THE UNIVERSITY OF PENNSYLVANIA LAW SCHOOL

ELECTRONIC COMMERCE: VERSION 2.0

NOTICES:

- Tentative exam information can be found by clicking here.
- The audio file for the October 31 make-up class is now available (in RealAudio) by clicking here.
- The materials for the final four classes are now online. Note the change in CP posting for Week 15 (Group 12).

eCommerce Competition II: The Standards Wars

Much of the hardware and software that enables the use of the Internet uses "standard" protocols -- and can thus interoperate with other equipment seamlessly. The existence of such standards (as well as the process by which they are created) may raise concerns along a variety of dimensions, especially with respect to competition policy.

Read the following:

Scott Bradner, *The Internet Engineering Task Force*, in Open Sources: Voices from the Open Source Revolution (1999)

Internet Engineering Task Force (IETF), *RFC 2026 - The Internet Standards Process* (edited: pp. 1-4 only)

Mark Lemley, *Antitrust and the Internet Standardization Problem*, 28 Conn. L. Rev. 1041 (1996) (edited: Section III-V only)

World Wide Web Consortium, *About the World Wide Web Consortium* (W3C) (2001).

Margaret Kane, *Will W3C mean dollar signs?* CNET News.com, October 5, 2001.

Charles Vincent & Jean Camp, *Setting Standards: Looking to the Internet for Models of Governance* (Fall 1999). [pdf]

Notes & Questions

1. What is the best way to deal with problems relating to Internet standard-setting? Would it be useful to abolish or curtail the standards-setting bodies, such as IETF or W3C?

2. If we decide to allow standards-setting bodies to operate, then is there anything we can do to try to preserve competition?

Open Sources: Voices from the Open Source Revolution

1st Edition January 1999
1-56592-582-3, Order Number: 5823
280 pages, $24.95

The Internet Engineering Task Force

Scott Bradner

For something that does not exist, the Internet Engineering Task Force (IETF) has had quite an impact. Apart from TCP/IP itself, all of the basic technology of the Internet was developed or has been refined in the IETF. IETF working groups created the routing, management, and transport standards without which the Internet would not exist. IETF working groups have defined the security standards that will help secure the Internet, the quality of service standards that will make the Internet a more predictable environment, and the standard for the next generation of the Internet protocol itself.

These standards have been phenomenally successful. The Internet is growing faster than any single technology in history, far faster than the railroad, electric light, telephone, or television, and it is only getting started. All of this has been accomplished with voluntary standards. No government requires the use of IETF standards. Competing standards, some mandated by governments around the world, have come and gone and the IETF standards flourish. But not all IETF standards succeed. It is only the standards that meet specific real-world requirements and do well that become true standards in fact as well as in name.

The IETF and its standards have succeeded for the same sorts of reasons that the Open Source community is taking off. IETF standards are developed in an open, all-inclusive process in which any interested individual can participate. All IETF documents are freely available over the Internet and can be reproduced at will. In fact the IETF's open document process is a case study in the potential of the Open Source movement.

This essay will give a short history of the IETF, a review of the IETF organization and processes and, at the end, some additional thoughts on the importance of open standards, open documents, and Open Source.

The History of the IETF

The IETF started in January of 1986 as a quarterly meeting of U.S. government funded researchers. Representatives from non-government vendors were invited, starting with the fourth IETF meeting in October of that year. Since that time all IETF meetings are open to anyone who would like to attend. The initial meetings were very small, with less than 35 people in attendance at each of the first five meetings and with the peak attendance in the first 13 meetings only 120 attendees, at the 12th meeting in January of 1989. The IETF has grown quite a bit since then, with more than 500 attendees at the 23rd meeting in March 1992, more than 750 attendees at the 29th meeting in March 1994, more than 1,000 attendees at the 31st meeting in December 1994, and almost 2,000 attendees at the 37th meeting in December 1996. The rate of growth in attendance has slowed to the point that there were 2,100 attendees at the 43rd meeting in December 1998. Along the way, in 1991, the IETF reduced the number of meetings from four to three per year.

The IETF makes use of a small Secretariat, currently operating out of Reston, VA, and an RFC Editor, currently operated by the University of Southern California's Information Sciences Institute.

The IETF itself has never been incorporated as a legal entity. It has merely been an activity without legal substance. Up until the end of 1997, the IETF's expenses were covered by a combination of U.S. government grants and meeting fees. Since the beginning of 1998 the expenses have been covered by meeting fees and the Internet Society.

The Internet Society was formed in 1992, partially to provide a legal umbrella over the IETF standards process and to provide some funding for IETF-related activities. The Internet Society, an international membership-based non-profit organization, also evangelizes for the Internet in parts of the world that the Internet has not yet reached. At this time the IETF can be best described as a standards development function operating under the auspices of the Internet Society.

The concept of working groups was introduced at the 5th IETF meeting in February 1987 and there are now over 110 working groups operating within the IETF.

IETF Structure and Features

The IETF can be described as a membership organization without a defined membership. There are no specific criteria for membership other than to note that people and not organizations or companies are members of the IETF. Any individual who participates in an IETF mailing list or attends an IETF meeting can be said to be an IETF member.

At this writing there are 115 officially chartered working groups in the IETF. These working groups are organized into eight areas: Applications, General, Internet, Operations and Management, Routing, Security, Transport, and User Services. Each of the areas is managed by one or two volunteer Area Directors. The Area Directors sitting as a group, along with the chair of the IETF, form the Internet Engineering Steering Group (IESG). The IESG is the standards approval board for the IETF. In addition there is a 12-member Internet Architecture Board (IAB), which provides advice to the IESG on working group formation and the architectural implications of IETF working group efforts.

The members of the IAB and the Area Directors are selected for their two year terms by a nominations committee randomly selected each year from among volunteers who have attended at least two out of the previous three IETF meetings.

