization efforts – that are the bane of the industry.

The consortia processes are rigorous, since they must comply with the provisions contained in the National Cooperative Research and Production Act of 1993, under which many of them are chartered. There is an area of expertise on the legal implications of the creation of consortia, and nearly every consortium that is created...
requires the services of at least one lawyer.\textsuperscript{51} Consortia operate as strictly under their rules as formal SDOs operate under theirs. If they fail to keep their processes legitimate, they risk all of their members and their own existence. The emphasis that consortia place upon following their rules is illustrated by the fact that, as of this writing, there has never been a successful suit brought against a consortium for anti-trust activities.\textsuperscript{52}

Consortia and alliances (their more short lived brethren) serve a need of the IT industry as a way to stabilize the market in a time of shortened product life cycles and rapid market change. By providing processes that are open, and by providing the market with multiple implementations of the consortia specification, they have increased competition and ensured that the standardization of the high technology industry can continue.

3. Open Source

Open Source is another form of standardization, and is probably the most expensive type of standardization in which an organization can engage, since participation and use of open source code may require that an organization change its fundamental licensing principles with respect to its intellectual property (IP).\textsuperscript{53} In all of the other organizational types, the contributing organization can choose the terms and conditions of its giving, as long as the terms are reasonable and non-discriminatory. The difference is that with open source, the terms and conditions of the grant are mandated in the particular licensing agreement chosen by the group.

The reason for the allure of Open Source is contained in writings by the philosopher and activist of the Open Source movement - Eric Raymond, in the Cathedral and the Bazaar\textsuperscript{54}, and Jamie Zawinski (formerly of Netscape who convinced Netscape’s management to make the source for Netscape’s browser into open source and call it Mozilla). Linus Torvalds led the creation of the popular Operating System named Linux in the same philosophical frame - which is open for all to use without exception or restriction, other than the requirement to act as part of the community. The movement has caught mindshare and market share, and many large corporations are embracing the Linux phenomena, hoping later that they can find the method to profit.

The key to understanding the open source community understands the license. The licensing itself is complex; there are at least five variants:\textsuperscript{55}

1. No license at all (i.e., releasing software into the public domain).
2. Licenses like the BSD License that place relatively few constraints on what a developer may do (including creating proprietary versions of open source products).
3. The GNU General Public License (GPL) and variants which attempt to constrain developers from “hoarding” code, i.e., making changes to open-source products and then not contributing those changes back to the developer community, but rather attempting to keep them proprietary for commercial purposes or other reasons.

4. The Artistic License, which modifies several of the more controversial aspects of the GPL.

5. The Mozilla Public License (MozPL) and variants (including the Netscape Public License or NPL) which go further than the BSD and similar licenses in discouraging “software hoarding” but which still allow developers to create proprietary add-ons if they wish.

The intent of these various forms of licenses is to ensure that the code remains open for all to use, validate, modify, and improve. These license forms, more than anything else, are the core of the Open Source standards movement. They encourage the community to act together, and act as a re-enforcing mechanism for “open source behavior” (which is a larger good to which all standards organizations must subscribe). By tying their unique behavior to licensing activities, they are then freed to espouse rules that re-enforce the benefits of open source licensing – including rules on how to write code, how to publish code, how to correct code, and so on.

The good aspect of open source is that there are multiple implementations of the code - anyone who wishes may take the source code and write an implementation. The difficult aspect of Open Source is that there is never a stabilized standard set of source code to specify, since by its very nature, Open Source is a constant and incremental improvement in a code base. However, the creators and purveyors of Linux are working on this, and are attempting to create a Linux standard that will solve this problem. If this problem is solved (basically, a version control problem), then the Open Source organization will also be a viable candidate for procurement.

4. Conclusion

All of the various forms of standardization can and do serve a purpose in the IT sector. There is the need for stability (provided by the formal arena), a need for defined and structured faster change (provided by consortia and alliances) and the need for complete community involvement (provided by open source.) The groups within each arena have not learned to work together for the good of “open systems”. Rather than considering proprietary and closed systems to be the force to be changed, they have dissipated their energies arguing about which form of standardization is best, forgetting that the answer is that “Standardization is best, and non-standardization is less than optimal.” ANSI is a necessary, but not sufficient,
standardization component for the needs of the IT sector. Consortia are central to IT standardization success - but need the stability that the formal process can offer. And for long-term change (to both the technical and legal fabric of IT sector standardization), open source is an interesting direction and may lead to an entirely different standardization environment in the future.

Standardization is a complex discipline that is constantly changing as the industry underneath it evolves. The last decade in the IT industry have seen massive change as the very nature of information use and sharing by customers has changed. The state and changes in the IT industry in the United States reflects the state and changes of its consumers - U.S. society, both commercial and private. The IT sector has been credited with making the U.S. economy much more productive, and this has aroused admiration throughout the world.56 Uniting the various forms of standardization by allowing equivalency - in legal as well as in economic settings - would only enhance the industry. It is one of those rare situations that has no negative consequences to the industry or society.

APPENDIX B: AIR FORCE COMPUTER ACQUISITION CENTER RFP 251

In the mid-80’s the Air Force was preparing a very large procurement for computing equipment in which it wanted to replace/upgrade its aging systems (Air Force Standard Multi-user Small Computer Requirements Contract). Specifically, it needed to get UNIX environments, but (1) there was no formal standard, and (2) there was no publicly available test suite to test that the systems procured under this contract would meet the functional requirements laid out in the RFP.

This was the time frame in which there were a multitude of UNIX variants that could not necessarily interoperate. Most were based on either BSD, developed at Cal Berkeley or Unix System III developed by Bell Labs Unix Development Laboratory. It was crucial that this procurement not result in yet more non-interoperable systems. At the time, AT&T Bell Labs had heavily invested in Unix as the steward of what was in essence a precursor open source development effort where hundreds of universities and other research facilities had helped to collaboratively evolve the Unix specification.

The Air Force, after close examination of the alternatives, decided to require that systems bid for its procurement (AFCAC 251) must conform to AT&T’s SVID (System V Interface Definition), where it cited specific publicly available texts that contained the specification.

At the time, AT&T also provided a Conformance Test Suite to test conformance of an implementation to the SVID. This test suite, SVVS (System V Validation
Suite) was only available from AT&T. AFCAC 251 required passing the SVVS as a condition of the procurement.

When this RFP was released, a formal protest was filed by a number of companies objecting that this procurement was not based on a formal standard, but on a proprietary, copyrighted specification. Further, and more importantly, it was claimed that the SVVS could not be used because it was the proprietary property of a potential bidder. The resulting protest was very high profile, lengthy, and very costly for all parties involved. In addition it resulted in significant delays to a critical federal procurement.

AFCAC 251 was the impetus for the proposal, and adoption, of Federal Information Processing Standard (FIPS) 151. FIPS 151 was based on the then maturing work of the IEEE Computer Society’s POSIX standards committee. POSIX was an operating system specification standard based on the Unix specification provided in the SVVID. Further, the National Bureau of Standards (NBS, now NIST) prevailed in establishing a test methods working group for POSIX that developed the POSIX Test Methods standard. This standard was used, along with the SVVS donated by AT&T, as the basis for the development of FIPS 151 PCTS (POSIX Conformance Test Suite) by NIST with the assistance of experts from a number of IT companies and organizations under a Cooperative Research And Development Agreement (CRADA). NIST then established an accredited POSIX test laboratory program and required the use of the PCTS in the certification of conformance of an operating system to FIPS 151.

So, how does this support the need for clearer rules for the use of Consortia standards as equals to formal standards?

Today, the leading edge evolution of most critical IT technologies is occurring in consortia, not in formal Standards Developing Organizations (SDOs). The government will be able to obtain the best information technology by requiring conformance to these consortia specifications. In the case of AFCAC 251 this would have resulted in the savings of many millions of dollars that was spent by the government and the protesting companies in defending/pursuing the AFCAC 251 procurement protest. In addition, the systems needed by the Air Force would have been obtained in a much more timely manner.

**APPENDIX C: DISA’S USE OF FIPS CERTIFICATION**

One element of DISA’s Defense Information Infrastructure Common Operating Environment (DII COE) is the identification of processor and OS platforms and software that will form the foundation of the COE, also called the DII COE Kernel. DISA’s customer needs (DISA’s customers are the CINCs, services and agencies
within DoD) has resulted in DISA maintaining three platforms as “COE compliant” including Solaris, HP-UX and Window NT/2000.

Responding to vendor assertions that they were being denied access to programs that required COE compliance, yet had no way to achieve that compliance (DISA, for cost reasons, would not undertake the effort, and there was no way for the vendor to do the work themselves), DISA established the Kernel Platform Certification (KPC) program.

The program requires four main items for acquiring a DII COE Kernel compliance certificate. These include:

- Providing a FIPS 151-2 certificate of Posix compliance
- Completing several test suites out of the UNIX98 branding suite maintained by the Open Group
- Successful porting of the COE "kernel code" to the candidate platform, and completion of a series of test suites that verify proper operation.
- Passing a security checklist that is roughly equivalent to commercial grade security (e.g. passwords for all accounts, access controls, etc.).

DISA has indicated that they expect the three platforms that they currently maintain in the COE will be kept COE compliant by their respective owners using the KPC program. The issues with the KPC are twofold. The first is that the KPC program addresses only Posix-compliant platforms. Windows NT and 2000 are not subject to its requirements, and DISA maintains that Windows OS “compliance” is essentially satisfied with a pointer to Microsoft documentation.

The second issue, which is more relevant to the standards availability theme, is that the lack of an alternative to the now withdrawn FIPS 151-2 has forced DISA to continue to use that obsoleted standard. DISA had investigated simply pointing to UNIX branding maintained by The Open Group, but this ran into an interesting problem. Other vendors successfully objected to this approach because The Open Group method of implementing Unix98 branding requires an ongoing commitment and subscription to the program with TOG. This apparently violates an acquisition law that prohibits the government from requiring vendors enter into long term, third party agreements in order to do business with the government.

The current solution, which DISA negotiated with The Open Group, is to specify a subset of the specific test suites desired by DISA, and which The Open Group will offer up to vendors on a modified basis that eliminates the long-term commitment. The FIPS 151-2 specification is still used, but is expected to be replaced by the Austin group’s specification within the next 6-12 months.
ENDNOTES

1 The Economist Newspaper, 23 February, 1993

2 An open standard is a standard which is not under the control of a single vendor and which is easily available to those who need it to make products or services.

3 While the NIST usage referred to technologies which are the basis of standards, today’s Internet and web standards are becoming the infratechnology upon which e-Business, e-Commerce, and all of the other “e-” activities are being built.


5 Libicki, Martin C. Scaffolding the New Web: Standards and Standards Policy for the Digital Economy, RAND, Santa Monica, CA, p. xi (http://www.rand.org/publications/MR/MR1215/)

6 These were the ANSI accredited standards committees called Accredited Standards Committee (ASC) X3 and Accredited Organization (AO) IEEE (Computer Systems). Approximately 85% of the key standards were created in X3, including storage interconnect, languages, and so on. The IEEE dealt with physical interconnects (such as local area networks) and eventually moved into software interfaces.

7 In 1996, X/Open was merged with the Open Software Foundation to create The Open Group. X/Open was originally created in Europe to embrace and extend UNIX® to limit the spread of U.S. companies into the European IT arena. After ten years of existence, and before its merger, it was largely dominated by major U.S. IT providers, with Siemens as its sole surviving European member.


9 The reason that consortia are often more visible within a company that are formal organizations is that consortia are more directly tied to the product success of a company. A company will join a consortium to promote the creation of a specification that it needs for market reasons - there is an imperative behind the consortia’s creation. The same imperative is not necessarily found in formal organizations.

10 The IETF describes itself in the following way: The Internet Engineering Task Force (IETF) is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of
the Internet architecture and the smooth operation of the Internet. It is open
to any interested individual. The actual technical work of the IETF is done
in its working groups, which are organized by topic into several areas (e.g.,
routing, transport, security, etc.). Much of the work is handled via mailing
lists. The IETF holds meetings three times per year. The IETF working groups
are grouped into areas, and managed by Area Directors, or ADs. The ADs
are members of the Internet Engineering Steering Group (IESG). Providing
architectural oversight is the Internet Architecture Board, (IAB). The IAB
also adjudicates appeals when someone complains that the IESG has failed.
The IAB and IESG are chartered by the Internet Society (ISOC) for these
purposes. The General Area Director also serves as the chair of the IESG and
of the IETF, and is an ex-officio member of the IAB. See http://www.ietf.
org

11 See http://www.w3.org/Consortium/ for a detailed description of both the
creation of the underlying vision of the Web by Tim Berners-Lee and the
initiation of the W3C by MIT, INRIA, and Keio University.

12 In the case of HTML 3.2 (a specification developed and promulgated by
W3C), ISO/IEC JTC1 SC18 (the committee charged with standardization of
this technology) tried to standardize HTML 3.2 with “JTC1 improvements”,
but only after W3C had standardized HTML 3.2, the users had implemented
it in millions of Web sites. After serious negotiations by W3C and major us-
ers and providers, SC 18 agreed not to make their standard different from the
W3C standard, which was in widespread use.

13 The Economist Newspaper, “The Age Of The Cloud, Survey Of Software”,
Special Supplement, April 4th, 2001, 111 West 57th Street, New York, NY
10019-2211

14 Spring and Weiss discuss the problems of private sector funding of the formal
standards organization in their article in Financing the Standards Develop-
ment Process pp. 289-320, in Standards Policy for Information Infrastructure,

15 Weiss, Martin and Carl Cargill. “Consortia in the Standards Development
Process” Journal of the American Society for Information Science 43(8)
(1992):559-565

16 Updegrove, Andrew, “Consortia and the Role of the Government in Standard
Setting”, pp. 321-348, in Standards Policy for Information Infrastructure,
edited by Kahin, Brian and Abate, Janet, MIT Press, 1995,

17 Ketchell, John, at The CEN/ISSS web site, http://www.cenorm.be/isss/Con-
sortia/Surveyshort.htm

18 Updegrove, op. cit., p. 327.
The rationale for this list of attributes derives from conversations with staff members of the House of Representatives Sub-Committee On Technology, Environment, and Standards, Daniel Weitzner of W3C, Stephen Oksala (Vice President, Society of Cable Telecommunications Engineers), Oliver Smoot (Chairman of the Board, ANSI), Dr. Mark Hurwitz (President, ANSI), Dr. D. Linda Garcia (Georgetown University), and others on how to describe a “good consortium”. It is based upon experience (both good and bad) of the participants in many discussions, but especially to those in the W3C Patent Policy Working Group.

Updegrove, op.cit., p. 338

Ibid., p. 338

ISO rules state: If the proposal is accepted on technical grounds, the originator shall ask any holder of such identified patent rights for a statement that the holder would be willing to negotiate worldwide licences under his rights with applicants throughout the world on reasonable and non-discriminatory terms and conditions. Such negotiations are left to the parties concerned and are performed outside the ISO or IEC. A record of the right holder’s statement shall be placed in the registry of the ISO Central Secretariat or IEC Central Office as appropriate, and shall be referred to in the introduction to the relevant International Standard (see item e) below). If the right holder does not provide such a statement, the technical committee or sub-committee concerned shall not proceed with inclusion of an item covered by a patent right in the International Standard without authorization from ISO Council or IEC Council as appropriate. ISO/IEC Directives, Part 2, 1992 (as amended) [Annex A, A.2, b)] http://isotc.iso.ch/livelink/livelink/fetch/2000/2123/SDS_WEB/sds_ipr.htm

The criteria here are a combination of the requirements of the IETF (running code and dual, competing implementations) and the testing regime of the UNIX® specification, run by The Open Group. The purpose of the conformance testing regime is to ensure that organizations claiming conformance to the specification actually do conform. However, it must be noted that the requirement for testing is contentious, as providers in the IT sector tend to favor “self testing and self certification” to testing provided by third parties. Allowance should be made to allow the consortium members the right to determine what level of testing they want; at the same time, the market, which on occasion has demanded third party testing, will be the ultimate arbiter of the decision.

U.S. Congress, Global Standards, op.cit., p. 14, footnote 23

PL 104-113 is an act to amend the Stevenson-Wydler Technology Innovation Act of 1980, Public Law 96-480.
OMB Circular A-119; Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities


“Balance of interest” is a term referring to the need to have equivalent interests (vendor, user, and others) have equal representation in an organization or in a development committee. As noted, a consortium is composed of those interested enough in a technology to commit resources (usually financial) with the hope of receiving a return on their investment, usually in the form of a specification that can be employed in some form of commerce.

Ibid.


The concept of sectoral approach in standardization is presented in ANSI’s National Standards Strategy for the United States, Section V, (http://www.ansi.org/Public/nss.html)

A significant difference of the IT sector with other sectors is that, within the IT industry, we are, in the main, speaking of voluntary market driven standards, which are left to the discretion of the provider to supply. It is important to note that the majority of unique IT sector standards are interface standards describing a particular systems interface. They do NOT deal with safety or environmental activities. They are optional in a product - depending upon the business model of the vendor. Standards of this type are (and will continue to be) one of the costs of doing business, just as is translation of instruction manuals into a native language.

The ASTM seems to have completely morphed into a standardization organization, and, while it maintains a “Yellow page listing” of consultants and expert witnesses, it doesn’t seem to be educating testing experts. The mission statement of the ASTM reads: “To be the foremost developer and provider of voluntary consensus standards, related technical information, and services having internationally recognized quality and applicability…” With a complete yearly set of ASTM standards costing nearly $7000, and with ASTM standards being cited in legislation, one can understand why the ASTM has moved entirely to standardization activities. (http://www.astm.org/NEWS/Mission2.html)

http://www.antitrustcases.com/summaries/456us556.html

http://www.antitrustcases.com/summaries/486us492.html

From ANSI’s web site, their description of themselves: The American National Standards Institute (ANSI) has served in its capacity as administrator and coordinator of the United States private sector voluntary standardization system for more than 80 years. Founded in 1918 by five engineering societies and three
government agencies, the Institute remains a private, nonprofit membership organization supported by a diverse constituency of private and public sector organizations. (http://www.ansi.org/public/ansi_info/intro.html)

The Institute ensures that its guiding principles -- consensus, due process and openness -- are followed by the more than 175 distinct entities currently accredited under one of the Federation’s three methods of accreditation (organization, committee or canvass). (http://www.ansi.org/public/ansi_info/national.html)


Between 1983 and 1989, the EU began to focus on its internal market and the plethora of standards available within Europe. As a result, the “Council Resolution of 7 May 1985 on a New Approach to technical harmonization and standards” was passed in 1985, establishing the principles of European standardization. The essential outcome of all of these activities was to gain a “…national commitment [that] formal adoption of European Standards is decided by a weighted majority vote of all CEN National Members and is binding on all of them” (http://www.cenorm.be/aboutcen/whatis/objectives.htm).