IETF Working Groups

One of the principal differences between the IETF and many other standards organizations is that the IETF is very much a bottom-up organization. It is quite rare for the IESG or the IAB to create a working group on their own to work on some problem that is felt to be an important one. Almost all working groups are formed when a small group of interested individuals get together on their own and then propose a working group to an Area Director. This does mean that the IETF cannot create task plans for future work, but at the same time it helps ensure that there is enough enthusiasm and expertise to make the working group a success.

The Area Director works with the people proposing the working group to develop a charter. Working group charters are used to list the specific deliverables of the working group, any liaison activities that might be needed with other groups, and, often most important, the limits on what the working group will explore. The proposed charter is then circulated to the IESG and IAB mailing lists for their comments. If significant issues do not arise within a week the charter is posted to the public IETF list and to a list of liaisons from other standards organizations to see if there is work going on in other forums which the IETF should be aware of. After another week for any additional comments, the IESG can then approve the charter and thereby create the working group.

IETF Documents

All IETF documents are public documents freely available over the Internet. The IETF does get a limited copyright from the authors when the documents are published to ensure the document remains freely available (the author can not decide to withdraw the document at some future time), republishable in its entirety by anyone, and, for most documents, that the IETF can make derivative works within the IETF standards process. The author retains all other rights.

The basic publication series for the IETF is the RFC series. RFC once stood for "Request for Comments," but since documents published as RFCs have generally gone through an extensive review process before publication, RFC is now best understood to mean "RFC." RFCs fall into two basic categories: standards track and non-standards track. Standards track RFCs can have Proposed Standard, Draft Standard, or Internet Standard status. Non-standards track RFCs can be classified as Informational, Experimental, or Historic.

In addition to RFCs, the IETF makes use of Internet-Drafts. These are temporary documents whose purpose is close to the original "request for comment" concept of RFCs and which are automatically removed after six months. Internet-Drafts are not to be cited or otherwise referenced other than as works in progress.

The IETF Process

The IETF motto is "rough consensus and running code." Working group unanimity is not required for a proposal to be adopted, but a proposal that cannot demonstrate that most of the working group members think that it is the right thing to do will not be approved. There is no fixed percentage support that a proposal must achieve, but most proposals that have more than 90% support can be approved and those with less than 80% can often be rejected. IETF working groups do not actually vote, but can resort to a show of hands to see if the consensus is clear.

Non standards track documents can originate in IETF working group activity or from individuals who would like to make their thoughts or technical proposals available to the Internet community. Almost all proposals for RFC publication are reviewed by the IESG, after which the IESG will provide advice to the RFC Editor on the advisability of publishing the document. The RFC Editor then decides whether to publish the document and, if the IESG offers one, weather to include a note from the IESG in the document. IESG notes in this case are used to indicate discomfort with the proposal if the IESG feels that some sort of warning label would be helpful.

In the normal case of a standards track document an IETF working group will produce an Internet-Draft to be published as the RFC. The final step in the working group evaluation of the proposal is a "last call," normally two weeks long, where the working group chair asks the working group mailing list if there are any outstanding issues with the proposal. If the result of the working group last call indicates that the consensus of the group is that the proposal should be accepted, the proposal is then forwarded to the IESG for their evaluation. The first step in the IESG evaluation is an IETF-wide last call sent to the main IETF announcement mailing list. This is so that people who have not been following the working group work can comment on the proposal. The normal IETF last call is two weeks for proposals that come from IETF working groups and four weeks for proposals not originating from IETF working groups.

The IESG uses the results of the IETF last-call as input to its deliberations about the proposal. The IESG can approve the document and request its publication, or it can send the proposal back to the author(s) for revision based on the IESG's evaluation of the proposal. This same process is used for each stage of the standards track.

Proposals normally enter the standards track as Proposed Standards, but occasionally if there is uncertainty about the technology or if

additional testing is felt to be useful a document is initially published as an Experimental RFC. Proposed Standards are meant to be good ideas with no known technical flaws. After a minimum of six months as a Proposed Standard, a proposal can be considered for Draft Standard status. Draft Standards must have demonstrated that the documentation is clear and that any intellectual property rights issues with the proposal are understood and resolvable. This is done by requiring that there be at least two genetically independent, interoperable implementations of the proposal with separate exercises of licensing procedures if there are any. Note that it also requires that all of the separate features of the protocol be multiply-implemented. Any feature not meeting these requirements must be removed before the proposal can advance. Thus IETF standards can get simpler as they progress. This is the "running code" part of the IETF motto.

The final step in the IETF standards process is Internet Standard. After being at Draft Standard status for at least four months and demonstrating significant marketplace success, a proposal can be considered for Internet Standard status.

Two major differences stand out if one compares the IETF standards track with the process in other standards organizations. First, the final result of most standards bodies is approximately equivalent to the IETF Proposed Standard status. A good idea but with no requirement for actual running code. The second is that rough consensus instead of unanimity can produce proposals with fewer features added to quiet a noisy individual.

In brief, the IETF operates in a bottom-up task creation mode and believes in "fly before you buy."

Open Standards, Open Documents, and Open Source

It is quite clear that one of the major reasons that the IETF standards have been as successful as they have been is the IETF's open documentation and standards development policies. The IETF is one of the very few major standards organizations that make all of their documents openly available, as well as all of its mailing lists and meetings. In many of the traditional standards organizations, and even in some of the newer Internet-related groups, access to documents and meetings is restricted to members or only available by paying a fee. Sometimes this is because the organizations raise some of the funds to support themselves through the sale of their standards. In other cases it is because the organization has fee-based memberships, and one of the reasons for becoming a member is to be able participate in the standards development process and to get access to the standards as they are being developed.

Restricting participation in the standards development process often results in standards that do not do as good a job of meeting the needs of the user or vendor communities as they might or are more complex than the operator community can reasonably support. Restricting access to work-in-progress documents makes it harder for implementors to understand what the genesis and rational is for specific features in the standard, and this can lead to flawed implementations. Restricting access to the final standards inhibits the ability for students or developers from small startups to understand, and thus make use of, the standards.

The IETF supported the concept of open sources long before the Open Source movement was formed. Up until recently, it was the normal case that "reference implementations" of IETF technologies were done as part of the multiple implementations requirement for advancement on the standards track. This has never been a formal part of the IETF process, but it was generally a very useful by-product. Unfortunately this has slowed down somewhat in this age of more complex standards and higher economic implications for standards. The practice has never stopped, but it would be very good if the Open Source movement were to reinvigorate this unofficial part of the IETF standards process.

It may not be immediately apparent, but the availability of open standards processes and documentation is vital to the Open Source movement. Without a clear agreement on what is being worked on, normally articulated in standards documents, it is quite easy for distributed development projects, such as the Open Sources movement, to become fragmented and to flounder. There is an intrinsic partnership between open standards processes, open documentation, and open sources. This partnership produced the Internet and will produce additional wonders in the future.

Next Chapter --->

[note: edited version]

Network Working Group S. Bradner
Request for Comments: 2026 Harvard University
BCP: 9 October 1996
Obsoletes: 1602
Category: Best Current Practice

The Internet Standards Process -- Revision 3

Status of this Memo

This document specifies an Internet Best Current Practices for the Internet Community, and requests discussion and suggestions for improvements. Distribution of this memo is unlimited.

Abstract

This memo documents the process used by the Internet community for the standardization of protocols and procedures. It defines the stages in the standardization process, the requirements for moving a document between stages and the types of documents used during this process. It also addresses the intellectual property rights and copyright issues associated with the standards process.

Table of Contents

1. INTRODUCTION

This memo documents the process currently used by the Internet community for the standardization of protocols and procedures. The Internet Standards process is an activity of the Internet Society that is organized and managed on behalf of the Internet community by the Internet Architecture Board (IAB) and the Internet Engineering Steering Group (IESG).

1.1 Internet Standards

The Internet, a loosely-organized international collaboration of autonomous, interconnected networks, supports host-to-host communication through voluntary adherence to open protocols and procedures defined by Internet Standards. There are also many isolated interconnected networks, which are not connected to the global Internet but use the Internet Standards.

The Internet Standards Process described in this document is concerned with all protocols, procedures, and conventions that are used in or by the Internet, whether or not they are part of the TCP/IP protocol suite. In the case of protocols developed and/or standardized by non-Internet organizations, however, the Internet Standards Process normally applies to the application of the protocol or procedure in the Internet context, not to the specification of the protocol itself.

In general, an Internet Standard is a specification that is stable and well-understood, is technically competent, has multiple, independent, and interoperable implementations with substantial operational experience, enjoys significant public support, and is recognizably useful in some or all parts of the Internet.

1.2 The Internet Standards Process

In outline, the process of creating an Internet Standard is straightforward: a specification undergoes a period of development and several iterations of review by the Internet community and revision based upon experience, is adopted as a Standard by the appropriate body (see below), and is published. In practice, the process is more complicated, due to (1) the difficulty of creating specifications of high technical quality; (2) the need to consider the interests of all of the affected parties; (3) the importance of establishing widespread community consensus; and (4) the difficulty of evaluating the utility of a particular specification for the Internet community.

The goals of the Internet Standards Process are:

- technical excellence;
- prior implementation and testing;
- clear, concise, and easily understood documentation;
- openness and fairness; and
- timeliness.

The procedures described in this document are designed to be fair, open, and objective; to reflect existing (proven) practice; and to be flexible.

- These procedures are intended to provide a fair, open, and objective basis for developing, evaluating, and adopting Internet Standards. They provide ample opportunity for participation and comment by all interested parties. At each stage of the standardization process, a specification is repeatedly discussed and its merits debated in open meetings and/or public electronic mailing lists, and it is made available for review via world-wide on-line directories.

- These procedures are explicitly aimed at recognizing and adopting generally-accepted practices. Thus, a candidate specification must be implemented and tested for correct operation and interoperability by multiple independent parties and utilized in increasingly demanding environments, before it can be adopted as an Internet Standard.

- These procedures provide a great deal of flexibility to adapt to the wide variety of circumstances that occur in the standardization process. Experience has shown this flexibility to be vital in achieving the goals listed above.

The goal of technical competence, the requirement for prior implementation and testing, and the need to allow all interested parties to comment all require significant time and effort. On the other hand, today's rapid development of networking technology demands timely development of standards. The Internet Standards Process is intended to balance these conflicting goals. The process is believed to be as short and simple as possible without sacrificing technical excellence, thorough testing before adoption of a standard, or openness and fairness.

From its inception, the Internet has been, and is expected to remain, an evolving system whose participants regularly factor new requirements and technology into its design and implementation. Users of the Internet and providers of the equipment, software, and services that support it should anticipate and embrace this evolution as a major tenet of Internet philosophy.

The procedures described in this document are the result of a number of years of evolution, driven both by the needs of the growing and increasingly diverse Internet community, and by experience.

[edited version]

ANTITRUST AND THE INTERNET STANDARDIZATION PROBLEM

Mark A. Lemley

28 Conn. L. Rev. 1041 (1996)

[. . .]

III. Antitrust and Standards

Antitrust law protects competition and the competitive process, by preventing certain types of conduct that threaten a free market. For example, antitrust prohibits competitors from agreeing on the price they will charge. n89 It prohibits certain "predatory" practices designed to exclude competitors from the market, and it places certain limits on the behavior of firms with market power. n90 While there is some disagreement as to the original or proper goals of antitrust law, the dominant approach to antitrust law today is the "economic" or "social welfare" model. n91 This approach takes the purpose of the antitrust laws to be promoting aggregate social welfare by ensuring that markets work efficiently and (to the extent possible) without government interference.