ISO 9000 is an entirely problematic standard. It was originally started as a U.S. Air Force standard in the 1960s, adopted by the British in the 1970s, and then sent to ISO in the 1980s. It is a “management standard”, which means that it doesn’t tell you “how to do quality”, but rather “how to manage a quality program, including the necessary paperwork and records retention”. The appearance of this standard and its rapid acceptance and “mandatory use” (including third party certification) in many European companies and government procurements left a bitter legacy with U.S. companies who were “forced” to comply with third party testing.

See the “CEN Constitution and Organization” at http://www.cenorm.be/boss/co000.htm#b1 for the complete text, recognizing the Vienna Treaty and the common European norms.

At a presentation at the American Academy for the Advancement of Science (17 February 2001, San Francisco), ANSI President and CEO Mark Hurwitz stated that he believed that the Europeans engaged in block voting to stop U.S. SDO initiatives. From a national point of view, this has significance; from an international point of view (that normally taken by multinational companies), the existence of a standard that is meant to satisfy a large potential market (325 million people) is of substantial interest and is worth investigating and possibly implementing.

Printing Office, March 1992), pp. 13-14 for a view of the U.S. standardization process which haunts the U.S. to this day in Europe.

43 From ANSI Online, ANSI’s web site, cite: http://www.ansi.org/public ANSI_info/national.html

44 It is interesting to note that both major international standardization organizations - ISO and the IEC have, within the last four years, adopted processes to recognize “Industry Technical Agreements” (ITAs), which allow any organization as “open” to progress a common industry practice through a lightweight process to achieve the appellation of either an ISO or IEC ITA. The senior organizations have recognized the need within their primary markets for a quicker and faster way to gain widespread recognition of a specification that is widely accepted, but possibly does not need the rigor of their full process. See http://www.iec.ch/ita-e.htm for a description of the IEC program, and http://www.iso.ch/presse/ita.htm for a description of the program at ISO.

45 http://caselaw.lp.findlaw.com/casecode/uscodes/15/chapters/69/sections/sec

46 A typical statement, taken from the proposed sponsor agreement of one consortium, is “Nothing in this Agreement shall be construed to require or permit conduct that violates any applicable Antitrust Law. A Sponsoring Member consents to the disclosure of its name as a member of the Corporation, for the purpose of permitting the Corporation to invoke the protection of the National Cooperative Research and Production Act of 1993 (15 U.S.C. §§4301, et seq.), if the Corporation decides to invoke such protection.”

47 It has been argued by several members of consortia that the travel and meeting requirements of formal organizations constitute a membership limitation, as very few private citizens have the ability to travel to all of the meetings of an international technical committee where the technology is decided. Some of the consortia with Internet based processes claim that their consortia dues are less than a participant would pay in travel costs.

48 The business case behind this type of decision is usually very complex and filled with enough vagaries to make the prediction of success purely Brownian. Normally, it comes down to a senior executive being willing to take a chance and go forward with opening a technology to the market.

49 The IT sectoral organization under CEN (CEN/ISSS) undertakes to maintain a list and description of consortia. It currently lists/links to approximately 260 consortia working in the areas of IT, either publishing specifications or specifying requirements. It is available at: http://www.cenorm.be/issss/Consortia/Surveyshort.htm

50 This statement amplifies the contention that there is a lack of education about standards and standardization.

The closest successful suit was the Addamax anti-trust suit that was lost and lost again on appeal. (United States Court of Appeals For the First Circuit No. 97-1807, Addamax Corporation, Plaintiff, Appellant, V. Open Software Foundation, Inc., Digital Equipment Corporation, and Hewlett-Packard Company, Inc, Defendants, appellees, Appeal From The United States District Court For The District Of Massachusetts).

The most popular types of licenses (Mozilla, GPL, and Berkeley) do not require that the owner of IP to give up the rights to their IP. Rather, these licenses require that the owner of the intellectual property grant broad, perpetual, and non-restrictive rights to use the IP, in effect making all of the users equal. The broad nature of the grant - in which the IP owner reserves few or no rights - is what has given many the impression that open source can be equated with forfeiting IP rights.

Available at http://www.tuxedo.org/~esr/writings/cathedral-bazaar/


“Despite the relatively modest share of ICT [Information and Communication Technologies] manufacturing in total U.S. production - 8% of total - the remarkable acceleration of productivity in that specific sector has contributed a disproportionately high 0.6% a year to total U.S. labour productivity growth.” From “Europe in the e-Economy - Challenges for Enterprises and Policy-maker”, Patrick Vittel-Philippe (Expert Advisor, DG Enterprise, European Commission), p.2
APPENDIX 5: THE "REPORT"

BEYOND CONSORTIA, BEYOND STANDARDISATION? NEW CASE MATERIAL AND POLICY THREADS

October 2001
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Management Summary

Current standards policy appears to be caught up in a polarised discussion about what type of organisation best serves the market for democratic and timely standards: standards consortia or the traditional formal standards bodies. The general feeling is that standards consortia work more effectively, but that they have restrictive membership rules and are undemocratic. The latter is a cause of concern for the European Commission, which requires democratic accountability in the standards process if it is to refer to such standards in a regulatory context. The Commission’s request for new input on how to deal with consortium standards is set against this background.

Aim

The Standardisation Unit of DG Enterprise had two objectives when it issued this grant to the Delft University of Technology. It sought:

• **New case material:** The aim was to acquire contemporary case material that illustrates how consortia work, why sometimes consortium standardisation is preferred to formal standardisation, and whether consortia work in ways that will deliver open standards.

• **New policy threads:** The aim was to develop a perspective on consortium standardisation that clarified its significance for EU standards policy. This required re-examination of current understanding of standards consortia, and of the underlying assumptions. Does the way the problem of standards consortia is defined - i.e., that their procedures are restrictive and undemocratic, and that their standards are therefore unfit as an instrument of regulatory governance - accurately describe what is at stake?
Methodology

Two case studies took place: Java standardisation in ECMA, an International Industry Association for Standardising Information and Communication Systems, and standardisation of the Extended Markup Language (XML) in the World Wide Web Consortium (W3C). Data was gathered, foremost, by means of participant observation, i.e. attending ECMA standards committee meetings, interviews with committee participants, face-to-face and by email, and content analysis of (electronic) documents and emails regarding the standards process.

Structure of the Report

The report consists of three parts. The two cases are presented in part I. Dominant assumptions on consortium standardisation are confronted with the case findings in part II. The current basis for standards policy is examined, and new policy threads are developed. Conclusions are drawn and recommendations are made in part III.

Conclusions

Why is consortium standardisation sometimes preferred to formal standardisation?

Consortia successfully market their feats. They are associated with timely standardisation and pragmatic standards solutions, despite some critical observations to the contrary. This, and possibly the homogeneity and suggested exclusiveness of consortium standardisation, attracts companies. The two cases further show that (a) some consortia are used as a stepping stone for formal standardisation, (b) consortia are often equally relevant with respect to market co-ordination, and (c) changing a formal standard significantly is easier if the standards work is moved to a different setting, i.e. standards consortium.

Does the current definition of the problem of standards consortia accurately describe what is at stake?

No, it does not. A redefinition of the problem is desirable, one which addresses the themes of democracy and compatibility.

Democracy. According to the dominant view, consortia lack openness and are undemocratic. This view underestimates the openness of most industry consortia and overestimates the democratic procedures of formal standardisation. The research findings indicate that formal standards bodies and standards consortia work
in similar ways. Consortia, too, strive for consensus, address minority viewpoints, etc. Although the latter more explicitly target industrial parties, both settings include and exclude the same constituencies. The framework of rivalry merely leads to new hybrid forms of organisation like the CEN workshops. Speculating somewhat, these will not lure companies away from consortia but instead lead to a shift within the CEN standards domain away from the more formal procedures. Moreover, it by-passes the more significant difference between standardising and not-standardising. The real issues lie at a higher level.

Compatibility. The cases further highlight that company and government policies overly emphasise the means of standardisation while largely bypassing its aim, namely technical compatibility. The latter can also be achieved by other means than standardisation. Among these are the proprietary and open source strategies to Information and Communication Technology (ICT) development. In certain circumstances, the latter strategies are more effective in achieving compatibility than standardisation. A more systematic inventory of compatibility-enhancing strategies is needed to supplement those deduced from the findings of the case studies.

Recommendations

The report pleads, firstly, for a European standards policy that bypasses possible rivalry between standardisation settings, goes beyond the inclusion of consortium standardisation, and works towards a differentiated standards policy. The latter should, on the one hand, reflect a pragmatic view where the majority of market standards is concerned (e.g. more exclusive, multi-party committees; focus more on standards implementation and market co-ordination). On the other hand, it should give more substance to the aim of democratic accountability which is required in de jure contexts. Secondly, a policy is desirable that goes beyond the standards process and centres on the objective of compatibility. This vantage point puts ‘the consortium problem’ into a very different, and clearer perspective. The Commission is therefore recommended to focus its policy on compatibility strategies, and not to restrict itself to standardisation. It is recommended that companies and governments re-assess their standardisation policy from the de facto compatibility standpoint.

Questions Raised

The report raises several questions. An important one concerns a difficult issue in the ICT field, namely that the supply-side of the market often lacks the necessary incentives to prioritise compatibility. What mechanisms does the public, i.e. the demand-side of the market, have at its disposal to advance collective compatibility interests? Would it be desirable legally to anchor compatibility interests in a way...
similar to that of how intellectual property interests are presently represented in regulation?

Foreword

This report presents the findings of a study on consortium standardisation, a project funded as a spontaneous grant by the European Commission DG Enterprise/Standardisation Unit, and with additional funding from Verdonck Holding B.V. and the Delft University of Technology. It took place in the period January 2000 - June 2001 (draft report), and was finalised in September - October 2001.

There are several people whom I want to thank personally. First of all, Jan van den Beld (ECMA) and Christine Berg (DG Enterprise Standardisation Unit) for starting me off in a very efficient way; the members of the Commission of Recommendation Prof. Theun Bruins, Wim Verdonck, and Prof. Wim Vree for providing the necessary contacts, the additional financial support, and comments on papers, respectively; Arjan Loeffen for his crucial part in the W3C case; Willem Wakker for the discussions, the cooperation, the interesting material, and for commenting on papers; Richard Hawkins, Raymund Werle, and my colleagues of the ICT department for commenting on papers and ideas; ECMA TC41 members and the interviewees (see Appendix I); and last but not least members of the European Commission’s Standardisation Unit/ DG Enterprise: Mr. Vardakas and Didier Herbert for their critical comments on the intermediary product, and Christine Berg, Christopher Roberts, and Michael Kirosingh, for their valuable advice along the way. They need not agree with the contents of this report.

Amsterdam, 17 October 2001

1. INTRODUCTION

In the past, the European Commission has always been very committed to formal European and international standardisation. For the reader who is less familiar with the issue at hand, formal standardisation refers to the voluntary consensus standards processes that take place in technical committees under the auspices of national, regional (e.g. European), and international standards bodies. The procedures that govern these committees express democratic values, aim to be inclusive (e.g. Public Enquiry of the International Standardization Organization (ISO) allows all interested parties that did not participate in drawing up a standard to comment on the draft standard), and reflect the desirability of a technical and politically neutral standards process (e.g. in the approval stage of a standard only the negative votes
which are accompanied by technical arguments are counted). At stake is what could be called a *democratic ideology* (Egyedi, 1996). Its characteristic features are, for example, decision making by consensus; voluntary application of standards; broad constituency of (national) delegations; well-balanced influence of national members in the management of international standards bodies; and impartial, politically and financially independent procedures.

Formal standards are an important point of reference for European regulation (New Approach, 1985) and public procurement. Furthermore, formal standards have been at the basis of a harmonised European market. However, in the field of information and telecommunication technologies standards have emerged with high market relevance, standards that stem from other sources than the formal standards bodies. Examples are Adobe’s Portable Document Format (PDF), the Internet standards developed by the Internet Engineering Task Force (IETF), and the Extended Markup Language (XML) recommendation developed under the auspices of the World Wide Web Consortium (W3C). How should these (de facto) standards be dealt with? Should the Commission revise its exclusive focus on the formal standards bodies, or should it encourage assimilation of these de facto standards by the formal standards institutions?

Questions to this intent are also raised in the European Council Resolution of October 1999 (Article 14). The Council observes “(...) an increasing tendency of interested parties to elaborate technical specifications outside recognised standardisation infrastructures” (Article 7). An important source for developing such specifications -and one on which the current research was requested to focus¹-is the standards consortium². A standards consortium is defined here as “an alliance of firms and organisations, financed by membership fees, formed for the purpose of coordinating technology development and/or implementation activities (…)” (Hawkins, 1998, p.1) Its outcomes are publicly available, multi-party industry specifications or standards. Usually its members are large companies, which indicates that the resulting standards are likely to be very relevance for the market. These consortia are also referred to as ‘market-driven consortia’ (CRE, 2000).

The common feeling is that standards consortia work more effectively than the formal standards bodies do. But, according to the same sources, their disadvantage is that they have restrictive membership rules and are undemocratic. The latter is a cause of concern for the European Commission, which requires a minimum degree of democratic accountability if it is to refer to such standards in a regulatory context. At first sight, the Commission seems to face a policy dilemma: adhere to a principled approach, one that prioritises a democratic standards process, or pragmatically include undemocratic consortia as a source of standards. The Commission’s request for new input on how to deal with consortium standards is set against this background.
Objectives

The current research was initiated, firstly, to provide contemporary case material that illustrates how consortia work, why sometimes consortium standardisation is initiated rather than formal standardisation, and whether consortia work in ways that will deliver open standards. For, although the phenomenon has been identified and studied since the early 1990s (e.g. Bruins, 1993), few case studies of consortium standardisation exist.

The second objective was to develop a new perspective on consortium standardisation that clarifies its significance for EU standards policy. This requires re-examination of current understanding of standards consortia, and of the assumptions and beliefs that underlie it.

Method: Case Studies

Initially, one consortium standards process was to be studied from start to end by means of participant observation (i.e. attending standards committee meetings), and interviews with committee participants. Concerned was standardisation of Java, a key network technology owned by Sun Microsystems, in the ECMA consortium, an International Industry Association for Standardising Information and Communication Systems. However, after two meetings the ECMA standards committee was prematurely disbanded. Since this reduced the time needed for data gathering, there was time left for a brief examination of a second case: standardisation of the eXtensible Markup Language (XML) by the World Wide Web Consortium (W3C). XML is presently viewed as a very important standard for structured information exchange. Since the standard was already finalised, data gathering for this case was done by means of document analysis, interviews with experts, and their feedback on the resulting working paper.

Structure of the Report

The structure of the report is as follows. In Part I, the two cases are presented. They can be read separately. In Part II current assumptions on consortium standardisation are confronted with the case findings. The current basis for standards policy is examined, and new policy threads are developed. In Part III conclusions are drawn and recommendations are made. The project has led to a number of papers and articles. These are listed in Appendix II.
PART I: CASES OF CONSORTIUM STANDARDISATION

Industry consortia differ. Some focus solely on the development of technical standards or specifications: standards consortia, or specification groups (Updegrove, 1995). As the CEN/ISSS website indicates, there are many such consortia (CEN/ISSS, 2000). They may be R&D-oriented and pre-competitive (research consortia, Updegrove, 1995; proof of technology consortia, Weiss & Cargill, 1992), or focus on heightening the usability of existing standards (implementation and application consortia; Weiss & Cargill, 1992). Other consortia foremost aim to promote the adoption of a certain technology and seek the support of a business community (strategic consortia, Updegrove, 1995). To achieve a critical mass, suppliers of primary technologies and providers of complementary products and services must be directed along defined paths (Hawkins, 1998). To this end, consortia may rally support by organising educational activities for users of standards (Hawkins, 1999) or by combining promotional activities with specification development. In sum, although there are many differences between consortia, their common emphasis is on co-ordinating a segment of the market.

In this part of the report, two contemporary cases of consortium standardisation are presented: the industry consortia of ECMA and W3C. The ECMA, which was founded in 1961, is one of the oldest standards consortia, while W3C, a consortium founded in 1994, is one of the younger ones. Both of them foremost seek the support of the business community and focus on developing standards (-according to the above typology: they are both specification group and strategic consortium). More specifically, the cases of Java standardisation in ECMA (1999-2000), and XML standardisation in W3C (1998) will be described. The findings shed light on questions such as why consortium standardisation is initiated, how consortia work, and whether consortia work in ways that will deliver open standards. An analysis follows in Part II.

In order to present the case findings in an interesting way, questions have been formulated that draw out the main characteristics of the cases. In the case of Java standardisation (Chapter II), the red thread is the question why a company would want to standardise its technical specification if the latter is already a de facto standard. The account is based on extracts from an article titled “Why Java was -not standardised twice” (Egyedi, 2001b, see Appendix II). In the XML case, another puzzling element is addressed. According to its developers, the XML standard is based on the Standard Generalized Markup Language (SGML), a standard developed in the formal standards setting (ISO/IEC JTC1). Why did XML developers, most of whom were SGML experts, choose to standardise XML within the World Wide Web Consortium rather than in JTC1? To a large extent, this chapter (Chapter III) is an extract of “Succession in standardisation: Grafting XML onto SGML”
Appendix

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(Egyedi & Loeffen, see Appendix II). Specific case-bound literature is included at the end of both chapters. General literature in included in the main reference list of this report.

2. JAVA IN THE ECMA CONSORTIUM

When Sun Microsystems approached the ISO/IEC Joint Technical Committee 1 (JTC1) to standardise its Java™ Technology in 1997, Java was already well on its way to become a de facto standard. Sun became a recognised submitter of Publicly Available Specifications (PAS) late 1997 but refrained from using its submitter status, allegedly because JTC1 had changed the PAS procedure in a way that would make the actual acceptance of the Java specs difficult. In April 1999, Sun approached the ECMA standards consortium, an international industry association for standardising information and communication systems, for the same purpose. If Java became an ECMA standard, it could be submitted to JTC1 by way of the Fast Track process. However, after the first meeting of the ECMA standards committee Sun again withdrew. This time ECMA’s Intellectual Property Right (IPR) rules were not elaborate enough, according to Sun. Two main questions arise. Firstly, why did Sun initiate formal and consortium standards activities in the first place? Secondly, why did Sun pull back twice?

There is a host of literature that addresses why companies partake in standardisation. Standardisation is part of the competitive product development process between producers (Weiss & Sirbu, 1990; Grindley, 1995). Companies partake in order to develop new markets and protect established markets (e.g. prevent compatibility to block competitors from their market). They use standards as change agents. They use them as strategic tools to consolidate a market position or gain advantage over competitors (Cargill, 1989; Bonino & Spring, 1991). This body of literature suggests that dominant market players, whose products have become a de facto standard, have few incentives to standardise. They are more likely to withhold information on interface specifications or change proprietary product interfaces at regular times to put off competitive product development. Or they may try to tie complementary products of other firms to their proprietary component technology. With an eye to long-term advantages, they may give away a technology or enter into coalitions with rivals to enlarge their user base and widen support for their proprietary standard (David & Greenstein, 1990). However, the step towards formal standardisation is seldom taken. In this respect, the initiative to standardise Java™ is rather unique.


2.1 Sun’s Java Technology™ and the User Environment

Java started as a programming language. In 1995, Sun realised that it could be used for the Internet. Its platform-independence, about which more below, allowed small Java programs to be downloaded and executed by web browsers. These moving, colourful applets triggered Java’s breakthrough on the Internet.

Java’s platform-independence. One of Sun’s maxims was ‘Write Once Run Anywhere’ (WORA): a Java software developer should not need to rewrite his or her software program for different platforms. Java programs were to be portable and scaleable. In order to achieve cross-platform compatibility, Sun created a standardised application programming environment. Each system and browser provider was to fully implement the specifications and Application Programming Interfaces (APIs) of the standardised Java environment if WORA was to be achieved. Several system providers, such as IBM and HP, did so. That is, they developed compatible Java Virtual Machines (JVMs, i.e. software that runs on proprietary operating systems and is capable of interpreting compiled Java byte code). Java is also applied in dedicated devices such as household appliances, television sets, cars, etc. in which case it is referred to as embedded Java, or real-time Java. The emphasis is in the case study on the Java programming environment.

Java user environment. Sun started by giving interested parties access to its source code. It invited developers to comment on, experiment with and improve the original source code. The source code was ‘open’ in the sense of being accessible and free of charge, but, for example, the decision about changes to the original code lay in Sun’s hands and commercial use was bound to license restrictions. Part and parcel of Sun’s licensing policy were the test suites used to certify compatible Java products, and the Java-compatible logo (the steaming cup of coffee) to brand compatible products. These instruments of control were closely tied to Sun’s IPRs to trademarks (e.g. Java™ and Java Compatible logo), patents (software algorithms) and copyright on the specifications.

Pressed by its commercial licensees, Sun developed a ‘Community Source’ licensing model, which sought to combine the advantages of the Open Source licensing model and the Proprietary licensing model (Gabriel & Joy, 1998). It did, indeed, represent a more liberal licensing regime for commercial parties, but Sun still retained ownership of the original code, the upgrades, and the test suites.

A Java community had developed. Sun tried to institutionalise this community in December 1998 with the Java Community Process (JCP) manual. However, the document was criticised for Sun’s too dominant role therein (Harold, 1999; Vizard, 1998). The second version issues in 2000 differed in many ways and answered to much of the critique (Shankland, 2000; Sun, 2000a).
The idea of WORA and Sun’s strategies to involve others in developing and implementing the Java platform led to a large user base. In 1999, there were more than 1.3 million Java developers (International Data Corporation, op. cit. in Babcock, 2000). This figure consists of developers who work for companies and, for the majority, of independent developers.

2.3 JTC1, the First Attempt

Sun was the first private company to apply as a recognised PAS submitter. IBM strongly backed up Sun’s application. This happened in March 1997. It caused a stir because although the rules allowed individual companies to apply, the criteria favoured open, consensus-oriented organisations. Within the American National Standards Institute (ANSI), Sun’s home base, opinions already strongly differed (Rada, 1998). In July, Sun’s application was turned down with comments. The comments of the JTC1 national members roughly focused on Sun’s desire to keep the Java trademark for itself and have the JTC1 standard called something else; on what body would be responsible for updating and maintaining the Java standard; and on whether Sun would be open in accepting changes to the standard (Clark, 1997). Sun addressed the comments in September 1997 and reapplied as PAS submitter (Sun, 1997a). It suggested, for example, that a JTC1 working group, which would be open to all stakeholders, would address the standards maintenance work, and it offered to supply the project editor. Two months later, Sun was accepted as a PAS submitter. But, again, there were comments (ISO/IEC JTC1, 1997). The national bodies expected their comments to be addressed in the Explanatory Report that would accompany Sun’s submission of the Java specs, and they added that voting ‘yes’ at this stage did not automatically include approval of the specs. According to Sun, the positive outcome of the voting was to be understood as international approval of Sun’s open Java development process. In the following year, Sun did not take steps to actually submit the Explanatory Report or the Java specifications to JTC1. Sun silently withdrew from the PAS process, a move that became apparent when Sun’s overtures to ECMA became public.

2.3.1 Initiative

In the following sections, the events are examined in more detail. I thereby distinguish between Sun’s explanation of the events and my interpretation of them, because they do not always coincide. I use the headings of ‘stated reasons’ and ‘interpretation’ for this purpose.

Stated reasons. Sun said its goal always was to “have Java, already a de facto international standard, codified as a de jure standard” (Sun, 1997b). From a busi-
ness perspective, Sun’s interest in standardisation was to increase the visibility and importance of Java and to promulgate a network-centric view on ICT developments. By approaching JTC1, Sun signalled that Java was to be a specification that people could rely on as being stable and that it would not be changed unexpectedly. It allowed people to make a commitment to it.

Sun chose the PAS procedure because this was the most effective way to get the Java technology formally accepted world-wide. It was a means to get easier access to the public procurement market, and to preserve industry’s substantial investment in Java. The latter argument can be understood as a way of saying that the Java submission should not undergo serious changes during the PAS review process.

**Interpretation.** Sun did not intend to hand over the evolution of Java to JTC1 (Sun, 1997d). It expected to retain control over the standards maintenance process by safeguarding the role of the Java community during JTC1 standardisation, whose input was co-ordinated by Sun itself. (“The JTC1 working group that will address standards maintenance must be responsive to international Java community.” (Sun, 1997a)) Sun upheld essential IPRs, and retained its patents (although no fees are asked), its copyright (joint-copyright ownership was suggested, no fees asked), and trademarks (e.g. control over compatibility logo). An additional benefit of the PAS procedure was that ongoing Java developments would become tightly linked to standards development. The revenues from IPRs were forfeited in exchange for enlarging and stabilising the Java market -without compromising control over cross-platform compatibility (e.g. by means of the Java compatible logo and the test suites). JTC1’s role was to codify and ratify the specification development activities supervised by Sun.

Sun’s PAS initiative can therefore best be understood as a means to orchestrate the orientation of market players. There are two main reasons to think so. Firstly, because JTC1 was the pre-eminent international standards body for IT matters, it was a focal point for consensus-based standards development. The PAS procedure would appear to leave room for the influence of competitive market players, keep them oriented towards Java developments led by Sun, and dissuade competitive developments. Secondly, in the years that preceded the PAS initiative Java was becoming a hype (1995-1996). Mainly by way of Netscape Navigator, copies of Sun’s Java runtime environment were downloaded to the PC systems of Windows users. Sun’s network-centric vision and Java’s promise of platform-independence made Microsoft nervous. Sun was challenging the basis of Microsoft’s software market, the Windows platform. In 1995, Microsoft had already approached other companies to withdraw from activities that supported Java™ developments (e.g. Netscape and Intel). By late spring of 1996, senior Microsoft executives were deeply worried about the potential of Sun’s Java technologies to diminish the applications barrier to entry (US, 1999).
In March 1996, Sun and Microsoft signed a Technology License and Distribution Agreement (TLDA) for the use of Java. The agreement included the incorporation of Sun’s Java™ Technology in Microsoft’s Internet Explorer 4.0. Late 1996, Microsoft released Internet Explorer 3.0. It was a much-improved version. Some reviewers considered it competitive to Netscape Navigator. In order to maximise the usage of Internet Explorer, Microsoft decided that the next version would be more tightly integrated into Windows (US, 1999). Moreover, Microsoft was using its Java license to create its own Java development tools and its own Windows-compatible Java runtime environment. It did so in a manner that undermined Java portability and that was incompatible with Sun’s Java products. In the same month that Sun started the PAS application, Microsoft distributed its own incompatible Java toolkit. When Sun applied as a PAS submitter for the second time, it was preparing a lawsuit against Microsoft for copyright infringement. For Sun, the rumours of Microsoft’s previous dealings with other players and a premonition of Microsoft’s strategy to develop a Windows-dependent Java browser and toolkit would have been reasons not to overestimate its own position in the market. In this market, the step towards international standardisation may well have served the purpose of rallying support for Java™. Sun most likely assessed that its footing in the Java market was not secure enough, which explains its willingness to standardise. On the other hand, it also explains why Sun could not relinquish control over Java.

2.3.2 Withdrawal

_Stated reasons._ Sun withdrew from the PAS process because it did not agree with changes in the PAS procedure decided on in November 1998 (ISO/IEC JTC1, 1999b). The old procedures still applied, but Sun’s status as a PAS submitter would have to be reconfirmed in November 1999, at which time the new rules would apply. The new procedures, according to Sun, implied that Sun would have had to turn standards maintenance and the evolution of Java over to JTC1. Moreover, standards maintenance would not be restricted to minor adjustments such as bug fixing. JTC1, on the other hand, remarked that the changes were clarifications (ISO/IEC JTC1, 1999d). Comparing the 1999 version of the PAS procedure with the previous version (1995), in the latter version handling of standards maintenance is settled ‘in accordance with the agreements made between JTC1 and the recognised PAS Submitter’. The 1999 version stipulates that the normal JTC1 rules for maintenance apply, regardless of the origin of the International Standard. JTC1 would take the lead in corrections to defects and -which will have alarmed Sun -revisions of existing standards. Reacting to Sun’s objections, the JTC1 chairman writes, that “the clause addressing the topic of maintenance in the revised JTC 1 PAS procedure is consistent with the comments made by a number of JTC 1 National Bodies that voted to approve Sun
as a PAS Submitter but noted the need for JTC 1 involvement in the maintenance of the resulting International Standard.” (ISO/IEC JTC1, 1999c).

But much had happened behind the scenes. Sun attributed the changes made to the PAS procedure to lobbying by Microsoft, Hewlett-Packard (HP) and others from the ‘Wintel world’ (Shankland, 1999b). (Microsoft wanted its own Java functionalities enabled.) Sun withdrew because it felt that the change of procedures was only a next stage in the opposition. The procedural changes signalled that Sun would encounter problems when submitting the Java specification. For example, a Java Study Group had been installed in JTC1 Sub-Committee 22 (SC22) and people were discussing how they were going to change the Java specification. It was at that point that Sun seriously started considering alternatives.

Interpretation. Sun judged that JTC1 would probably not agree to ratify Sun’s work in view of the influence of the ‘Wintel-world in JTC1. But, apart from the reasons Sun gave for withdrawing, there were developments in the market that threatened Sun’s position, occurrences which increased Sun’s desire to keep a grip on Java developments. Firstly, Microsoft did not abide to the Java licensing agreement, and posed a threat to cross-platform compatibility. In October 1997, Sun filed a complaint against Microsoft for copyright infringement. In March 1998, the court granted Sun’s request for a preliminary injunction. Microsoft was not allowed to use the Java Compatible trademark unless its products passed Sun’s test suites. In May, Sun filed a complaint for unfair competition. In November 1998, the court ordered Microsoft to change its software and development tools. Microsoft appealed against the ruling (Egyedi, 2000b).

Secondly, in the same period there were disquieting developments in the area of real-time embedded Java. Hewlett-Packard (HP) announced in March 1998 that it had developed a clean-room version of real-time embedded Java, that is, a version that was developed without looking at Sun’s source code (Concerned is a manner of reverse engineering by which Sun’s IPRs on Java are circumvented.). In June, the US National Institute for Standards and Technology (NIST) started organising workshops to develop specification requirements for real-time Java. Sun participated, as did competitors such as HP and Microsoft (Jensen, 1999). In November 1998, a Real-Time Java Working Group (RTJWG) led by Microsoft and HP was formed. Sun did not participate. The RTJWG approached the US national standards channels, that is, the National Committee for Information Technology Standardisation (NCITS/ NIST), to formalise its standards work. But in January 1999 its request was turned down because NCITS feared this could lead to fragmentation of the Java market. The RTJWG subsequently founded the J Consortium. Meanwhile the Real-Time Expert Group (RTEG) was formed within the Java Community Process, a group that was led by IBM.
The RTJWG activities were disquieting to Sun, because real-time Java draws on the base specifications of Java™. According to the experts whom Sun consulted, it was not possible to write real-time specs in a useful way without making changes to the base specifications. There was therefore a risk that competitive developments in the field of real-time Java would affect the work done on Java™ within Sun’s JCP.

Sun reacted to the market pressure and to changes in the PAS procedure by elaborating the procedures for Sun-led Java community participation, withdrawing from JTC1, and exploring alternative options for international standardisation. In December 1998, Sun issued its first version of the JCP and presented its Community Source licensing model (see earlier). They were designed to signal that Sun had taken the criticism of ‘benevolent dictatorship’ to heart and accepted more far-going influence of the community on Java development. The Community Source model, which partly sympathised with the open source movement, was to underscore Sun’s new approach. It mainly served to re-orient players in the field of real-time Java. Sun’s JTC1 initiative had failed to keep the real-time Java dissidents in line. The withdrawal in itself was based on Sun’s assessment that it would not be able to manoeuvre the Java specification through the PAS procedure unscathed. It was a move that followed from its compatibility control strategy. To keep control of Java it needed to withdraw. This time it did not attempt to re-orientate the market, since those involved with the Java™ programming environment publicly heard about Sun’s withdrawal only when Sun had already approached ECMA (May 1999). To them, Sun was still pursuing the standardisation path.

2.4 ECMA, the Second Attempt

In April 1999, Sun formally approached the ECMA to discuss Java standardisation (Shankland, 1999a). Sun initially proposed that ECMA would carry out ‘passive maintenance’ of the Java standard, meaning that Sun’s JCP would still determine Java development (Sliwa, 1999). But ECMA refused to endorse this approach. The two parties ultimately agreed to the instalment of a technical committee on Platform-Independent Computing Environments (TC41) which would ‘standardise the syntax and semantics of both general-purpose and domain specific platform-independent computing environments.’ The committee would develop a standard for a cross-platform computing environment based upon the Java 2™ Standard Edition Version 1.2.2, a specification that consists of the Java Language Specification, the Java Virtual Machine Specification, and the Java API Core Class Library Specification. The aim was to contribute the standard to ISO/IEC JTC1 by means of the Fast Track process. The ECMA General Assembly gave its approval in June 1999.
The first TC41 meeting took place in October 1999. It was chaired by IBM. During the meeting, Sun emphasised that the TC should focus on ‘edition rather than addition’ of the Java specifications. Sun provided the main editor. The JTC1 SC 22 Java Study Group, with which the ECMA liaised, would be asked for input before formally invoking the Fast Track process. Three task groups were installed to tackle the work. A Microsoft representative chaired the group working on the API specifications. Sun was to distribute the Java 1.2.2 specification on CD-ROM at the meeting. However, at the end of the two-day meeting a Sun representative announced that Sun lawyers required more time to consider the IPR issues involved (ECMA, 1999a). The second meeting was set in January 2000.

In December 1999, Sun made public that it would not contribute the Java specifications to ECMA. At the January meeting, the TC41 participants debated whether it would be feasible to draft a Java standard without Sun’s contribution. But some large companies objected (Fujitsu, Siemens, HP and Compaq). In March 2000 the TC was disbanded.

2.4.1 Initiative

Stated reasons. Sun chose ECMA because ECMA had close ties with the formal European and international standards bodies and an A-liaison with JTC1, which gave it access to the Fast Track procedure. Sun understood that in the past ECMA standards had been submitted to a yes/no vote in JTC1 without any modifications, and often successfully so. If Java would become an international standard, customers, partners and developers would feel more confident about investing in it (Perez, 1999). But, Sun said, it would also be pleased if Java would remain an ECMA standard (Shankland, 1999b).

From Sun’s standpoint, ECMA TC41 would edit the Java version that resulted from Sun’s JCP trajectory, because there were products based on it and there was a developer community working to the specification. Sun was under the impression that ECMA had agreed that Sun would retain copyright of the specifications during the standards process, and that ECMA would copyright the resulting standard. The latter was necessary to submit it to JTC1 through the Fast Track procedure. (Although Sun would not claim copyright of the standard, it would hold on to IPRs such as the Java name and the Java Compatibility logo, which had a business value to Sun.)

Furthermore, TC41’s program of work was specifically limited to the Java Standard Edition version 1.2.2. Any risks which Sun was taking would be restricted to this Java version. More far-reaching changes would be part of a new Java version, a development process that would take place within the JCP environment (Sliwa, 1999).
Interpretation. ECMA was an open standards consortium and thus an answer to continuous pressure from licensees and real-time Java developers to open up the Java development process. Many large companies were members. So ECMA processes also promised to be relevant in respect to co-ordination of the market. Sun’s move further suggested consistency in its aim towards international standardisation. But at the same time, the move was an alibi for withdrawing from the PAS procedure without gravely letting down those who were pressing Sun for open standardisation.

Sun’s position in ECMA was stronger than in JTC1. Sun participated at the time in the ECMA Coordinating Committee (Mr. R. Cargill) and shortly after in its Management (Ms. V. Horsnell, treasurer); and the acting chair of the JTC1 SC22 Java Study Group, with which ECMA liaised, was a Sun representative (Mr. J. Hill). Sun further controlled the conditions under which the process would take place by means of its IPRs and by restricting the scope of the program of work. Perhaps, too, in the preparatory period of defining TC41’s program of work, Sun had less reason to fear Microsoft. The judicial system was partly checking Microsoft’s undermining actions with regard to Java compatibility. In the set up of this standards initiative, Sun had a more focused control strategy than during the PAS initiative. Its emphasis appears to have been on technology content-oriented standardisation.