The antitrust laws regulate business conduct in three basic ways. First, section 7 of the Clayton Act prohibits mergers and asset acquisitions where the effect of the acquisition may be substantially to lessen competition in a relevant market. n92 Second, section 2 of the Sherman Act prohibits monopolization, judicially defined as acquiring or maintaining market power through anticompetitive conduct, as well as at- [*1067] tempts to monopolize. n93 Third, section 1 of the Sherman Act prohibits agreements, usually between competitors, which unreasonably restrain trade. n94 The Clayton Act's prohibition on mergers does not concern us here, but both sections of the Sherman Act are important in understanding the antitrust rules likely to be applied in the Internet software industry.

A. Monopolization by Standard-Setters

Section 2 of the Sherman Act prohibits "monopolization." Significantly, courts distinguish between monopoly itself, which is perfectly legal, and monopolization, which is not. n95 In the words of the most influential court case on the subject, "it does not follow because [a defendant] had such a monopoly, that it 'monopolized' the ingot market: it may not have achieved monopoly; monopoly may have been thrust upon it." n96 Evidently, something more than market power is required for antitrust condemnation under section 2. That "something more" is the acquisition or maintenance of monopoly through anticompetitive conduct, as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident. n97 "Anticompetitive conduct" as defined by the courts may be shown in a variety of ways, notably by proving that that alleged monopolist has engaged in some form of conduct that itself violates some other provision of the antitrust laws (tying, resale price maintenance, etc.) in an

effort to monopolize. n98 In addition, unilateral conduct that is legal under most circumstances may be considered anticompetitive conduct sufficient to prove monopolization when engaged in by a party with market power. n99 Thus, under current law, monopolists face greater [*1068] restrictions on their unilateral conduct under section 2 than do other competitors.

The peculiar economics of software (and particularly Internet software) markets present a real problem for section 2 analysis. The problem has three components. First, applying section 2 to a standardized software market with a single dominant firm arguably does not fit very well with existing precedent. The factors discussed in Part I above will tend to drive an unregulated software market to monopoly, at least where the standard adopted is proprietary. While in the ordinary case control of a market by a single firm may raise section 2 concerns, in this case the monopolist may have some legitimate claim that its monopoly has been "thrust upon it" and is therefore not illegal under the rule of United States v. Aluminum Company of America (AlCOA). n100 Courts have generally exculpated antitrust defendants whose major offense was possessing an inherent or "natural" monopoly. Thus, the owner of the only newspaper in a small town, n101 the only football team in a medium-sized town, n102 and even the owner of the only facility currently capable of making a certain product n103 have defeated antitrust claims against them on the grounds that their monopolies were "natural."

In most markets, this hands-off rule has been tempered by greater antitrust scrutiny of the natural monopolist's attempts to maintain its dominant position. Thus, even a regulated electric utility with a monopoly conferred in part by government franchise violated the antitrust laws when it denied access to power transmission to towns that wished [*1069] to buy their power elsewhere. n104 Antitrust also seeks to limit the ability of a natural monopolist to extend its monopoly into other competitive markets, by what is sometimes referred to as "monopoly leveraging." n105 But in a standardized market such as Internet software, once the tipping effect gives a particular company a monopoly, that monopoly is likely to be quite durable. While it will not hold a monopoly position forever, a company in such a position can keep its market power for sometime with a relative minimum of effort--and without engaging in anticompetitive conduct designed to maintain or extend market power. This is particularly true if, as Cheesebrough and Teece suggest, large companies already in the market have an advantage in future standards competitions because consumers will expect them to prevail. n106 As the law now stands, courts will not act against a firm that obtains monopoly power without acting anticompetitively. n107 Antitrust scrutiny of such a company is likely to be limited to the fringes, policing certain minor aspects of a defendant's conduct rather than attacking the defendant's dominant position itself. This seems to have been the fate of the government's notorious action against Microsoft its conduct in the operating systems market. n108 [*1070]

A second problem with applying section 2 to dominant firms in the software industry is one of remedy. Even were the courts to reverse the long-standing rule and conclude that durable monopoly can and should be attacked by antitrust regardless of how that monopoly was obtained, it is not at all obvious how to go about applying the antitrust laws to such a monopolist. Antitrust offers three basic remedies to private plaintiffs--treble actual damages, attorneys' fees, and injunctive relief against anticompetitive conduct. n109 Injunctive relief seems inappropriate here, where by hypothesis there is no anticompetitive conduct to enjoin. The only injunction one can imagine being relevant--one imposing an

affirmative duty on a monopolist to predisclose and license its standards--has repeatedly been rejected by Congress and the courts. n110 Treble damages and attorneys' fees are a powerful incentive to private plaintiffs. n111 But what are a plaintiff's actual damages? If the plaintiff is a competitor upset that it did not get the dominant position now held by the defendant, the measure of its injury is simply the revenue it lost by not itself being able to charge consumers a supra-competitive price. It is hard to imagine a court accepting such a damage theory, even if we set aside the probably insuperable problem of proving antitrust injury. n112 Consumers might fare better; they could claim that the dominant [*1071] firm had used its market power to overcharge them and that the measure of their injury is the extent to which the price of the dominant firm's good exceeds its cost. But accepting such a claim is tantamount to declaring ongoing judicial price regulation of the entire industry, something the antitrust laws have historically been loath to do--and with good reason. n113