2.4.2 Withdrawal

Stated reasons. Sun’s official reason to withdraw from the ECMA process was that “(…) ECMA has formal rules governing patent protections; however, at this time there are no formal protections for copyrights or other intellectual property.” (Sun, 1999) Unofficial Sun sources indicated that problems had arisen between the ECMA GA meeting (June 1999) and the first ECMA TC41 meeting (October 1999). These concerned the timing and place of the first meeting, which was scheduled months later than Sun had intended, and procedural issues. (Certain companies insisted that the committee would not be chaired by Sun, that the editors would not be Sun people, and proposed that Microsoft co-ordinate the development of API specifications.) There were also hints, according to Sun, that the oral agreement on copyright, as Sun understood it, would not be upheld. Sun became wary.

At the first committee meeting, Sun lawyers were taken by surprise by the ECMA secretary general’s explanation of IPR rules regarding contributions to standardisation. As a rule ECMA documents were not copyrighted. Regarding the copyright status of the Java specs, Sun’s contribution would become an ECMA document once it was assigned a TC document submission number. When Sun representatives protested, the ECMA secretary general proposed to explore means by which Sun could maintain copyright during the standards process. (“Contributions from
member companies to ECMA can be copyrighted, and can retain their copyright status if the owner of such a specification allows ECMA to freely use the contents of the contribution for the development of an ECMA Standard.” (ECMA 1999c)

The problem was, firstly, that the parties (Sun and ECMA) had a different view on what was previously agreed, and in particular who was to copyright the Java specs during the standards process. But, secondly, Sun’s ideas with respect to the meaning of copyright at that point appeared to differ from ECMA’s. Sun differentiated between a copyrighted specification and a copyright of the contents of the specification (i.e. roughly speaking, the difference between paper and software). The problematic part was how TC41 would handle the latter copyright interpretation, which was new to all concerned. At the subsequent meeting of the ECMA Coordinating Committee (November 1999), Sun explained the distinction, and said that it intended “to provide ECMA with a derivative copyright but that this has to be treated as an IPR, under a copyright license agreement” (ECMA, 1999b). The conditions of such an agreement were not yet decided on. Early December, Sun announced its withdrawal.

George Paolini, vice president of Java community development at Sun, provided another reason for Sun’s withdrawal. He said in a letter to ECMA that Sun had decided to keep control of Java within its Java Community Process. “The Java Community Process has expanded its level of activity to a point where we now believe the interests of the entire Java community will be best met by continuing to evolve the Java specifications with the open JCP process.” (ECMA, 1999b) By then, a proposal for the second version of the Java Community Process had been developed.

Interpretation. The events that took place before the first ECMA TC41 meeting, indicated that Sun’s influence on the standards process was under attack: procedural issues were discussed that would undermine Sun’s position. Furthermore, according to a member of the ECMA Coordinating Committee the prior informal agreement about copyright issues was ambiguous.

The steps which Sun took in the months following its withdrawal give credence to Sun’s official reason to withdraw. The industry association of European Information and Communication Technology Industry Association, founded in January 2000, installed a Standards Policy Group chaired by Sun. The policy group was to develop a position on the licensing terms of software technology embedded in standards protected by copyrights rather than patents. Sun also planned to raise the issue at a meeting of the European ICT Standards Board, but refrained from doing so before the meeting (ICTSB, 2000). Lastly, Sun called together a Standards IPR Forum meeting during the Open Group Conference (April 2000, London) to address, among other things, ownership of copyright on submissions.
However, the primary issue was not that the copyright agreement was ambiguous and informally arranged—probably both ECMA and Sun initially had an interest in this arrangement. The above-mentioned procedural disputes between June (approval of the TC41 work program) and October 1999 (the first TC41 meeting) seem crucial. Moreover, in August, Sun heard that in its ongoing lawsuit against Microsoft the court had granted Microsoft’s appeal against the preliminary injunction for copyright infringement. The appeal was, in brief, that the punishment did not fit the crime committed (i.e., a breach of contract should not be punished by means of an injunction). This verdict was a blow to Sun, and had consequences for Sun’s stance in ECMA. If Sun would loosen its IPR claims for the purpose of ECMA standardisation, it might jeopardise its position in the next stage of the lawsuit.10 Furthermore, possibly also the outcome of the lawsuit raised Sun’s doubts about what legal protection a copyright offers (although this was to my opinion not the issue in the August trial). This would explain Sun’s introduction of a dual meaning of copyright. In sum, procedural issues and the Sun v. Microsoft lawsuit fuelled Sun’s wariness. By not clearing the copyright issue beforehand, Sun could introduce a new meaning of copyright, one which would not be acceptable to the ECMA TC, to pave the way for total withdrawal. “[Sun] just does not want to give up control”, as the ECMA Secretary General, Jan van den Beld, told the press (Niccolai & Rohde, 2000), and it had several reasons not to do so. Possibly Sun did not believe Java was stable enough or had achieved sufficient critical mass to relinquish control (Niccolai & Rohde, 2000). Whatever reason presided with regard to ECMA standardisation, Sun’s actions focused on preserving control over the Java™ specifications.

2.5 Conclusion

Sun primarily initiated standardisation in JTC1 and ECMA because an international standard implied stability, would increase market confidence and would therefore encourage commitment to Java. It wanted JTC1 and ECMA to ‘ratify’ the existing Java™ specification and did not seek the involvement of their committee members in its development. Rather, it sought commitment from the clients of these standards bodies (i.e., implementers of JTC1 standards). It withdrew from JTC1 because it suspected standards politics behind procedural changes, because of incompatible and competing market developments, and—above all—because it expected that its Java specification would not survive the PAS procedure unscathed. Sun intensified its compatibility control strategy in subsequent negotiations with ECMA. To minimise risks, it focused its standards initiative on a specific version of the Java specifications. However, the procedural disputes that preceded the first ECMA committee meeting made Sun wary. Added to new developments in the lawsuit...
Table 2.1 Summary of the findings. (The largesse of the X indicates whether technological compatibility and market orientation are significant factors (X) or not (-), or to a lesser degree (x).)

<table>
<thead>
<tr>
<th>Sun actions &gt; Co-ordination strategies</th>
<th>Formal Standardisation (JTC1)</th>
<th>Consortium Standardisation (ECMA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initiation</td>
<td>Withdrawal</td>
</tr>
<tr>
<td>Technology-oriented compatibility control</td>
<td>-</td>
<td>X Java would not survive PAS unscathed</td>
</tr>
<tr>
<td>Orchestration of market orientation</td>
<td>X Heighten market’s commitment to Java</td>
<td>x JCP installed to attract real-time Java developers</td>
</tr>
</tbody>
</table>

with Microsoft, Sun referred to ECMA’s ambiguous copyright rules to pull back from ECMA standardisation.

Table 2.1 summarises the main findings. It shows that Sun’s initiative to formalise its de facto standard was primarily motivated by its aim to orchestrate the market. Whereas, a basic fear of a fragmented technical platform -and ensuing market effects -motivated Sun to withdraw.

Sun pursued a protective and defensive control strategy. Whether it should instead have followed a more offensive strategy, based on confidence in a market-co-ordinated development of platform-independent Java, is a matter for debate.

2.6 Case-Specific References

Babcock, Ch. (2000). ‘Java: Can Sun control the flood’, Inter@ctive Week, June 12 2000 [www.zdnet.com].

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ISO/IEC


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3. XML IN THE WORLD WIDE WEB CONSORTIUM

The XML standard (1998) was well received by the information technology practitioner community. While the trade press mostly hailed it as a functionally rich sequel to the HyperText Markup Language (HTML), it sometimes described it as a welcome leaner version of the Standard Generalized Markup Language (SGML). According to XML developers themselves, XML (1998) was a compatible successor to SGML (1986/1988), a standard developed in the formal standards setting of ISO/IEC JTC1. Was XML, indeed, compatible? If so, why did XML developers,
most of whom were SGML experts, standardise XML within the World Wide Web Consortium rather than in ISO/IEC JTC1? To provide the background necessary to answer these questions, a brief sketch of the technologies concerned follows.

### 3.1 SGML

Work on SGML started in 1969 with the development of a language called the Generalized Markup Language (GML) at IBM (Goldfarb, 1990). It was used to manage the large amount of complex industrial documents at IBM. GML was designed to record document structures independent of how these structures would subsequently be processed. For example, GML documents recorded headings, paragraphs, lists and figures – that is, information that is useful for editorial applications— but no formatting instructions. In this manner, GML separated the document description from the formatting languages (IBM used several such languages for printing). Also, because GML identified document structures, fragments of documents could be addressed and reused in different contexts.

In 1978, the ANSI took an interest in IBM’s work on GML. By the efforts of Charles Goldfarb, one of the three inventors of the language, work started on a more generic version: SGML. A major addition to the original design was made. In order to determine the validity of the document structure, and to support a wide variety of lexically different languages (e.g. different signs for start-tag), a formal description, or grammar, would accompany each document. Firstly, this grammar identified the type of components (elements) and their interrelations (content model).

### Box 3.1. Aims of the SGML and XML standardisers

<table>
<thead>
<tr>
<th>SGML Objectives (Source: ISO 8879:1986, Clause 0.2)</th>
<th>Design goals for XML (Source: XML 1.0, 2nd ed., 2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Documents “marked up” with the language must be processable by a wide range of text processing and word processing systems.</td>
<td>1. XML shall be straightforwardly usable over the Internet.</td>
</tr>
<tr>
<td>2. The millions of existing text entry devices must be supported.</td>
<td>2. XML shall support a wide variety of applications.</td>
</tr>
<tr>
<td>3. There must be no character set dependency, as documents might be keyed on a variety of devices.</td>
<td>3. XML shall be compatible with SGML.</td>
</tr>
<tr>
<td>4. There must be no processing, system, or device dependencies.</td>
<td>4. It shall be easy to write programs which process XML documents.</td>
</tr>
<tr>
<td>5. There must be no national language bias.</td>
<td>5. The number of optional features in XML is to be kept to the absolute minimum, ideally zero.</td>
</tr>
<tr>
<td>6. The language must accommodate familiar typewriter and word processor conventions.</td>
<td>6. XML documents should be human-legible and reasonably clear.</td>
</tr>
<tr>
<td>7. The language must not depend on a particular data stream or physical file organization.</td>
<td>7. The XML design should be prepared quickly.</td>
</tr>
<tr>
<td>8. “Marked up” text must coexist with other data.</td>
<td>8. The design of XML shall be formal and concise.</td>
</tr>
<tr>
<td>9. The markup must be usable by both humans and programs.</td>
<td>9. XML documents shall be easy to create.</td>
</tr>
<tr>
<td>10. Terseness in XML markup is of minimal importance.</td>
<td></td>
</tr>
</tbody>
</table>

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It was defined separately in what was called a **Document Type Definition** (DTD). Secondly, the DTD included a descriptive lexical and syntactical model that defined how the data was to be recorded, archived and distributed.

Working drafts were published between 1980 and 1983. In 1983, the Graphic Communications Association (GCA) produced the first SGML recommendation. It was adopted by the US International Revenue Services and the US Department of Defense (DoD). The International Organization for Standardisation (ISO), too, became interested. It started a working group on SGML (ISO/IEC JTC1/SC18/WG8, now equivalent to ISO/IEC JTC1/SC34). This led to an international standard in 1986 (ISO 8879: 1986). An amendment was issued in 1988 (ISO 8879: 1988).

The 1988 version remained stable for eight years. In that period, ISO also published a number of SGML-related, supplementary standards. We mention two important ones. The first is the **Hypermedia/Time-based structuring language** (HyTime, ISO/IEC 10744:1992), a standard that addresses hypermedia relations. It offers a rich model for addressing and linking SGML documents as well as other type of information objects. Another important standard, called the **Document Style Semantics and Specification Language** (DSSSL, ISO/IEC 10179.2:1996) addresses styling. It specifies rules for transforming and formatting SGML documents. Furthermore, various tools and applications were created. Because the SGML concept was based on process-independent document structures, the same data in SGML documents could be understood by, for example, database and text processing tools. The range of SGML supporting tools included word processors, parsers, transformers, publishing engines, browsers, document management systems, and even dedicated programming languages and libraries. Areas of application included publishing (e.g. so used by the American Association of Publishers, IBM, and the US Department of Defense in the CALS initiative), text research (Text Encoding Initiative), and the exchange of product information (Society of Automotive Engineering J2008).

One of the important uses made of SGML was the HyperText Markup Language (HTML). It was developed by Tim Berners-Lee (CERN, and founder of W3C) for the World Wide Web, and first standardised by the IETF in 1995 (Berners-Lee & Connolly, 1995). HTML did not start out as a fully SGML-compliant application. It complied from the second version onwards. Many of the rules imposed on SGML documents were not—and are still not—enforced by browsers for HTML documents. Most browsers even accept and process invalid HTML documents.

### 3.2 XML

The W3C installed the SGML Editorial Review Board (ERB) in 1996 to develop XML (Connolly, 1997). Its members all had SGML expertise. Many also participated in SGML(-allied) ISO working groups. Apart from bringing the power of SGML
to the web (XML), the ERB aimed to develop specifications for ‘XML hypertext link types’ and for DSSSL use in an Internet context.\textsuperscript{12}

The review board became a regular working group (XML WG) the year after. Microsoft, one of the three active members of the XML WG, was an early adopter of XML for Internet Explorer. Netscape, likewise an active member, supported XML at a later stage. Together, these two companies covered a large share of the HTML market, which is of interest because at the time the web-browser was the main platform for XML document exchange. The W3C recommendation for XML 1.0 was published in February 1998 (Bray, Paoli & Sperberg-McQueen, 1998).

A wide range of XML applications, tools and standards has emerged since. Presently, the number of public applications exceeds 250. They address very different areas: publishing, electronic data interchange (XML/EDI), data modelling (UML/XMI), workflow management (WfMC), software engineering (SOAP), and so on. The functionality offered by XML-based software tools is equivalent to those for SGML. But, firstly, the advent of web content delivery, and the emergence of XML servers and middleware has led to additional XML functionality. Secondly, many libraries and XML extensions to existing programming environments have become available. Thirdly, the number of W3C XML-based specifications and standards by far exceeds those for SGML. W3C has produced additional recommendations on naming (namespaces), normalisation (XML information set), transformation (XSLT), publication (XSL, Associating style sheets), implementation (DOM), addressing (Xpath) and linking (Xlink) of XML documents.

### 3.3 Efforts to Create a Compatible Successor

The participants in XML development were SGML experts. They partly were or had been active in SGML or SGML-allied standards developments (e.g. DSSSL-O), and often knew each other from, for example, GCA conferences. The constituency of W3C’s working group and JTC1’s WG8 overlapped. Because of overlapping membership there was reciprocal influence. However, there was also a degree of group identification (we-them)\textsuperscript{13} and standards politics (e.g. personal differences and the Not-Invented-Here syndrome)\textsuperscript{14}.

When the W3C’s working group started, it was clear that “(...) the ultimate goal of this effort is the creation of a form of SGML that can be used to transmit documents (or document fragments) to a future generation of Web browsers and similar Internet client applications.”\textsuperscript{15} But whether this XML would be an SGML subset, a derivative, a conformance level, or an application profile was not yet decided and, as the chair of the working group writes, “our uncertainty has two levels: we’re not sure where the optimum balance is between SGML compatibility and ease of implementation as a general goal, and we’re not sure which specific features of
SGML should be retained in XML. (...)”\textsuperscript{16} The starting point was, that XML would be compatible with SGML. That is, existing SGML tools should be able to read and write XML data, and XML instances were to be SGML documents without changes to the instance.\textsuperscript{17}

Overlap between the constituents of the W3C and the JTC1 working groups kept the compatibility intent alive. In September 1996, soon after the electronic discussion list of the W3C working group started, Eve Maler posted a contribution which illustrates some of the compatibility concerns and dilemmas that were at stake\textsuperscript{18}. For example,

\begin{quote}
Who is the customer/audience for XML --existing robust-SGML users, existing Web/HTML users who are not SGML-aware, or both? (...) I’d rather think of XML as an effort to define a cohesive SGML ‘application profile’ that benefits both tool creators and document creators, rather than a set of unrelated cool hacks that make it easier to write parsers. (...)What should happen when existing SGML documents (including valid HTML) are processed by XML tools? Should a ‘round trip’ between the two forms be possible, or is only XML->SGML or SGML->XML okay?
\end{quote}

Partly these were resolved. Some were impossible to resolve satisfactorily.\textsuperscript{19} The outcome was a largely but not fully aligned XML specification in respect to SGML (1988). That is, the XML Recommendation included a non-normative part which, if implemented, “increased the chances” of XML-SGML interoperability. But it provided no guarantee. JTC1, on the other hand, developed a new version of SGML (SGML 1999) to re-established compatibility. (For a technical discussion of the SGML-XML relationship and efforts to re-forge compatibility between them, see Egyedi & Loeffen, Appendix II.)

### 3.4 Analysis of Standardisation Outcome

Why was XML not fully compatible with SGML (1988), as had been the aim? Did XML represent a paradigm shift? What sort of causes led to discontinuity in standardisation?

#### 3.4.1 Paradigmatic Elements

To briefly refresh the reader’s memory, a paradigm is a set of shared views, heuristics, exemplars, etc. that guide and structure the way a practitioners community normally solves its problems. Which paradigmatic features structure the way SGML practitioners (i.e. standards developers and implementers) work? That which characterises the SGML problem and started things off was the need to reuse
information fragments and share documents across publication systems in a future-proof way. IBM addressed the problem by separating the syntactical and the logical document structure. It determined – as it were – the sort of answers with which to solve the puzzle and laid the fundaments for the SGML approach. XML developers were raised with the principles of SGML. SGML was a technical exemplar and an exemplar in respect to the functionality it could offer: the identification, exchange and reuse of information fragments in different contexts. XML, too, was initially document-oriented.

Furthermore, in discussions XML was called a “lean-and-mean dialect of SGML”\(^2\). It was to become a simpler version of SGML. It could become so, for example, because different from SGML it could refer for character sets to Unicode and the ISO 10646 standard. Simplifications like these emphasise continuity rather than deviation from SGML features. Except for the DTD-less document, which we would typify as a shift within the SGML paradigm, the general SGML mindset and strategies also apply to XML.

### 3.4.2 Causes for Discontinuity

**Context of Use.** What explains the discontinuity between the standards successors? Firstly, the web-based context of use had little in common with the context of SGML in the 1980s (technological anachronism). The technology of the 1990s offered new opportunities and posed different constraints. The domains of use shifted together with the practitioners involved (migration of use). See Figure 3.1. Although the information modelling approaches of SGML and XML were in principle identical, the SGML problem was foremost how to manage the company-internal, complex flow of documents. XML, on the other hand, developed as a solution to the limitations of HTML in respect to company-external, web-oriented document exchange. See Table 5.1.

**Context of Standardisation.** Some thought the XML market would only be of interest to SGML users\(^2\). Others hoped to target the huge, well-funded, energetic Web population.\(^2\) There would be an important marketing advantage in being able to say “XML processors can read HTML”.\(^2\) Therefore compromises to XML

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*Figure 3.1. A schema of the relative importance of domains of use in SGML and XML*

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compatibility with SGML were considered that left the installed base of HTML untouched. The deliberations are well illustrated by the following quotation, and explains part of the discontinuity in the SGML trajectory.

(...) For the 99% of the world that doesn’t care a bit about SGML (...). They know HTML, so we must make things look like HTML. But when it comes to adding the important things that HTML doesn’t have, we should make them as attractive as possible. (...) The SGML folks need a standard, as well as capability so they will continue to need SGML. But for the rest of the world, clean extendible markup is the biggest need, not SGML compatibility.22

However, more influential was the successful spread of HTML use. It was an exemplary achievement in the eyes of XML developers. Its implication for standardisation was: aim for simplicity. If we compare the SGML aims with the design goals of XML, the latter’s emphasis on ease of implementation and usability is salient (See Box 3.1). Simplicity was difficult to align with compliance to SGML.

### 3.5 Conclusion

This case study focused on XML as a successor of SGML (1988). It shows that a discrepancy existed between the claimed compatibility between XML and SGML, and the actual outcome of XML standardisation. XML deviated from the decade-old stable SGML trajectory. This did not occur because of any paradigmatic change in the way SGML principles were used in XML -although the abandonment of DTDs was a revolutionary step. There were other reasons. Firstly, XML’s context of use differed from SGML’s. It was company-external and web-oriented, whereas SGML

---

**Table 3.1. Causes for discontinuity: Differences between the problems, context of use, and context of standardisation of SGML and XML.**

<table>
<thead>
<tr>
<th>Causes for discontinuity ↓</th>
<th>SGML</th>
<th>XML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Orientation</td>
<td>Company-internal</td>
<td>Company-external</td>
</tr>
<tr>
<td>Context of use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Technology</td>
<td>1980s (mainframes etc.)</td>
<td>1990s (Internet, chips etc.)</td>
</tr>
<tr>
<td>• Domains</td>
<td>Publishing</td>
<td>B2B, application integration</td>
</tr>
<tr>
<td>Standardisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Frame of reference</td>
<td>GML</td>
<td>SGML, HTML</td>
</tr>
<tr>
<td>• Standards body: culture</td>
<td>ISO: stability, accountability</td>
<td>W3C: pragmatism, speed</td>
</tr>
<tr>
<td>• Problem, emphasis on</td>
<td>Ubiquitous applicability</td>
<td>Simplicity, implementability</td>
</tr>
</tbody>
</table>
foremost had a company-internal focus. Secondly, the HTML context of standardisation played a role. The spread of HTML use was exemplary for XML developers. The message was: aim for simplicity in standardisation, which at times conflicted with aim of compatibility with SGML. In other words, two exemplars guided XML development and coloured its heritage relation with SGML: SGML, which was a technical exemplar and an exemplar in respect to the functionality it could offer, and HTML, which was a standardisation exemplar in terms of its simplicity and widespread diffusion. In respect to the type and setting of standardisation, therefore, the W3C consortium headed by the pragmatic developer of HTML (Tim Berners-Lee) was a more likely choice for XML standardisation than the more formal ISO. This change of institutional setting made it easier for XML developers to deviate for practical or other purposes (e.g. Not-Invented-Here) from standard SGML solutions developed in JTC1. Incompatible succession is then more likely to occur.

3.6 Case-Specific References


ISO/IEC JTC1/SC18 Documents

PART II: ANALYSIS

EU policy on consortium standardisation, or the lack of it, is partly based on some unchecked—but widely shared—assumptions and beliefs. In this part of the report these are confronted with the findings of the case studies and other, additional sources. Examples are discussed to underscore why ‘the consortium problem’ needs to be redefined. The current policy framework is examined, and a new one is developed. Specifically, Chapter IV addresses consortium standardisation, compares it to formal standardisation, and lays the basis for recommendations on this point. But the insight gained by the cases reaches beyond consortium standardisation. In Chapter V, consortium standardisation is discussed within this wider context.

4. CONSORTIUM STANDARDISATION

In so far as consortia focus on specification development, they are seen as rivals of the formal standards bodies (e.g. CEN/ISSS, 2000). They compete on different dimensions. For example, they compete for committee participants. Standards consortia are thought to drain away the scarce technical expertise needed in the formal standards committees, and some of the large industrial companies who tend to volunteer for the required committee secretariats. A certain degree of competition would therefore seem plausible. However, there is little research on the matter. What information there is, for example, in respect to whether or not the rise of standards consortia has led to a decline of industry participation in formal standardisation, is inconclusive (Hawkins, 1999; Cargill, 2000).

Lack of hard data also exists in respect to the two dimensions on which this chapter focuses, and on which standards consortia and the formal standards bodies are most often compared: democracy and time. Standards rhetoric refers to them in terms of the ‘consensus versus speed’ dilemma. In the past, the formal standards processes have often been criticised for being slow and bureaucratic. This was later seen to explain the rise of consortia in the early 1990s, which were significantly more effective in developing standards. In response, the formal standards bodies introduced many new measures and procedures to speed up the process (Egyedi, 1996). However, the criticism held on. Indeed, the rationale behind the age old criticism still seemed to apply: consortia produce specifications quicker than the
formal bodies do because they need not bother with the lengthy democratic and open process, with consensus decisions, with a well-balanced representation of interest groups, etc. (Meek, 1990; Rada, 2000). Because for consortia consensus is not a main issue, the reasoning goes. Indeed, the CRE report (2000) states that consortia deliver non-consensus specifications. Therefore, among other advantages, consortia need not compromise on standards content as much as the formal standards bodies do; they can operate in a more timely manner; and they can therefore better cater to the needs of time-sensitive technologies. Such is currently the dominant view.

Table 4.1. Schema of the rhetorical basis of the framework for current standards policy: The formal standards bodies are slow but operate democratically, while industry consortia are undemocratic but effective in developing standards.

<table>
<thead>
<tr>
<th>Speed &gt; Degree of democracy</th>
<th>Slow</th>
<th>Fast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Democratic</td>
<td>Formal standards bodies</td>
<td>Standards Consortia</td>
</tr>
</tbody>
</table>

This view is not self-evident. It contains several values and assumptions that are a matter for debate. For example, ‘democracy’ is not a concept well-understood in relation to the standards setting. Its meaning and significance for standardisation has not been held to closer scrutiny. Its implications for standardisation have therefore largely remained unspecified.

The way ‘democracy’ is defined is of immediate relevance to the ‘consensus versus speed’ assumptions that lie at the basis of -among others -EU standards policy, which are

1. Formal standardisation proceeds much slower than consortium standardisation.
2. Formal standardisation is democratic in theory (i.e. standards procedures).
3. Formal standardisation is democratic in practice.
4. Consortium standardisation is undemocratic in theory (i.e. standards procedures).
5. Consortium standardisation is undemocratic in practice.
6. A generic standards policy well-serves both public and market interests.

*Speed dimension.* The first assumption addresses the speed dimension. Although very little quantitative data exists on the matter, at present doubts are being raised about the timeliness of consortium standardisation (Hawkins, 1999; Krechmer, 2000). The two cases discussed in Part I are not very helpful in this respect. In a
sense, the Java/ECMA case confirms these doubts, since Java standardisation never really took off. Moreover, as was noted in Chapter II, in order to allow ECMA standards to be fast-tracked through the formal JTC1 process, ECMA procedures need to be compatible with JTC1 procedures. This comes with a certain degree of bureaucracy. Therefore, had Java standardisation proceeded, it would have been submitted to a certain degree of bureaucracy too. More in general, no significant difference in standardisation pace is to be expected between formal standards bodies and consortia that have close ties with the formal standards bodies. In the W3C case, the initial draft XML standard took 11 weeks to develop (September-November 1996)\(^2\)\(^6\), which is very fast. (Of course, this high pace was made easier because the XML working group built upon ISO’s decade old SGML technology, and had gained ample experience with SGML.) The standard was published in February 1998, 15 months later.

The two cases cannot confirm or disaffirm recent doubts about the high speed of consortium standardisation. Quantitative research is needed to provide a definitive answer. What about formal standardisation? Do the formal standards bodies still merit criticism for their slow pace? Since the mid-1980s many different measures have been taken at the European and international level to speed up standardisation\(^2\)\(^7\). To give an impression of the pace at that time and the changes that followed:

- According to the ISO/IEC Directives, 7 years were needed to take a standard from start to Draft International Standard in 1989, while in the Directives of 1992 this period had been reduced to 3 years.
- The approval time of recommendations in the ITU-T has been reduced from 4 years in 1988 to a maximum of 9 months in 2000 (ITU-T, 2000).

Other important innovations were the Fast-Track process and the PAS procedure of ISO/IEC (see Chapter II). These last years have seen, for example, an increasing amount of web-based information exchange among committee members; pre-standardisation initiatives for the timely development of industry specifications (e.g. CEN workshop agreements, CWAs; ISO-organised Industry Technical Agreements, ITAs); and pre-publication of standards on the website of the standards sector of the International Telecommunications Union (ITU-T).\(^2\)\(^8\) Therefore, already if one only takes the changes applied by the formal bodies into account, the difference in pace of standardisation with standards consortia has been fast diminishing. See Table 4.3. The arrows in the ‘speed dimension’ indicate that consortia take longer than would be expected according to the dominant rhetoric, while the formal standards bodies operate faster than would be expected.
Below, the democratic dimension of the ‘consensus versus speed’ rationale is examined. First supposed lack of democracy in standards consortia is addressed and cross-checked with the two consortium cases (section 4.1). Next a comparison is made with formal standardisation. Again, this is to determine whether both standards environments are as different as standards literature and standards policy would have it (section 4.2). Having compared both settings on the dimensions of speed and democracy, in the final section of this chapter the more fundamental question is posed whether this comparison has actual relevance for EU standards policy. It is related to the sixth assumption listed above, which will be introduced in more detail in section 4.3.

4.1 Consortia: Democracy and Openness

Lack of “openness” and “democracy” sum up the main problem of governments with consortia. I take the terms to refer to a want in membership procedures (i.e. lack of diversity among committee participants and the exclusion of certain groups) and in decision making procedures (i.e. not consensus-driven and no provisions for the inclusion of minority standpoints), respectively. Is this perception of consortia correct? In the following, first the standards procedures (i.e. theory) are examined, and then the way they are applied (i.e. praxis).

4.1.1 Undemocratic Procedures?

The focus is, again, on the two cases of ECMA and W3C. As an illustration, their membership and decision procedures of two consortia are discussed in more detail.

Membership. ECMA and W3C have several membership categories. Apart from the usual industry members, small and medium-sized Enterprises (SMEs), and governmental and educational institutions can participate. The consortia demand membership fees. Members pay a fee according to the membership category they are in. Only Ordinary ECMA members (i.e. full membership fee is 70,000 Swiss Franc) have a vote in the General Assembly. W3C bestows no extra voting benefits on full members ($US 50,000 per year).

Decision procedures. The decision structures of ECMA and W3C differ strongly. In ECMA the ultimate power lies in the hands of the General Assembly (GA). But only ordinary members have a vote in the GA. In other words, there is full democracy among members that pay the ordinary membership fee (large companies). In W3C, the ultimate power lies in the hands of the director, who formally has the role of a benevolent dictator. In other words, there is no democracy at this level. Indeed, where the chairs of W3C technical committees are concerned, ‘if it is necessary to move
on’ this person also has far-going powers. However, the W3C standards process is
consensus-oriented, and strives for a vendor-neutral solution and an open process,
according to the W3C rules. Some procedures give room to minority standpoints.
W3C’s combination of these democratic ideological features with ‘dictatorship’
leads to an interesting mix of procedural directions (W3C, 2001).

ECMA procedures are internally -ideologically -consistent. The process should
be consensus-oriented and give room to minority standpoints as well. Where W3C’s
director appoints committee chairs, in the ECMA committee members elect the
chair. If there is a deadlock in an ECMA committee, voting takes place by simple
majority of the members present at the meeting. In both W3C and ECMA, each
member may assign several representatives to participate in the standards work,
but the company has only one vote. See Table 4.2.

The two cases do not simply confirm the widely shared bleak picture. On the
contrary, although there may be practical and organisational exclusion mechanisms
(e.g. membership fee\textsuperscript{30}), in principle consortium membership is open. Indeed, in
certain respects they appear more open than the formal bodies. For example, while
the latter usually keep access to committee drafts restricted to participants -and,
thus, seek consensus within a limited group -consortia more often post their drafts
on the web and actively seek comments from outside (Rada, 2000).

The W3C case indicates that the procedures of -some -consortia allow them to
be reigned in an autocratic manner. However, at committee level their procedures
embody the same values as those of the formal standards bodies (i.e. strive for
consensus, address minority viewpoints, etc.). There is one exception: consortia do
not explicitly include in their policy the aim to involve diverse participants.

4.1.2 Undemocratic Practice?

The inclusion or exclusion of individuals or groups can differ during and after
the standards process. Unlike the formal standards bodies, participation in the

\begin{table}
\centering
\begin{tabular}{|c|c|c|}
\hline
Consortia Degree of democratic decision making within ... & ECMA & W3C \\
\hline
Standards consortium & democratic (General Assembly) & undemocratic (‘benevolent dictator’) \\
\hline
Standards committee & consensus-oriented & consensus-oriented \\
\hline
\end{tabular}
\caption{Characterisation of the two consortia in respect to their (un)democratic approach at the level of the standards committee and the overall organisation based on their respective procedures.}
\end{table}
consortium standards process is not automatically linked to standards use. Often it may not be in the interest of early members of a consortium committee to seek additional committee members from other interest groups since this often makes the standards process more complex. Therefore, depending on the market, an exclusive standards process might be preferred during this phase. However, once the standard is finished -to satisfaction -committee members have an interest in the diffusion of its use. The inclusive phase begins. The attention of other market players must be directed towards the new standard in order to heighten interoperability among multi-vendor products.

An exclusive phase followed by an inclusive phase is normal practice where proprietary specifications become de facto standards (e.g. Java). However, with regard to consortium standardisation, pragmatism and instrumentalism rather than principle may sometimes exclude parties during standardisation. Indeed, exclusion does not typify the standards process in the two cases addressed in this report.

- The W3C/ XML working group primarily used an easily accessible discussion list for standards development, where technical as well as strategic and pragmatic questions were raised. Contributions to the discussion list give the impression that individuals rather than company representatives are participating. Openness and inclusion seem to characterise the standards process as well as the diffusion phase.
- Only two plenary face-to-face meetings had been held when Java standardisation in ECMA prematurely stopped. Those who attended partook as company or organisational representatives. Interestingly, a large group of business users (SHARE) was represented in the technical committee. The woman in question was chair to one of the three task groups, a very inclusive move towards users.

In sum, consortia do not automatically link more and diverse participation in the standards process to wider standards use. Therefore, they do not expressly aim to be inclusive at committee level. However, in practice they may nevertheless show a high degree of inclusion (e.g. open, publicly accessible discussion lists, user participation, and user representation in key functions).

### 4.2 Formal Standardisation: Democratic Praxis?

The second assumption in the ‘consensus versus speed’ dilemma is that the procedures of the formal standards bodies embed democratic ideals. Content analysis of official documents confirm this assumption (Egyedi, 1996). However, are these ideals also evident in formal standards practice?
Standards consortia typically have an informal manner of handling procedures (Hawkins, 2000). That is, theory and praxis is likely to diverge lightly. The significance of the procedures of formal standards bodies, too, must not be overemphasised. As Schoechle’s (2001) tale about the Emperor and the Professor illustrates, politically correct procedures are at times leniently applied or downright misused. If we look at the inclusive procedures of the formal standards bodies, do they lead to a greater amount of or higher quality consensus decisions, or to a higher diversity of participant categories? The formal standards bodies have not systematically monitored aspects of democracy and openness characteristics of their technical committees. To my knowledge, regrettably, no other quantitative data exists on the matter. Therefore, in this respect the experiences of individuals are an important main source. According to such sources, the democratic aims of the formal process are not met (Cargill, 2000). Often the formal standards process is an exclusive one. Generally, the participation of end-users and SMEs is very low (Jakobs, 1999); formal procedures are often exploited in ‘undemocratic’ ways (e.g. staging a voting during Christmas holiday; Egyedi, 2000b), or redefined (as when e.g. US multinationals participate in European national delegations; Cargill, 1999). The regional governments and formal standards bodies are well aware that in formal standardisation the objectives of democracy, diversity and openness are often not met. Under the present conditions, it would be as difficult for the formal bodies to amend this situation as it would be for consortia to meet such objectives.

In fact, the formal standards bodies and standards consortia are rather similar in other respects as well. For example, in respect to Java, JTC1 and ECMA dealt with Sun in much the same way. The same parties participated and the same issues arose. In both fora, Sun insisted on ‘edition, not addition’. This illustrates that ‘rubber-stamping’ - which is a crude generalisation of the work which ‘edition’ would nevertheless entail -is a practice which takes place in standards consortia as well as formal standards bodies.

In sum, although consortia more explicitly target industrial parties, in practice the formal standards bodies and standards consortia include and exclude the same constituencies. Like the formal bodies, they also strive for consensus, address

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**Table 4.3. Convergence in the standards process between formal standards bodies and standards consortia along the dimensions of ‘speed’ and ‘democracy’**

<table>
<thead>
<tr>
<th>Speed dimension - Degree of democracy</th>
<th>Slow</th>
<th>Fast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Democratic</td>
<td>Formal standards bodies</td>
<td></td>
</tr>
<tr>
<td>Undemocratic</td>
<td>Standards consortia</td>
<td></td>
</tr>
</tbody>
</table>
minority viewpoints, etc, that is, they share the values of the formal ideology at committee level. However, unlike the organisational set-up of the formal bodies, there is much variation in who is the ultimate gatekeeper, an individual director, like in W3C, or a collective, like the General Assembly in ECMA.