Government regulators have an additional remedy in their armory--they can seek structural relief against a defendant. n114 Such relief might include an order divesting certain assets, the division of the company into separate operating groups, or even a flat prohibition against a company participating in a given market (say, an order barring Microsoft from competing in the market for applications programs). n115 Yet even this drastic remedy seems futile in the face of the relentless economics of standardization. n116 Suppose that antitrust regulators obtain structural relief against the dominant software provider in a market--that they break it up into several pieces, or even bar the dominant player from the market entirely. What then? The analysis undertaken in Part II suggests that the firms that remain in the industry (and new entrants attracted by the potential to set the next-generation standard) will compete for a time, but that such competition will end with most of the participants driven out of business and the market settling on a new standard (offered by a new dominant company). Perhaps the antitrust process will begin again at that point, n117 but it is hard to see that anything has really been accomplished, particularly given that both interim standards competition itself and enforcement of the antitrust laws involve significant social costs. n118

There are two other possible remedial benefits to section 2 enforcement. First, it may be that the existence or threat of section 2 actions will be sufficient to deter anticompetitive conduct by standard-setters. [*1072] However, it is not at all clear why section 2 enforcement efforts directed at durable monopolies obtained through normal competitive means would be effective in preventing anticompetitive conduct. It seems at least as likely that such actions would deter reasonable, pro-competitive conduct.

Second, obtaining structural relief against the owners of standards will temporarily (though not permanently) solve the problem of the durable monopoly, by replacing it with a new standards competition. Whether or not this is a good thing depends on whether creating such a new standards competition is more efficient than remaining in a durable monopoly. Certainly such antitrust enforcement would temporarily reduce price-cost ratios, though it would have to be applied regularly. If timed properly, such relief could also benefit newly-developed, technologically superior products, by allowing them to compete immediately in a new standards competition. Structural relief would increase wasteful competition to set the new standard, however, since standards competitions would occur more frequently. n119 Further, it is not clear that such antitrust-induced standards competitions would produce an efficient product choice,

since the fear of future antitrust action might deter investment in new standard-setting. Whether such relief is worth the significant costs it would require is doubtful.

There is a final, more conceptual problem with applying section 2 to dominant firms in markets characterized by standardization. Historical quibbles notwithstanding, n120 antitrust law today is fundamentally about enhancing competition. The classic statement of this rule is that the Sherman Act protects competition, not competitors. n121 At least in the long run, the one thing section 2 of the Sherman Act cannot do in an industry such as this is enhance competition. Monopolists who acquire their power through the work of market forces rather than [*1073] anticompetitive conduct will continue to do so as long as the market forces push in that direction. If the end result of antitrust action is a market which is dominated by a different company, but which is otherwise no more competitive than it was before the courts intervened, it is reasonable to question the point of the enterprise in the first place. n122

For these reasons, I think that if antitrust is viewed as a weapon to be used against entrenched monopolies relying on a product standard, it is doomed to failure. n123 It does not follow from this, however, that section 2 should play no role whatever in Internet software markets. Standards do not last forever; they are periodically replaced by newer and presumably better standards. This is especially true in the context of the Internet, where the relevant standards competition sometimes seems to change on a monthly basis. As discussed above, the period during which a new standard is set is frequently one of vigorous competition between potential standards. While such competition is in some senses inefficient--parties may engage in wasteful rent-seeking n124 in order to capture the dominant position, and consumers of unsuccessful standards may be stranded n125 --it can also have a valuable market-disciplining effect. At least in theory, competition to set standards should ensure that the "best" standard available at the time is the one that is selected. n126 [*1074]

Because de facto standard-setting is a high-stakes game--the winner gets a durable monopoly for several years, and the losers get nothing--participants in this competition may be expected to try to tip the balance in their favor. n127 Many of these efforts will fall under the category of vigorous competition, something the antitrust laws seek to promote. For example, companies may compete to offer their product earlier, with more and better features, or at a lower price, in an effort to convince a critical mass of consumers to adopt it. But companies may also engage in potentially anticompetitive actions in an effort to become the market leader. n128 Because the value of being a leader in a standardized market is sufficiently high, for example, this may be a case where such normally problematic antitrust theories as predatory pricing and monopoly leveraging actually make economic sense.

Predatory pricing (pricing a product below marginal cost in an effort to gain market share) is alleged with much greater frequency than it actually occurs, a fact which has inclined courts and commentators against it. n129 The normal problem with predatory pricing claims is that a firm will not price below costs unless it expects to be able to "recoup" its losses with supracompetitive pricing later. n130 In a market with low barriers to entry, this strategy is unlikely to work, since once the predator raises its price, new entrants will compete and drive the prices back down. To the extent that standardization effects create a significant barrier to entry in software markets once a market standard has been established, they may make recoupment (and therefore predation) more likely. n131 Certainly, the conventional

explanation why both of [*1075] the main competitors in the Web browser market have offered their products to the public for free is in order to capture browser market share. n132

However, rent-seeking during the competition period may counterbalance this effect to some extent. For example, if ten firms each know that victory in a standards battle will allow them to reap significant supracompetitive profits, each will have a similar incentive to predate. This "competitive predation" may drive up the costs each firm would have to incur to prevail, reduce the market penetration value of pricing below cost, and therefore make predation less desirable to the firm. n133 The current market battle over Web browser standards may be an example of such competitive predation, with both parties giving away their key software in an effort to capture market share and, eventually, the standard. n134 If, as Professor Farrell concludes, a standards competition between two proprietary technologies, both of which may be priced predatorily, should nonetheless tip the market towards the long-run superior technology, n135 there is reason to be concerned about predation in this context only to the extent that it is asymmetric--that is, only if for some reason one firm is much better situated to survive a predatory [*1076] pricing battle. In cases of symmetric competitive predation, where both firms have sufficient resources to engage in the competition, it is hard to see how consumers will be harmed by the outcome of the competition.

Symmetric (or even slightly asymmetric) competitive predation presents another, more practical problem for antitrust enforcement--the problem of knowing whom to sue. Take the Microsoft-Netscape browser battle as an example. Which of these companies is the dangerous monopolist who must be stopped? The immediate answer from those schooled in the operating system market may be: Microsoft. But it is Netscape, not Microsoft, that has an 85% market share today, and it would seem odd to prosecute a fringe competitor in such a market. n136 People interested in the industry can spend hours debating who will win this competition; perhaps that fact alone should incline antitrust enforcers against acting at all.

Alternatively, it is possible that giving away browsers is seen by both Microsoft and Netscape as an entry into a market which will eventually be composed of a suite of programs, for many of which the companies could charge. On this theory, the browser battle is really directed at the so-called "intranet" market--internal corporate networks using Internet-compliant technology. n137 Microsoft's recent market approach, for example, seems to involve embedding Internet applications deeply within its server operating systems, thus linking these two markets more tightly. n138 Since Microsoft currently does rather better at maintaining market share for operating systems than it does for Web browsers, some might call this an effort to leverage its monopoly into a new market. n139

Monopoly leveraging as an antitrust theory is in a position similar [*1077] to predation. The whole idea of leveraging has been criticized by some commentators on the grounds that monopolists could obtain the same profits from their existing market as they could from the market they sought to enter. n140 However, leveraging from a traditional to a standardized market may make economic sense, because obtaining control at the proper time can result in a durable monopoly, something that may not be possible in other markets with lower barriers to entry. n141 An example of such leveraging may be at work in the Web browser market, where Microsoft managed to convince the largest private online service provider, America Online, to feature Microsoft's Internet Explorer browser as its primary Web software. In return, Microsoft offered AOL preferred placement on all future versions of the Windows 95 desktop.

n142 Alternatively, Microsoft might be portrayed as seeking to capture the Web browser market in order to shore up its control of the personal computer operating systems market. This latter theory is also a claim of leveraging, albeit a more subtle one: on this view, Microsoft wants to capture the browser market to ensure that its operating system monopoly is not outflanked by a new generation of computer operating systems integrated into Web browsers. n143 [*1078]

During the period of competition to set a standard, antitrust can in theory serve a valuable role as market referee. By ensuring that the standards competition is resolved on the merits of the competing products, rather than on the basis of power leveraged from other contexts, this form of antitrust scrutiny would promote social welfare at least to some extent. This "refereeing" may take the form of actions to enjoin particular acts of leveraging in circumstances where it is anticompetitive. Alternatively, it could take the much more drastic form of structural relief, blocking leveraging by removing the defendant from one of the markets entirely. n144 The market may still be locked into a new standard, but at least it will be the best possible standard. n145

However, even this more limited use of section 2 faces practical problems. Like merger analysis under section 7 of the Clayton Act, it is extremely time-sensitive. The time to prevent anticompetitive conduct designed to influence a standards competition is when the conduct occurs, not after the standard has already been set. In the fast-paced world of the Internet, where the definitions of the market seem to change almost monthly, n146 well-timed action is especially important. Unfortunately, antitrust cases are notoriously slow, and the more complex the industry, the slower they seem to be. Microsoft was investigated for years before a complaint was even filed; n147 the government's prosecution of IBM went on for 13 years before being dismissed during trial. n148 And section 2 enforcers lack even the procedural advantages enjoyed by their counterparts in merger enforcement: pre-merger notification and approval rules n149 and a relatively clear set of guidelines to apply. n150 As a result, antitrust in the computer industry frequently seems to be looking backward rather than forward, focusing on the last [*1079] generation's monopolist rather than the next generation's. Unless this problem can be overcome--and it is hard to see how to do so n151 --the practical utility of section 2 in this industry may be limited even during the standard-setting period.

B. Antitrust Treatment of Standard-Setting Organizations

Not all privately-set standards result from the success of a single firm in market competition. As discussed in section II above, an alternate means of standard-setting is for potential competitors to get together, perhaps at a trade association meeting or in a group convened specifically for this purpose, and agree on a single technical standard that they will each use. Group standard setting has some obvious advantages over de facto standard setting. Notably, the end result of a group standard-setting process is that a number of different companies can compete to sell products implementing the standard, thereby offering the hope that at least some competition will occur in the market. Group standard setting may also promote competition in the development of improvements to the standard, since each of the competitors may seek advantage over the others by improving the design in ways compatible with the basic interface specifications. n152

Unfortunately, section 1 of the Sherman Act, which prohibits conspiracies in restraint of trade, poses a potentially significant barrier to standard-setting organizations. Private group standard setting necessarily involves getting

competitors together over a period of time to discuss the technical details of their current products and their plans for the future. Section 1 historically has been quite hostile to this form of information exchange among competitors, viewing it (with some justification) as a likely means for facilitating a cartel. n153 A series of early [*1080] cases held that the exchange of price information by competitors is highly suspect, and may even be illegal per se under section 1. n154 Even the exchange of non-price information, such as would have to occur in a standard-setting organization, has been held illegal in certain cases where it may have anticompetitive effects. n155 And one court considering standard-setting bodies in the computer software industry has held that any evidence suggesting that the purpose or effect of such a group is to give its members an advantage over competitors creates a genuine issue of fact for trial under the rule of reason, despite serious questions about whether the standard had or was likely to acquire any market power. n156 The result has been a reluctance among at least some groups to engage in formal standard-setting for fear of antitrust liability. n157

Automatic condemnation of standard-setting organizations under section 1 is unwarranted. n158 While exchanges of information between competitors do pose a risk of cartel facilitation in certain circumstances, [*1081] particularly where the industry is already concentrated, those risks are significantly ameliorated in the Internet software context for three reasons. First, the exchange of information can provide procompetitive benefits the market would not otherwise provide, by allowing a number of different firms to produce and market competing products compatible with a single standard. n159 To the extent that this makes the market for the standard more competitive, it will reduce the price of the standard and therefore facilitate its wider adoption. n160 Indeed, in certain industries the need for standardization is so great that it is impossible to compete effectively without group standardization efforts. n161