4.3 European Union: Single Policy - Two Areas of Interest

The conclusion is that by and large committee standardisation in consortia is (a) not undemocratic in theory (striving for consensus & accounting for minority stand-points), and (b) as undemocratic as formal committee standardisation in practice. Moreover, the alleged difference in pace between the two types of standards fora seems to be based on dated information about the formal standards bodies, and is overrated. Since both standards development environments increasingly seem to show similar characteristics in theory (procedures) and in practice (committee process), has the distinction made by standards policy become arbitrary? Before answering, let us return to the central issue.

In Chapter I, the following reasoning was introduced: formal standards are an important point of reference for European regulation in particular. The European Commission requires a degree of democratic accountability if it is to refer to such standards in a regulatory context. However, in the field of ICT standards have emerged with a high market relevance, standards that stem from standards consortia. How should these standards be dealt with? According to the previous discussion, one could reason, the Commission can take the pragmatic route and include consortia as a source of standards. For in democratic respect the consortium standards process does not differ notably from the formal one.

This answer, however, does not take into account that, firstly, in the field of ICT, on which this report focuses, standards will seldom be part of regulation. Overall, the regulator’s need for democratic accountability of ICT standards processes - whether it takes place in a formal standards body or in a standards consortium - is absent. Secondly, where such a need does exist, should not the regulator’s concern for democratic accountability be given more substance? As a first step, more clarity should be created by the European regulator about what type of democracy is needed and for what purpose. The second step would be to monitor systematically if ‘democratic’ standards developing organisations follow up the democratic requirements, be they formal standards bodies or consortia.

The two previous points already more or less argue the case that a comparison between and a polarisation of formal and consortium standardisation has little actual relevance for European standards policy. The next and third point takes these arguments one step further. It is related to the sixth assumption that underlies European standards policy: “A generic standards policy well-serves both public
and market interests.” Much of what happens in standards committees is of little interest to the Commission\textsuperscript{33}. The standards have no relation with issues of health, safety, environment, privacy etc. The latter issues concern the general public, are subjects likely to be addressed by regulation, and therefore typically need monitoring by the European Commission. A two-fold standards policy for regulation-related, and other, mostly market-related standards would seem appropriate. Thereby the requirement of democratic accountability would only apply to standards processes that include public interest issues addressed by regulation. These processes would be closely monitored. For all other standards, no changes would need to be made. Both formal standards bodies and consortia could apply for the status of ‘accredited, monitored democratic standards development environment’. In this respect, the ITU-T has recently introduced an Alternative Approval Process for all its standards, except for those which have policy or regulatory implications. The latter still need to undergo the Traditional Approval Process (ITU, 2000).\textsuperscript{34} The reverse would be at stake for public interest standards. A specified concept of democracy would need to lay the basis for a well-monitored type of democratically accountable standardisation.

5. STANDARDISATION AND OTHER COMPATIBILITY STRATEGIES

Instead of fuelling rivalry and pitting standards environments against each other, it would be more appropriate to underscore the common ground between them\textsuperscript{35}: the belief that in certain instances standardisation is the preferred mechanism for coordination of the ICT market. In areas where coordinative action is needed, any multi-party standard—whether of consortium or formal origin—will be preferred to no standard at all. Or are there other, more effective means of coordination apart from standardisation which also enhance compatibility among products and services? With regard to compatibility standards\textsuperscript{36}, policy developers are prone to lose sight of the aim of compatibility\textsuperscript{37} and focus more narrowly on the means instead, namely on committee standardisation\textsuperscript{38}. The latter is a means to co-ordinate the activities of parties that compete in the market (Schmidt & Werle, 1998; Weiss & Sirbu, 1990). Ideally, the resulting standards become the shared basis for compatible implementations. However, standards do not guarantee compatibility. Whether compatibility is achieved de facto, depends on the scale and manner in which standards are implemented. Little information exists on this aspect of standardisation\textsuperscript{39}.

Ultimately policy interest should focus on technical compatibility and on compatible implementations. These outcomes can be contributed to and achieved by other means than standardisation as well. Compatibility often results as a by-
product of market dominance. In the field of computer software, for example, de facto standards such as PDF and UNIX have emerged that sometimes more forcibly induce widespread compatibility than some committee standards do. The origin of these de facto software specifications differs. Some result from in-company R&D efforts, others from various forms of co-operation between multiple parties. The type of specification development process need have no bearing on how the ownership of the specification is handled. A company may keep the proprietary technology for itself. It may, for example, monopolise the production of a key component, and define an interface which ties complementary products of other firms to the proprietary component technology (David & Greenstein, 1990). However, it may also give away its technology with an eye to expected long-term advantages, or enter into coalitions with rivals to enlarge its user base and increase support for its technology. At present, the practice of giving free access to the software source code is gaining interest. Well-known examples are Linux, TCP/IP, SMTP, DNS and C. An ‘open source-mindedness’ seems to be developing, also among commercial companies (O’Gara, 2000).

Whatever ownership approach is used - proprietary, open source or other approach - a sizeable market share may result. If a software specification acquires market dominance, we retrospectively speak of ‘de facto standardisation’. This would seem to refer to a standards process, whereas it actually refers to a process of software diffusion. The term ‘de facto compatibility’ would better express the relevance of the compatibility outcome. Compatibility is in this situation a by-product of a successful product development and diffusion - which may include compatibility aims - rather than the outcome of a proprietary or multi-party standards trajectory. See Table 5.1. This table compares committee standardisation with software development. Both are specification processes. How the specifications are developed - multi-party or by a company - need have no direct effect on their use. If a committee standard is implemented widely the consequence is similar to that of a dominant product specification: de facto compatibility results. For compatibility can only be measured as an aspect of the market, and not as an aspect of the specification process.

<table>
<thead>
<tr>
<th>Stages &gt; Type of Specification Process</th>
<th>Specification Process</th>
<th>Market Process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Participation</td>
<td>Outcome</td>
</tr>
<tr>
<td>Committee Standardisation</td>
<td>Multi-party</td>
<td>Standard</td>
</tr>
<tr>
<td></td>
<td>Implemented widely?</td>
<td>Yes &gt; de facto compatibility</td>
</tr>
<tr>
<td>Software Development</td>
<td>Multi-party</td>
<td>Specification</td>
</tr>
<tr>
<td></td>
<td>In-company</td>
<td>Market dominance?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No &gt; local or no compatibility</td>
</tr>
</tbody>
</table>

Table 5.1. The two specification processes that may lead to de facto standards in software (i.e. compatibility)
5.1 Other Compatibility Enhancing Measures: Sun’s Java Strategies

There is a wide diversity of strategies which companies may use to enhance software compatibility. Sun Microsystems illustrates this in respect to its de facto Java standard. To briefly refresh the memory, Java is a middleware technology for which compatibility, and in particular the integrity of the Java platform, is crucial. Sun has therefore introduced several complementary, compatibility-enhancing measures such as the Java programmer certificate and the Java Compatibility Logo (Egyedi, 2001a).

Firstly, Sun started by giving interested parties access to its source code. It invited developers to comment on, experiment with and improve the original source code. Since the developer community worked with the same source code, this open source approach had a light coordinating effect. Likewise, the instructional books which Sun authors and others wrote on Java, and the training programs that led to ‘certified’ Java developers added to a coordinated Java trajectory. These activities fortified the development of a Java practitioner community, but they did not guarantee compatible Java implementations. More effective in this respect was the free distribution of the Java Software Development Kit (SDK, formerly JDK). The SDK contained a full suite of development tools to write, compile, debug, and run applications and applets. Use of the SDK narrowed down the number of possible programs to those that would run on ‘standard’ Java platforms.

Secondly, another means to enhance compatibility is IPR licensing. Sun’s licensing policy was based on its intellectual property, which it protected by means of trademarks (Java name, Java-Compatible logo), patents (software algorithms) and copyrights (specifications). Part and parcel of Sun’s licensing policy were its test suites. These were used to certify compatible Java products. They gave licensees access to the ‘Java compatible’ logo (the steaming cup of coffee). The logo had much goodwill among Java programmers. Different from e.g. the strategy of encouraging the use of the SDK, which is a means to coerce developers towards compatible implementations (compatibility push), the logo created an incentive towards developing compatible commercial products (compatibility pull).

The Java Community Process (JCP) was a third means to co-ordinate the development of Java. Together with a new licensing model (Community Source License), Sun issued The Java Community Process (sm) Program Manual: The formal procedures for using the Java Specification development process (1998, 2000). The last and most evident compatibility strategy to mention here are Sun’s two failed standardisation attempts in JTC1 and ECMA (see Chapter II).

Sun applied these compatibility strategies sometimes successively, sometimes simultaneously, sometimes in combination. Some strategies were focused (e.g. the
Java Software Development Kit), others were more diffuse (e.g. the Java Community Process); some were forceful (e.g. licensing combined with IPRs), while others were more coercive (e.g. compatibility logo); some strategies were based on proprietary control (e.g. IPRs), while others primarily aimed to broaden the Java user base (standardization); some strategies primarily aimed to direct the attention of market players towards Java developments (e.g. standardization), while others specifically targeted technical compatibility (IPRs). Its strategies are listed in Table 5.2. The table distinguishes between compatibility strategies that control the initial phase of a specification process (what goes in: input control) and those that control its outcome (output control). The specification process at stake can either be a software development process or a standards process. For example, Sun’s problem with JTC1 and ECMA standardization was, partly, that while it could control its own standards input (i.e. the Java specification), it could not control the outcome of the standards process. Therefore its standardisation attempts are listed in the left column. A more output-oriented means to control Java compatibility (right column) was the use of Sun test suites to determine Java compatibility.

### 5.2 Why Choose the Standards Strategy?

Why would a company want to initiate standardisation if there are other, possibly easier means to achieve compatibility, or if, as in the case of Java, de facto compatibility already exists? Firstly, the straightforward rationale for approaching a standards body is to foster technical compatibility among existing or future products and services. The resulting standard then serves as a concrete means to co-ordinate product and service development of different producers and providers. Secondly,
companies also profit from another level of co-ordination. Economic studies have pointed out the relevance of compatible product pre-announcements (Farrell & Saloner, 1986) and ‘embrace-and-extend’ strategies regarding standards (Vercoulen & van Wegberg, 1999). These aim to direct the actions and orientations of other market players. They address the strategic level of market co-ordination and complement the operational level of technical compatibility. In sum, the standardisation process unites two complementary co-ordinative functions: technical compatibility and market co-ordination. Both aspects to committee standardisation serve as an ex ante mechanism for structuring the market.

Turning to our example, at a very early stage of Java development Sun had announced that it intended to standardise Java. If Java were to become an International Standard, this would signal stability in Java development, increase market confidence and encourage commitment to Java. It needed the commitment of industry to counteract possible competing Java developments and prevent fragmentation of the Java market. This early promise was, similar to the effect of product pre-announcements, a means to keep Java programmers and competitor companies focused towards Sun-driven Java initiatives. The step towards formal JTC1 standardisation in 1997 was in line with the promises made. Since Java was already a de facto standard, Sun wanted JTC1 -and later ECMA -to ratify its Java specification, not change it (‘edition, not addition’). It did not seek committee standardisation in the usual sense. In other words, Sun’s actions mainly targeted market co-ordination. This aim was better served by the status of formal International Standard than consortium standard or de facto industry standard, according to Sun.

Standardisation remains a well-used option. Although in Sun’s case, it was not a very successful strategy, Sun’s competitors in the embedded Java area, the J Consortium, have applied it more successfully. The consortium has become a recognised PAS submitter, which allows it to submit its embedded Java specifications to ISO/IEC JTC1. Its efforts triggered Sun’s recent decision to adapt Java in order to better suit the requirements of embedded Java users.

5.3 Contribution Towards Compatibility

The list of compatibility enhancing strategies in Table 5.2 puts standardisation into perspective. Of interest is then, of course, how effective standardisation is in securing technical compatibility relative to other strategies. The question is difficult to answer because little empirical data exists. For example, little is known about the actual impact of standardisation. But some preliminary observations can be made.

The problem of all voluntary standards, formal standards and consortium standards alike, lies in not being able to enforce -partial or full -compliance to standards (i.e. little output control). Even submission to conformance testing is
mostly a voluntary matter. Apart from regulatory requirements, conformance to standards depends almost solely on market-pull mechanisms. That is, demand-driven conformance to standards is needed if standardisation is to lead to actual compatibility. The demand-side of the market is reasonably developed where individuals are concerned (e.g. consumer organisations). However, mechanisms to coordinate shared consumer interests in compatibility are lacking in the post-standardisation phase. This contrasts strongly with the diversity of coordination mechanisms used by the supply side of the market. In other words, because of the voluntary nature of standards implementation (voluntary technical base) the degree of compatibility that is ultimately achieved is uncertain and non-transparent. See Table 5.3 (second column). Are other types of specification processes, possibly in combination with compatibility-enhancing measures, more effective?

Several types of specification processes are imaginable. The previous chapters mentioned four of them: pure proprietary specification development, the open source approach to software development, and the two middle-of-the-road approaches used by Sun: proprietary-led multi-party specification development and the community source approach. Let us focus the comparison with standardisation on the two most extreme strategies: the proprietary and the open source strategy. They come with different licenses (Cargill, 2000; O’Mahoney, 2000). A well-known open source license is the General Public License (GPL) used for the operating system Linux. It allows one to download Linux, and use, change and distribute adapted source code without charge. These adaptations should in turn be made available in source code. This license thus removes the incentive to turn a program into a proprietary product.

The open source approach faces many of the same compatibility problems as standardisation does. Sharing the same source code need not imply a compatible technical base. The license does not diminish the incentive the change source code, and if software compatibility would be prioritised -there are no easy means to control the outcome of the open source process. Therefore, with the open source strategy compatibility is uncertain and the outcome may be diffuse -albeit transparent (see Table 5.3 column 4). Market pull is needed to maintain compatibility among software products. In contrast, the proprietary approach to specification development, where IPRs are usually kept under tight control, prescribes other players to how to deal with the specifications by means of licensing agreements. The proprietary specs start out as being compatible (controlled technical base; compatibility push) and compatibility is imposed on licensees (controlled outcome), a strategy that is usually very effective (Table 5.3, column 3).

In sum, apart from standardisation, there are other, sometimes more effective compatibility strategies which lead to de facto compatibility. Whether or not the European Commission should involve itself in compatibility strategies other than
Table 5.3. Assessment of the type of and degree of compatibility achieved in different specification processes

<table>
<thead>
<tr>
<th>Aspects of Compatibility</th>
<th>Specification Processes</th>
<th>Software Development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standardization</td>
<td>Proprietary Approach</td>
</tr>
<tr>
<td>Conformance Mechanism</td>
<td>market pull, demand-driven</td>
<td>compatibility push</td>
</tr>
<tr>
<td>Ultimate Technical Compatibility of Software</td>
<td>uncertain voluntary techn. base non-transparent outcome</td>
<td>high controlled techn. base controlled outcome</td>
</tr>
</tbody>
</table>

standardisation - or even as little as possible in standardisation - is a matter for debate. For the moment, this debate should be kept open. It should not be closed beforehand with reference to the danger of reinforcing monopolies. The Java case study suggests that in certain circumstances, the public’s primary interest is in solutions that prevent unnecessary fragmentation of the market. Since there are few legal means to safeguard the public interest in compatibility, if the latter coincides with a company interest, proprietary solutions deserve consideration. At the same time, we should not overemphasise the idea of compatibility control: the case also shows that even tightly controlled compatibility strategies (e.g. licensing combined with IPRs) cannot prevent incompatible developments (Microsoft’s use of Java).

PART III: CONCLUSION AND RECOMMENDATIONS

The research on which this report is based aimed, firstly, to provide contemporary case material that illustrates how consortia work. The main material of the two case studies was presented in Part I of the report. The material partly served to answer the questions: Why is sometimes consortium standardisation initiated rather than formal standardisation? Do standards consortia work in ways that will deliver open standards? These questions were answered in Part II. A summary of the answers is given in section 6.1 and 6.2. The second objective was to examine

a. The assumptions and beliefs that are part of current understanding of standards consortia (see Chapter IV, introduction), and
b. To develop a new perspective on the significance of consortium standardisation for EU standards policy (see Chapters IV and V).

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In this part of the report, the consortium problem is readdressed, and core-arguments for the proposed new policy direction is summarised (section 6.3). Overall conclusions are drawn, and recommendations are made (Chapter VII).

6. REVIEWING CONSORTIUM STANDARDISATION

6.1 Why is Consortium Standardisation Sometimes Preferred?

The case studies and literature show that standards consortia successfully market their feats. They are associated with timely standardisation and pragmatic standards solutions, despite incidental critical observations to the contrary. This, and possibly the homogeneity and suggested exclusiveness of consortium standardisation attracts companies. The two case studies further show that:

- **The consortium can be a stepping stone for and offer easier access to formal recognition of technical specifications:** Sun chose ECMA because ECMA had an A-liaison with JTC1, which gave it access to the Fast Track procedure. In the past ECMA standards had been submitted to a yes/no vote in JTC1 without any modifications, and often successfully so.

- **A consortium may be seen as equally relevant to market co-ordination as a formal standards body is:** ECMA was an open standards consortium and thus an answer to continuous pressure from licensees and real-time Java developers to open up the Java development process. Many large companies were members. So ECMA processes also promised to be relevant in respect to co-ordination of the market.

- **A consortium may represent an exemplary style of standardisation (simple and widely used standards):** For XML developers, HTML was a standardisation exemplar in terms of its simplicity and widespread diffusion. In respect to the type and setting of standardisation, therefore, the W3C consortium headed by the pragmatic developer of HTML (Tim Berners-Lee) was a more likely choice for XML standardisation than the ISO.

- **Improving a standards is easier if this takes place in a new institutional setting (consortium):** The change from SGML's JTC1 setting to the setting of W3C made it easier for XML developers to deviate for practical or other purposes (e.g. Not-Invented-Here) from standard SGML solutions.
6.2 Do Consortia Deliver Open Standards?

The two cases do not simply confirm the widely shared assumption that consortia are undemocratic. To the contrary, although there may be some practical exclusion mechanisms, in principle consortium membership is open. Indeed, in certain respects consortia appear more open than the formal bodies. For example, while the latter usually keep access to committee drafts restricted to participants -and, thus, seek consensus within a limited group -consortia more often post their drafts on the web and actively seek comments from outside.

The W3C case indicates that -some -consortia are reigned in an autocratic manner. However, at committee level their procedures embody the same values as those of the formal standards bodies (i.e. strive for consensus, address minority viewpoints, etc.). There is one exception: consortia do not explicitly aim to involve diverse participants.

Consortia do not automatically link more and diverse participation in the standards process to wider standards use. Therefore, they do not expressly aim to be inclusive at committee level. However, in practice they may nevertheless show a high degree of inclusion (e.g. open, publicly accessible discussion lists, user participation, and user representation in key functions). In fact, the formal standards bodies include and exclude the same constituencies. Therefore, in so far as compatibility standards (i.e. market standards) are concerned, standards consortia will probably do the job as well as formal standards bodies do.\(^{45}\) (In other situations, see below point 2.)

6.3 Redefining the Consortium Problem

Standards consortia are defined as a problem. Their procedures are held to be undemocratic and therefore unfit as an instrument of regulatory governance. Does this accurately describe what is at stake? As was discussed in Part II, there are several questionable aspects to the way the consortium problem is defined. They are listed in Table 6.1 and briefly summarised below.

**Democratic standardisation?** [1, 2, 3]. Consortia procedures are held to be unfit for use in a regulatory governance context because they are undemocratic. However, should the standards setting primarily be seen as an extension of regulation? A sharp distinction should be made between *de jure* uses of standards that touch on issues of health, safety, privacy, environment, etc., on the one hand, and compatibility standards, on the other. Consortia usually address the latter. This type of standardisation is more aptly characterised as market coordination among competitors. How this takes place, that is, whether consortia operate in true or quasi-democratic way (e.g. multi-party standardisation), the level of democracy is here foremost a marketable asset of the standard. The consumer decides its value.
For *de jure* uses, where the public interest is involved, the democratic requirements of the European government need to be re-examined and defined more sharply. Once these are clarified and operationalised in measurable terms, ‘democratic standardisation’ need not be restricted to the formal standards bodies. Because of this difference between the use of standards in a market and in a *de jure* public interest context, in this respect a more specific, twofold standards policy for each of these areas seems appropriate.

**Co-ordination of Technology: Compatibility** [4]. The ‘consortium problem’ is defined as a standards development problem. Standardisation, whether by means of formal standards committees, hybrid workshops (e.g. CEN/ISSS workshops), or specification consortia, it is one means to co-ordinate technology development. However, the compatibility objective can also be achieved by other means. Other compatibility strategies are, for example, proprietary-led multi-party specification development, and the open source approach to software development.

Many issues that seem very important from a standardisation standpoint take on a different meaning in the light of the compatibility objective. For example, the distinction between specifications and standards becomes unimportant; and, instead of concerns about non-consensus consortium standards, there should be relief about the fact that companies prefer standardisation above proprietary strategies. De facto compatibility should be the central issue.

**Market Co-ordination by Specification and Strategic Consortia** [5]. Most specification consortia are implementation-oriented. They aim at coordinating technology development in a multi-vendor environment. They succeed if companies implement the specifications. The result is, ideally, a co-ordinated segment of the market. This outcome requires the support of a business community.

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**Table 6.1. The shift in perspective needed in standards policy based on an analysis of the consortium problem.**

<table>
<thead>
<tr>
<th>Aspect of the Consortium Problem</th>
<th>as defined</th>
<th>as redefined</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 primary characterisation of the standards setting</td>
<td>regulatory governance</td>
<td>market coordination among competitors</td>
</tr>
<tr>
<td>2 democratic standards process *compatibility standards</td>
<td>consensus, well-balanced participation of interest</td>
<td>multi-party</td>
</tr>
<tr>
<td>3 health/safety/enviro nm/ etc. standards</td>
<td>groups</td>
<td>(discussion needed to further refine ‘democratic standards needs’)</td>
</tr>
<tr>
<td>4 aim of technical co-ordination</td>
<td>standardisation</td>
<td>compatibility</td>
</tr>
<tr>
<td>5 stage of standardisation emphasised</td>
<td>standards development</td>
<td>standards implementation</td>
</tr>
</tbody>
</table>

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consortia focus on developing such communities. However, the ‘problem as defined’ almost exclusively emphasises standards development issues. Instead issues concerning standards implementation should acquire more emphasis. A re-definition of this aspect of the consortium problem is required.

7. CONCLUSIONS AND RECOMMENDATIONS

**Beyond Consortia.** Current standards policy appears to be caught up in a polarised discussion about which category of organisations best serves the market for democratic and timely standards: standards consortia or the traditional formal standards bodies. It is an unhelpful discussion, this framework of rivalry.

Let us, for a moment, go along with it. In the discussion, consortia are seen as a problem. They lack an open and democratic standards process. However, neither recent literature nor the case studies in this report can confirm this. The findings show that in theory the standards committees of both settings strive for consensus and address minority viewpoints, while in practice both largely include and exclude the same constituencies. The framework of rivalry merely leads to new hybrid forms of organisation like the CEN workshops, which, speculating somewhat, will not lure companies away from consortia but instead lead to a shift within the CEN standards domain. Moreover, it by-passes the more significant difference between standardising and not-standardising. The real issues lie elsewhere. These are discussed below as main threads for standards policy. (For more detail, I refer to the previous chapter.)

**Democracy: beyond rhetoric.** European standards policy shows too little interest in whether democratic standards procedures provide the desired democratic accountability or not. Where a *de jure* need for standards exists, that is, where standardisation touches on aspects of health, safety, environment, privacy, security, etc., should not the regulator’s concern for democratic accountability be given more substance? Firstly, more clarity would need to be created about what type of democracy is needed and for what purpose – in practice. This is a political decision. Secondly, the Commission should monitor systematically if ‘democratic’ standards developing organisations follow-up the democratic requirements, be they formal standards bodies or consortia. For where democratic accountability is still important, insight into the factual democratic course of the standards process is needed. For market coordination, on the other hand, the democratic requirement of ‘balanced representation of interest groups’ could be simplified to ‘multi-party participation’.

A differentiated standards policy is recommended to better cater to the significance of standardisation as a means to coordinate the market and as an instrument
of regulatory governance. Differentiation prevents a situation where democratic (or other political) ideals are diluted in order to be able to apply a market-oriented standards policy to de jure situations -or, as presently happens, vice versa. In this scenario, the assignment of a work item to either the multi-party or to the more demanding ‘democratic’ standards environment becomes an important decision.

An interesting case for gaining experience about problems of assignment would be the ITU-T’s recent introduction of a two-fold track of the Traditional and the Alternative Approval Process for de jure and non-de jure standards.

**Beyond Standardisation.** Standardisation -whether by means of formal standards bodies, hybrid workshops or specification consortia -is one means to achieve technical compatibility. There are other means to this end as well. In standards policy the vantage point of compatibility should take priority. It puts into perspective the distinction between (a) standards and specifications (de facto standards), and (b) formal and consortium standards. These distinctions, which may seem very important from the standardisation standpoint, take on a different meaning in the light of compatibility aims. In this light, both standardisation and software development are specification processes, and ownership and property issues (open source/ proprietary) are in principle irrelevant. The primacy of standards’ implementations and compatible technologies then comes back into focus. For example, a proprietary multi-party specification (e.g. Java) and a standard stemming from a consortium led by a ‘benevolent dictator’ (XML from W3C) can be at least as effective in fostering compatibility as a formal standard. A gap appears to exist between outcome-oriented market practices and process-oriented governance ideals, which standards policy will need to address. Compatibility can only be measured as an aspect of the market, and not as an aspect of the specification process.

In addressing standardisation, current policy should not overemphasise standards development activities; it should focus more on standards implementation and market co-ordination. Furthermore, it is recommended that companies and governments re-assess their standardisation policy from the de facto compatibility standpoint.

Whether or not the European Commission should involve itself in other compatibility strategies than standardisation (e.g. licensed software specification processes) -or even as little as possible in standardisation -is a matter for debate. For the moment, this debate should be kept open. It should not be closed beforehand with reference to the danger of reinforcing monopolies. The Java case study suggests that in certain circumstances, the public’s primary interest is in solutions that prevent unnecessary fragmentation of the market. Since there are few legal means to safeguard the public interest in compatibility, if the latter coincides with a company interest, proprietary solutions deserve consideration. At the same time, we should not overemphasise the idea of compatibility control: the case also shows that even tightly controlled compatibility strategies (e.g. licensing combined with IPRs) cannot prevent incompatible developments (Microsoft’s use of Java).
Institutionalisation of public compatibility interests: coordination of demand and legislation. In particular in the current immature state of the ICT field, the supply-side of the market often lacks the necessary incentives to prioritise compatibility. What mechanisms does the public, the demand-side of the market, have at its disposal to advance collective compatibility interests? This question has arisen in two different contexts: (a) while comparing the effectiveness of different compatibility strategies, and (b) in relation to Microsoft’s attempts to fragment the Java platform.

a. Comparing the effectiveness of different compatibility strategies. The standardisation and open source software strategies suffer from the same problem: whether they lead to compatible products is not clear. Taking the example of standardisation, compliance to (voluntary) standards cannot be enforced. Demand-driven conformance to standards is needed if standardisation is to lead to actual compatibility. However, in the post-standardisation phase there are no mechanisms that coordinate shared consumer interests in compatibility. This contrasts strongly with the diversity of coordination mechanisms used on the supply-side of the market. Discussions about supporting users and user coordination during the standards process should be extended to include the post-standardisation phase with the aim of fortifying demand-side interests in compatibility.

b. Maintaining the integrity of a platform. A regulatory asymmetry exists between IPR interests and compatibility interests. Current regulation anchors the primacy of IPR ownership and market competition in law, but it hardly recognizes the societal significance of compatibility interests (i.e. technical interoperability). Would it be desirable to legally anchor compatibility interests in a way similar to intellectual property interests?

Much research remains to be done. Among other things, the actual compatibility effects of -formal and consortium -standardisation and the open source approach remain uncertain. For example, little is known about (a) the participatory specification process of Open Source Software, which could contain leads for improving or diversifying standards development; and (b) whether the process and outcome of developing open source software involve problems of compatibility (e.g. upward compatible or stable source code). Case studies are needed to throw light on these issues.

A second area of research which this study points to, is the effectiveness of different compatibility strategies. A more systematic inventory of the compatibility implications of market strategies is needed to supplement the findings of the Java case. Of interest is which other means exist to enhance compatibility and how their contribution can be measured (i.e. quantify effectiveness).
REFERENCES


Appendix


APPENDIX I: INTERVIEWEES

Java case:
Jan van den Beld (ECMA, Secretary General) Carl Cargill (Sun, Director of Standardisation) Roger Martin (Sun, Standardisation Strategy Manager) Wim Vree (Delft University of Technology) Informal interviews were held with participants to the ECMA Technical Committee 41 meetings.

XML case:
Arjan Loeffen (Salience B.V.) Pim van der Eijk (eXcelon Nederland B.V.) Diederik Gerth van Wijk (Kluwer B.V.) Charles Goldfarb (SGML inventor/ XML expert)

General:
Willem Wakker (ACE Consulting)

APPENDIX II: LIST OF PUBLICATIONS ON THE PROJECT


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ENDNOTES

1 The scope of this research does not include some interesting, recent phenomena such as the significance of the CEN workshops and the meaning of the Open Source phenomenon for standardisation. These settings deserve separate attention.

2 Other sources of what Bruins (1993) calls grey standards, are trade-or profession-oriented organisations (e.g. IEEE, ASE), and organisations like the IETF, a non-commercial multi-party forum, that work towards a specific environment (see e.g. Abbate, 1994; CRE, 2000; Egyedi, 1994, 1996).

3 The standards process was to be concluded within the initial period of the EU research grant (15 January 2000 -15 March 2001).

4 The procedure for the Transposition of Publicly Available Specifications into International Standards is based on the Fast Track process (see next note). It also allows an external organization to submit its specification as a draft International Standard, which means that according to JTC1's aims, the transposition can be completed within 11 months (ISO/IEC JTC1, 1999b). But the criteria for becoming a recognized PAS submitter are less restrictive than those for an A-liaison membership.

5 The Fast Track process is an option for consortia and other multi-party fora that have an A-liaison membership status in JTC1. The A-liaison status is meant for organizations that contribute actively to JTC1 standards committees (e.g. ECMA and IEEE). It gives access to the Fast Track procedure: an A-liaison member can submit its specification as a final Draft International Standard and thus skip the prior phases of the JTC1 standards process. This procedure strongly reduces the time needed for standardization. ("The duration of the final ballot, to become an IS ballot is six months." (ISO/IEC JTC1, 1999a)

6 Two other significant exceptions are Adobe's PDF-format (ISO/DIS 15929; 15930) and HTML (ISO/IEC 15445:2000) which was offered first to the IETF and later to ISO.

7 APIs comprise the standard packages, classes, methods and fields made available to software developers to write programs (Sun, 1997c).

8 Of interest is that Sun had taken first steps to formalize Java through ANSI, the first most obvious step for a U.S.-headquartered company. According to Sun's head of standardization, Sun did not pursue this route because of "arcane and potentially obstructionist processes" in ANSI (Cargill, 2000).

9 The EICTA position paper is referred to in CSN 337-03 Sun's Up To Something.

10 Informal communication with ECMA TC41 participants. The ruling was confirmed in January 2000. Sun's compliant against Microsoft for unfair competition was granted. (Sun, 2000b).
Compatible succession -or 'grafting' as it is called in Egyedi & Loeffen, 2002 - refers to a situation where software products that comply to the successor standard also interoperate with products based on its predecessor. Such is typically the aim when the successor is a new edition or a minor revision of a standard. Concerned are incremental innovations, where the problem addressed by the old standard has not changed and -in essence -neither has the means to solve it. Both standards are part of the same technological paradigm (Dosi, 1982).

Jon Bosak: "Re: Welcome to w3c-sgml-wg@w3.org!", one of the first submissions to the discussion list of the W3C SGML Working Group, contribution to w3c-sgml-wg@w3.org discussion list, Aug 281996.

Tim Bray quoted in Charles F. Goldfarb, 'Re: Compliance with 8879, a moving target', 12 Sep 1996.

Private communication.

Jon Bosak, 'W3C SGML WG: The work begins', contribution to w3c-sgml-wg@w3.org discussion list, 5 Sep 1996

Jon Bosak, 'W3C SGML WG: The work begins', 5 Sep 1996.

Two other aims are "For any XML document, a DTD can be generated such that SGML will produce "the same parse" as would an XML processor," and "XML should have essentially the same expressive power as SGML."

Eve L. Maler, 'Compatibility issues and principle #3', contribution to w3c-sgml-wg@w3.org discussion list, Sep 16 1996.

David G. Durand, 'Last unstructured discussion: SGML compatibility', 9 Oct 1996, contribution to w3c-sgml-wg@w3.org discussion list.

"Re: Capitalizing on HTML (was Re: equivalent power in SGML and XML)," C. F. Goldfarb, contribution to w3c-sgml-wg@w3.org discussion list, Sept. 19 1996.

Charles F. Goldfarb, 'Re: Make DTDs optional?', contribution to w3c-sgml-wg@w3.org discussion list, 30 Sep 1996)

Tim Bray, 'XML, HTML, SGML, life, the universe, and everything', contribution to w3c-sgml-wg@w3.org discussion list, 08 Nov 1996.

Tim Bray, 'Recent ERB votes', 06 Nov 1996. In: Reports From the W3C SGML ERB to the SGMLWG And from the W3C XML ERB to the XML SIG, Compiled for the use of the WG and SIG by C. M. Sperberg-McQueen, 4 December 1997.

Cargill (1999) notes a number of advantages. Consortia are generally more under control of their members than the formal standards bodies; they have more financial room to manoeuvre; and they need not forgo the public procurement market of the US government, which in practice also accepts consortium specifications (In the OMB circular of the United States it says that no prefer-
Acknowledgement is given to formal (consensus) standards in respect to (non-consensus) consortium standards. CRE, 2000).

The democratic rationale is: A democratic standards process best serves the aim of widespread, international use of standards and specifications (e.g. compatible products, consumer protection, etc.). This rationale has not been checked. See Egyedi (1996).

Tim Bray, "Boston, for those who weren’t there’, 22 Nov 2006 (contribution to w3c-sgml-wg@w3.org discussion list)."

Egyedi 1996, section 4.3.2

Placing on the website may occur from a few days to 4 weeks after approval of the text. Approval Time runs from determination/consent to final approval. (Source: "The IT Standardization and ITU", presentation of Houlin Zhao, Director of the Telecommunication Standardization Bureau of the ITU, at the IEEE SIIT 2001 conference in Boulder US, 3-5 October 2001

ECMA procedures are less explicit on this account than W3C procedures

High membership fees are often viewed as a stumbling block for participation by small-and medium-sized enterprises (SMEs) and users. However, critics are usually not aware, firstly, of special lower fees for non-profit organisations; secondly, of the costs incurred by participating in formal standardisation (travel, hotel and subsistence costs of going to committee meetings, the membership fees (e.g. ITU annual fee 20.000 $; associate fee 6.000 $); thirdly, of the -often publicly accessible -discussion lists of consortium standards committees, and invitations to participate in external reviews.

Although an electronic mailing list was installed, the committee was disbanded before it had been put to use for technical discussion.

W3C has been accused of rubberstamping the products of major vendors because of the 'member submission process' (Rada, 2000 p.22). This process makes it possible to consider proposals developed outside of W3C. The W3C rules explicitly state that this process is "not a means by which Members ask for 'ratification' of these documents as W3C Recommendations."

In exceptional cases, consortium standards are likely to be relevant as indirect means for market governance, that is, in situations of complex market coordination problems where government support is needed to break dead-locks in the market. As such, consortium standards are relevant as part of the European Union's public procurement policy.

In the alternative process the approval time is 2-9 months and publication time is 3-9 months Approval Time runs from determination/consent to final approval. (Source: "The IT Standardization and ITU", presentation of Houlin Zhao, Director of the Telecommunication Standardization Bureau of the ITU, at the IEEE SIIT 2001 conference in Boulder US, 3-5 October 2001.