Second, the risk to competition posed by such an information exchange--that the participating companies will band together to raise prices and restrict output--is much less disturbing if the alternative to group standard-setting is a de facto monopoly, rather than robust competition. Finally, the setting of voluntary product standards does not carry with it the same danger of capture and exclusion that inheres in prohibitory standard-setting organizations (those with the power to bar a product from the market directly), of the type that were at issue in Allied Tube and similar cases. n162 The Internet Engineering Task Force (IETF), which sets technical interface standards for the communications functions of the Internet, is an example of a group standard-setting organization which is clearly necessary and which historically has posed little or no danger to competition, since it traditionally has not adopted proprietary private standards. n163

There is some indication in the caselaw that courts interpreting [*1082] section 1 will be flexible in their treatment of standard-setting organizations. n164 In one early information-exchange case, Maple Flooring Mfgrs. Ass'n. v. United States, the Supreme Court held that a trade association that exchanged information in order to promote product standardization acted reasonably and therefore lawfully, even though the association distributed some general price data. n165 The Court distinguished American Column & Lumber, discussed above, n166 on the ground that in that case much of the information exchanged could only be used for anticompetitive purposes, while in Maple Flooring there was a legitimate purpose for the exchange, and the association took some steps to prevent the disclosure of unnecessarily detailed information. n167 Further, more recent cases such as Broadcast Music, Inc. v. Columbia Broadcasting System n168 have allowed even joint price setting in circumstances in which the collaborative action

was necessary to facilitate market exchange, and thus create opportunities for trade that would otherwise have been lost. n169 This arguably bodes well for collective action by competitors in a standards-driven industry, since they can argue that the alternative to joint standard-setting is likely to be monopoly. This more flexible treatment of standardization efforts must continue if group standardization is to be a viable alternative. In short, in this particular context, the best thing the antitrust laws can do to promote [*1083] competition is not to interfere with industry cooperation. n170

Again, however, it does not follow that antitrust has no role in this area. Two types of joint standard-setting activity in particular may raise antitrust concerns. First, some standard-setting organizations restrict access to the standard to members of the organization. In industry terms, the standards are "closed" rather than "open." n171 This restriction may be problematic if the membership of the organization is only a subset of the full industry, since access to the standard may be critical to competition. Such a partially-closed group may be able to limit effective competition in the industry to competition between members of the group. n172

Antitrust treats such claims of exclusion from private groups in one of two ways. First, closing the group might be viewed as a horizontal group boycott or concerted refusal to deal with competitors. While the parameters of the antitrust prohibition against group boycotts are far from clear, n173 the Supreme Court's decision in Northwest Wholesale is instructive. There, the plaintiff sued a wholesale purchasing cooperative that had denied it membership (and accompanying discounts on products purchased in bulk by the cooperative). The Court nominally applied a per se rule condemning the joint refusal to deal, but in fact engaged in a rule-of-reason type of inquiry, seeking to determine the [*1084] importance of membership to effective competition and whether "the boycotting firms possessed a dominant position in the relevant market." n174 The rule against group boycotts has also been applied (again under the rule of reason) to the New York Stock Exchange, a body which is at least in part a standard-setting organization. n175

Alternatively, antitrust might treat access to a standard-setting organization (or at least its interface standards) as an "essential facility." Under this doctrine, the owners of facilities that are essential to effective competition must make them available to competitors on nondiscriminatory terms. Thus, the railroads which collectively owned the only railroad switching yard in St. Louis at the height of the railroad era were required to give all railroads access to the yard on equal terms. n176 Similarly, regulated local telephone monopolies must interconnect all long distance carriers on substantially equal terms. n177 A similar claim that membership in a standard-setting organization (or at least access to its work product) was essential to competition in a networked industry arguably would guarantee a "level playing field" for all competitors.

It is not clear which of these two legal theories would apply in the case of the Internet. The essential facilities doctrine has been roundly criticized as overbroad. Professor Areeda called it "an epithet in search of a limiting principle." n178 And the vast majority of essential facilities claims are rejected by the courts, even in circumstances where control over a facility confers a substantial advantage upon a competitor. n179 [*1085] Further, a decision to apply the essential facilities doctrine to standardized industries would offer no way to distinguish group standards from individual standards, and therefore could dramatically expand the scope of antitrust intervention in the market. n180 Group boycott claims, by contrast, do attempt to distinguish concerted action to boycott a competitor (which is subject to section 1 scrutiny) n181 from unilateral refusals to deal (which are generally legal). n182 However, recent cases

such as Northwest Wholesale suggest that the law of group boycotts is converging with the rule on essential facilities, and that a group boycott will not amount to a section 1 violation unless the plaintiff has been denied effective access to the market. n183 Further, vigorous application of the antitrust laws to require access to standards groups may discourage group standard-setting altogether, since companies may be unwilling for a variety of reasons to discuss their product plans with certain competitors. n184

While the issue is not free from doubt, the use of antitrust doctrine to compel access to a standard-setting organization should probably be rare. n185 Not every organization which attempts to set industry standards [*1086] must be open to all members. n186 This does not mean that standard-setting organizations should never be forced to open their doors, however. While there are good reasons to limit the use of the essential facilities doctrine, efforts to control a highly standards-driven market which appear likely to succeed may well be appropriate cases for application of the doctrine.

A second type of anticompetitive behavior by participants in a standard-setting organization may be more amenable to antitrust treatment in certain circumstances. That behavior is the "capture" of a standard-setting group by a particular participant. In the context of Internet software markets, the most likely means of capturing a standard is by the strategic use of intellectual property rights. n187 Two examples should suffice.