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Private discussion with Carl Cargill.
The term 'compatibility standard' is used in this chapter to distinguish this category of standards from safety and health standards (e.g. Grindley, 1995). The ISO defines compatibility as the "suitability of products, processes or services for use together under specific conditions to fulfill relevant requirements without causing unacceptable interactions." (ISO/IEC, 1991) ICT practitioners also use the term 'interoperability'.

The term 'standardisation' refers here to activities that are exclusively set up to lead to standards and that take place within formal standards bodies such as ISO or in standards consortia such as W3C (i.e. multi-party industry standards fora).

Presently, an EU project on the impact of standardisation is taking place, which promises to throw light on the subject (see www.standardsimpact.org).

See for an example Grindley, 1995, p.140 a.f.

NB: Other case studies would probably show up additional strategies.

The two types of co-ordination are complementary explanatory frameworks—although specific strategies may sometimes be explained by both.

The license is 'viral': all changes to the source code automatically become part of the software commons (Op cit. from 'The world is taking to open source', Apr 12th 2001, From The Economist print edition, Opinion, Economist.com, Out in the open.)

Although, when the source code diverges at least with open source software the differences are retraceable.

NB: Quantitative research is needed to confirm this.
APPENDIX 6: THE "DIN PAPER"

STRATEGY FOR STANDARDISING INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

4. GENERAL STRATEGY

In conceptual terms, standardisation in information and communications technology primarily means safeguarding the cooperation of heterogeneous, distributed systems. In other words: interoperability is the main standardisation objective for ICT. This interoperability refers to all levels of the OSI reference model as well, increasingly, to semantic aspects. However, the latter is causing considerable problems since existing systems and processes (cf. product classification in e-business, for example) are typically involved bringing standardisation to its limits if 100% solutions are aimed at.

Interfaces (in hardware and software), communications protocols and data objects are standardised to safeguard interoperability. This means that interfaces can remain stable in the long term in complex distributed systems and investments are thus secured and migration made possible. By contrast, the standardisation of product-related aspects plays a very minor role in ICT.

However, the standardisation objective of ICT is not limited to interoperability. Much rather, the penetration of ICT into all areas of society, especially the consumer area, means that issues of relevance to society are also gaining in importance. Security including biometry and data protection are in great need of standardisation, as are ergonomic aspects, especially with regard to allowing the disabled barrier-free access to new technology (‘disability access’, ‘design for all’). These issues require the participation of the general public and are consequently predestined for treatment in standardisation organisations instead of other bodies.

4.1 Standardisation Policy Aspects

Standards

The development of specifications and standardisation are methods for technical harmonisation called into being and supported by industry – they all have their own justification. This leads to industry’s interest in combining these various methods and their products in accordance with their specific strengths and making the competent organisations and bodies cooperate purposefully, where this is necessary.
Development processes and voting methods based on consensus are the optimum precondition for the general acceptance of the standards and fair competition between rival companies. In this connection, to achieve consensus it may be appropriate to aim for a pragmatic “80% solution” instead of a perfect “100% solution” and to treat the remaining heterogeneity with other means (cf. A 4.2.1). However, the search for consensus comes up against its limits where market opportunities are jeopardised by the course of time.

In addition to the development process and voting method, revision and updating as well as consistency among themselves are also important characteristics of standards. Revision, updating and consistency are particularly marked in standards. In the case of standards for short-lived products, revision and updating do not play a major role – specifications that lose their significance when the product comes to the end of its life can be used here. The situation is completely different with standards that serve the purpose of building up the most varied structures (infrastructures) to be maintained in the long term – here the precautions for revision, updating and consistency must satisfy the most rigorous demands.

If specifications prove their value on the market and thus become part of an infrastructure, their transposition into a standard and the transfer of responsibility for revision and updating to a standardisation organisation is a desirable step.

**Statement A 0.1 Need for Standards of Different Consensus Levels**
SICT acknowledges that in the field of ICT there is a need for standards at different consensus levels, depending on the planned application. Consequently, there is a need for standardisation organisations as well as consortia/fora. These can complement each other. However, it lies in the interests of all concerned – the developer and the user of standards – if duplication of effort and conflicting solutions are avoided with cooperation between specification developers and standardisation organisations.

Depending on the planned application, in each case the most suitable form of standard should be developed and used.

**Statement A 0.2 Graduated System of Products of the Standardisation Organisations**
The proliferation of consortia in the ICT field that can be seen has considerable cost consequences for the companies affected: participation in many of these organisations requires high expenditure of personnel and financial resources, irrespective of the duplication of effort resulting from the lack of coordination between the consortia. It is therefore in the interests of the industry concerned to limit the number of consortia.

SICT therefore expressly welcomes the fact that the international (ISO, IEC) and European (CEN, ETSI; CENELEC under consideration) standardisation organisa-
tions, as well as DIN, make the establishment of fora and consortia superfluous to a certain extent by meeting the needs of industry by introducing alternative standardisation processes (workshops, etc.) and products (Workshop Agreements, etc.) and by a graduated system of standardisation products. SICT calls upon the standardisation organisations to introduce further improvements to the methods in a dialogue with the potential users of such workshops.

**Statement A 0.3 General Main Issues of ICT Standardisation**

SICT recommends that ICT standardisation should primarily focus on those subjects where it can bring its specific strengths into play. In particular there are

- Subjects that concern infrastructures with a long-term effect;
- Subjects where competing technologies do not encourage competition and, in fact, tend to impede it (cf. the VHS and Betamax video systems);
- Subjects with great heterogeneity in the groups concerned with respect to economic region, market share and role in the market;
- Subjects with great public interest (authorities, large group of users);
- Subject with a reference to the cultural peculiarities of individual countries and regions.

**Statement A 0.4 Upgrading Other Standards**

SICT recommends that the standardisation organisations establish methods, if they have not already done so, that allow other standards to be upgraded quickly.

**Standardisation as an Instrument of Government and Policy**

Standardisation is an important instrument of (economic) policy. Standards serve

- The technical implementation of the so-called key requirements of European directives in line with the so-called New Concept of the European Union in the regulated area;
- The harmonisation of markets and, thus, the dismantling of barriers to trade or – in a negative case – the isolation of markets by means of the deliberate choice of deviating standards;
- The creation of new markets by achieving advantages of scale;
- The rationalisation of administrative processes (authorities as large-scale users).

**Statement A 0.5 Standards and the Statutory Regulated Area**

SICT supports the application of the New Concept for technical regulation in the European Union in the ICT area, too. Although the co-regulation approach is to be
welcomed in principle, from the point of view of standardisation it has not convinc-
ingly demonstrated its usefulness.

SICT calls for the reference to standards for regulation pursuant to the New
Concept. The use of other specifications in this connection is rejected.

SICT recommends that the standards organisations offer their services for de-
veloping the specifications needed for self-regulation to the main parties involved
in co-regulation. These can also be *Workshop Agreements* (CWAs, IWAs) if this
corresponds to the wishes of the main parties involved. A binding application of
*Workshop Agreements* is rejected. Financial support for workshops that is not ori-
ented to the interests of the main parties involved is also rejected by the European
Commission.

**International, European and National Standardisation**

**Statement A 0.6 Primacy of International Standardisation**

SICT firmly emphasises the primacy of international standardisation because the
ICT market is a global market. In this connection, persistent efforts are being made
for strong impetus for international standards to come from Germany.

SICT firmly emphasises that a splintering of international standardisation into
further organisations other than ISO, IEC and ITU-T would run counter to the goal
of uniform international standards and vehemently rejects this.

In addition to this strong international orientation, European integration continues
to play an important role. However, European standardisation only makes sense
in conjunction with top international developments or pilot applications or with
regionally restricted solutions. Alternative or rival developments to international
standardisation should be rejected. This means that SICT recommends that Euro-
pean ICT standardisation should always be assessed from the aspect of the ability
to transfer and apply the results at an international level. German participation in
European projects should be primarily based on this consideration.

By contrast, purely German standardisation in information and communications
technology is not supported unless it expressly and exclusively serves to provide a
strong impetus for international standardisation.

**Statement A 0.7 National Delegation Principle and the Role of National
Standardisation Organisations**

The national delegation principle for participation in international or European
standardisation allows all concerned appropriate participation in the development
and decision-making processes. SICT therefore recommends that this principle also
be retained in ICT standardisation.
With the increasing supranational character of ICT standardisation, a priority task for national standardisation organisations is to give all groups concerned, especially SMEs and consumers, a platform for participation at international or European level.

**Statement A 0.8 Language in ICT Standardisation**
In information and communications technology, standards are preferably drawn up at international level and applied in the original version and language. The time-consuming development and updating of standards at three levels (international, regional and national) does not bring any value added for the groups concerned in the ICT field. In the field of ICT, standards should therefore be developed at international level and applied in the original version. It is then necessary or sensible to transfer them into regional or national standards

- If matters relating to safety technology are dealt with,
- If the users cannot use the standard in the original version,
- If technical harmonisation/interoperability cannot be achieved in any other way.

In these cases, too, the transfer and update should be done with as little effort as possible.

**Market Orientation**

Standards that do not comply with market needs do not develop an effect; developing them is a waste of resources. The difficulty is recognising market needs when initiating a project with a certain degree of reliability or recognising declining market interest on time. If the players in a standardisation project are only economically interested parties, it can be assumed that a project meets the market needs. However, the situation is different in standardisation with a potentially broad spectrum of players: with the exception of standardisation in the context of the New Concept, the market orientation of standardisation projects should be strictly reviewed and ensured.

**Statement A 0.9 Ensuring Market Orientation**
The market orientation of standardisation projects shall be ensured by: appropriate criteria for evaluating projects and their strict application, respecting minimum participation, consistent project management and halting projects if the timeframe is exceeded, appropriate involvement of all participants, even in the state sector, in the project costs.
4.2 Standardisation and Remaining Heterogeneity

The previous sections contained clear indications for the fact that the traditional methods of standardisation are coming up against their limits in ever more sectors (such as virtual specialist libraries) – in spite of all the improvements to the details of the methods. On the one hand, they appear to be indispensable and clearly increase quality and efficiency in some areas. On the other hand, they can only be implemented to a certain extent within the context of global provider structures and changed framework conditions, against a background of rising costs. That is why the previous standardisation concepts should be reconsidered. The remaining and unavoidable heterogeneity must be countered by various intellectual and automatic methods for subsequent conceptual integration. A new way of looking at the remaining call for maintaining consistency and interoperability is needed. It can be described with the following premise: standardisation should be thought of from the point of view of the remaining heterogeneity. Only with the joint interaction of intellectual and automatic methods for dealing with heterogeneity and standardisation is there a strategy for a solution that does justice to the current technical, political and social framework conditions.

Only at first glance does it seem to be a contradiction that considerations about deregulation, such as the acceptance of the standards that can only be implemented incompletely, will simultaneously lead to a strengthening of efforts for integration. However, if standardisation is not viewed as an independent or primary process to which all others have to subject themselves, but as a method that is thought of from the point of view of the remaining heterogeneity and is modelled and implemented in terms of this, conditions for consistency and interoperability that can be used under current conditions.

Statement A.0.1 Remaining Heterogeneity
If there is no success in some areas to implement standardisation, or to do so only partially, with reasonable time being spent, the consequences of the lack of standardisation and how the remaining heterogeneity can be at least approximately countered by automatic or intellectual methods should be specifically analysed for every remaining detail. The costs and concessions to quality that may result should be compared to the effort and the prospects of success of further strengthened attempts at standardisation.

4.3. Operative/Organisational Aspects

Statement A.0.1 Interdisciplinary Work
ICT standardisation frequently calls for interaction between experts of several specialist areas. SICT therefore recommends that the existing fixed structures in
the standardisation organisations should be supplemented with flexible structures and ways of working that not only support this interdisciplinary work, but also encourage it in the long term. The establishment of strategically oriented bodies that set targets for cooperation should also be considered. For example, one solution could be project-related teams that are called by a cross-body board and report to it. (ICT SB)

**Statement A 0.2 Cooperation between ISO, IEC and ITU-T in the Field of ICT**

In line with the convergence character of ICT, relevant standardisation work affects the traditional field of work of all three international standardisation organisations, ISO, IEC and ITU-T. SICT therefore firmly calls upon ISO, IEC and ITU-T to intensify their cooperation in the field of ICT standardisation and to cooperate in a pioneering fashion.

**Statement A 0.3 Cooperation with other Specification Developers**

SICT emphasises (cf. 4.1.1) the need to cooperate with other specification developers in order to largely avoid duplication of effort and conflicting solutions. An important aid is the use of the world wide web to inform third parties about existing standards as well as projects currently being worked on.

The future structure of international ICT standardisation should be one of a cooperative network of conventional standardisation organisations and standard developers of a new type. SICT recommends that the standardisation organisations in this network should take on the active role of a catalyst in initiating standardisation work by identifying need and expressing requirements. The standardisation organisations should aid for moderation, especially with apparent conflicting recommendations and those with legal consequences.

An infrastructure that supports interaction and documentation beyond language and national borders is needed for the assumption of an active role in the desired network of standardisation networks. SICT recommends that the standardisation organisations build up the required structures on the internet. The establishment of a cooperation platform structurally based on the ICT Standards Board in Europe (ICTSB), for example, should be considered.

SICT recommends that the standardisation organisations review their processes for adopting other suitable standards into the set of standards together with other standard developers and to design them in such a way that they encourage this adoption and do not hinder it.

**Statement A 0.4 Standardisation Alongside Development**

SICT views standardisation alongside development as an important instrument for introducing trial developments to standardisation. Successful projects in standar-
disation alongside development show that standardisation and innovation are not a contradiction in terms. Moreover, standardisation alongside development can be used to practise other ways of working within a standardisation organisation with a level of consensus deviating from standardisation. However, in this connection, attention must be paid to sufficient coordination within the meaning of A 4.3.3.

**Statement A 0.5 Criteria for the Evaluation of Standardisation Areas and/or Individual Issues**

SICT recommends that objective criteria be developed, according to which an evaluation of the standardisation areas or individual issues with regard to their compliance with the market needs can be made at any point in the process. This evaluation should aim at providing decision-making aids for strategic decisions that need to be made. In particular, these include decisions about setting up new bodies and running their secretariats, initiating new projects, choosing an appropriate level of consensus and/or the appropriate form for publication as well as target data (cf. Statement 4.1.1). In this connection, the conclusions in 3.7.6 should also be considered. The criteria, the evaluation and the decisions derived from them strictly oriented to market relevance must be made transparently at all levels in order to ensure active support for the goals.

**Statement A 0.6 Initiating New Issues**

The initiation of new issues relevant to the market especially requires that the imminent needs within the context of research and development be recognised at an early stage. The support and incorporation of research and development in standardisation must be strengthened beyond the existing levels of the previous extent within the context of standardisation alongside development.

The standardisation organisations should observe technological developments (technology watch) on their own initiative in order to be able to recognise trends at an early stage. They should take the initiative themselves to review new issues for their need for standardisation.

The new way that the standardisation organisations see themselves as a platform for various levels of consensus for standardisation must be made transparent to the consortia and fora in particular that are to be involved to a greater extent, with the framework conditions applicable to all forms of publication being emphasised: strict project management with time and resource planning, milestones, reviews, criteria for abandonment.

As the initiation of new issues after evaluation of the market relevance on the basis of objective criteria (cf. Statement 4.3.5) also presupposes active perception of the interests, those involved must undertake to provide the necessary resources.
Statement A 0.7 Public Relations/Information Policy/Transparency
The transparency of the work of standardisation organisations must be permanently improved. In this connection, the instrument of the internet/WWW/email should be used more intensively. This transparency starts with initiating new projects and includes the development of draft standards. SICT recommends that interested members of the public be given the opportunity, via suitable internet fora, to follow and comment on a development project; the power to make decisions, however, will remain with the competent standardisation body.

Statement A 0.8 Marketing
Standardisation organisations are in competition with other standardisation organisations in the field of ICT. However, they cannot assume that the need for new standards will be brought to them. Much rather, the standardisation organisations must actively try to introduce new interested parties to standardisation and to meet the need for standardisation with all of the instruments available (cf. A 4.1.2). To do this, marketing should be intensified in the long term.

Aussage A 0.9 Project-Related Work
SICT recognises that the standardisation organisations have already made great efforts to meet industry’s demands for targeted standard development that is on time. However, more stages are needed. Professional project management using appropriate tools should be introduced throughout and the staff should be trained accordingly. However, for the effectiveness of the project management methods it is also necessary for all involved in the standardisation to be prepared to enter into effective obligations to provide resources.

Statement A 0.10 Other Products of the Standardisation Organisations
Standards and other standards are addressed to a specialist audience, e.g. product developers or testers, who are usually familiar with the state of affairs described in the standard in questions and its technical environment. In addition, however, there is a large audience that does not meet these requirements and that has a great need for introductory literature, maybe in the form of tutorials or recommendations for use. Standardisation organisations, especially those at national level, have specialist staff suitable for meeting this need. This and other services by the standardisation institutes, such as specialist representation in international and European bodies with their own staff, can also help to reduce the great dependence of financing the standardisation infrastructure on the sale of standards (cf. A 4.3.11 and A 4.3.12).

SICT firmly recommends that new paths should be taken in this respect.
Statement A 0.11 Electronic Provision of Standards
Experience shows that the electronic provision of standards can help their distribution in the long term, especially for small and medium-sized companies (SMEs) as well as in the academic field. SICT also points out that ICT standardisation differs from standardisation in other fields due to the ‘competition situation’ of the bodies described (cf. Error! Reference source not found.) as well as the fact that those involved and interested in standardisation definitely prefer electronic ways of working. Standardisation must take account of this. SICT recognises that income from the sale of standards are indispensable for financing the standardisation infrastructure (cf. Statement A 4.3.12), but demands that other innovative financing models be used in addition for the field of ICT, e.g.:

- The possibility of acquiring the non-exclusive copyright for a standard so that it can subsequently be made freely available. Pricing in line with the economic benefit of the standard for the relevant buyer, e.g. lower price for the academic, by contrast higher price for the manufacturer of a relevant product.

Statement A 0.12 Financing Standardisation
SICT emphasises the need for standardisation to finance itself. Consequently, all involved in standardisation should also be involved in the costs appropriately. This also applies to participants from the state area, with a distinction being made between regulatory and application-oriented tasks. SICT recommends that the proportion of member-related financing be increased in order to be able to reduce the prices of the standards (cf. A 4.3.11).