In 1992, the Video Electronics Standards Association (VESA) adopted a computer hardware standard called the VL-Bus standard, which governs the transmission of information between a computer's CPU and its peripheral devices. n188 Each of the members voting to adopt the standard, including Dell Computer Corporation, was required by VESA rules to affirm that they did not own any patent rights which covered the VL-Bus standard. n189 Dell's representative did in fact make such a statement. Nonetheless, Dell asserted a patent against other VESA members for using the VL-Bus standard eight months later, after the VL-Bus standard had been widely adopted. By working to adopt as a group standard a technology Dell allegedly knew was proprietary, n190 [*1087] Dell could obtain the help of its competitors in establishing a standard which it would ultimately be able to control. While the VL-Bus standard has little to do with the Internet, and indeed is no longer in common use even in PC design, the problem is instructive because the IETF has historically required the same agreement by participants not to assert intellectual property ownership of Internet standards. n191

The second example involves a common standard for file exchange of graphics over the Internet--the "GIF" standard. n192 No official group set GIF as a standard; rather, after it was released by Compuserve in 1987, GIF was apparently free for all to use and was gradually adopted by a number of Internet users (as well as developers of extension programs) during the late 1980s and early 1990s. Unisys Corporation obtained a patent in 1986 which arguably covers the compression algorithm used by the GIF standard (the LZW patent). Unisys kept largely silent about the patent while the GIF standard gained market share--whether intentionally or because they were unaware of the GIFLZW overlap is unclear. n193 In 1994, it asserted the patent against Compuserve and others who transferred graphics over the Internet using the standard. n194 Unisys' actions with respect to the LZW patent were arguably intended to have an effect similar to Dell's. Though Unisys made no affirmative representation that the standard was not

proprietary, its silence during the crucial period of standards competition allowed it to take a more mature industry by surprise.

The competitive harms of this form of capture are relatively clear. [*1088] Not only does the capturing party end up with exclusive control over the market standard, converting a group standard-setting process into a de facto one, but the capturing party can use the group standard to achieve a dominant position it could not have attained in an open standards competition. Had Unisys or Dell announced up front that the standards they were backing were proprietary, it is unlikely that the affected industries would have chosen those standards. At the very least, those standards would have faced stiffer competition than they did. n195

The most likely avenue of antitrust attack against such capture does not involve section 1 at all but rather is an attempted monopolization claim under section 2. n196 Attempted monopolization has three elements--intent to monopolize, anticompetitive conduct in furtherance of that intent, and a dangerous probability of success. n197 Assuming the failure to disclose relevant intellectual property rights was intentional and not an oversight, the first element should be easy to satisfy. n198 Efforts to capture an industry standard in any given case would constitute anticompetitive conduct precisely in the situation where those efforts are likely to threaten monopolization--that is, where the standard being set is one which will likely dominate the industry. n199 Market [*1089] power may be the necessary result of patent enforcement in some cases, while in others the patent owner's control over the market stems from a failure of information in the market, a failure which the patent owner herself has induced. n200 While the fact that the antitrust defendant does own intellectual property rights governing the technology suggests some caution in applying the antitrust laws, n201 the mere possession of an intellectual property right will not protect its owner from a charge of dominating a market by extending the scope of that right. n202 In the Dell case, the FTC entered into a consent decree in which Dell agreed not to assert its intellectual property rights in the VL-Bus. n203 To date, the Unisys case has not been litigated.

Of course, not all patents covering standards will necessarily be [*1090] anticompetitive. While one approach to standards is to require them to be intellectual property-free (IETF's approach, at least until recently), intellectual property can coexist with procompetitive standard-setting. For example, ANSI and other groups do not require that an intellectual property owner give up any claim to a standard, but merely that they license their intellectual property rights on a reasonable basis. Other examples of reasonable and even procompetitive uses of intellectual property in the standard-setting context are possible. n204 It is only in that subset of cases where the patent is used as a competitive weapon that concerns about market control are implicated. n205

Even where an act is anticompetitive, it is possible to argue that application of the antitrust laws is not warranted to the extent that nonantitrust legal principles can more effectively be brought to bear on the same conduct. n206 In the particular context of the Dell case, there are several possible alternatives to antitrust analysis. First, Dell's nondisclosure of its patent violated a rule of the standard-setting organization requiring disclosure of intellectual property rights. As a result, some commentators have argued that a breach of contract claim is the appropriate response to Dell's actions and that invoking antitrust is unwarranted. n207 [*1091] It is not clear that this argument has much force in the Dell case. First, not all of the parties injured by Dell's action were members of VESA, and non-members presumably lack standing

to sue for breach of contract. n208 Second, the damages for breach of such a contract may be limited in ways that mean Dell would not have to compensate even VESA members for the full value of the competitive harm they have incurred. n209 Finally, not all organizations have such a rule, and in some cases (such as the Unisys GIF standard) there is no contract at all.

Alternatively, it is possible that Dell could be liable to VESA or its members on some sort of fraud or misrepresentation theory. This is perhaps more promising than contract, in that it offers plaintiffs the possibility of recovering their actual damages. But a fraud theory must of necessity be based on some duty to the plaintiff, which would seem to preclude suits by consumers or by nonmembers of the group.

Perhaps a more likely approach is to try to solve the problem within the confines of intellectual property law. A rule requiring compulsory licensing in such cases would solve the problem, but intellectual property law has historically rejected compulsory licensing in most circumstances. n210 A final non-antitrust approach to the Dell problem is to apply the doctrine of equitable estoppel. There are a number of precedents suggesting that companies who fail to disclose a known patent to a standard-setting group may be estopped from later asserting that patent against members of the group once they have adopted the patented technology as a standard. n211 One such case even involves fail- [*1092] ure to assert a patent during a de facto standards competition, and is therefore potentially applicable to the Unisys GIF problem. n212 To the extent that equitable estoppel will prevent enforcement of intellectual property rights in such a situation, it would appear to accomplish the same goals as antitrust action. However, the uncertainty associated with this rule n213 suggests continued antitrust vigilance in this area, at least as a backstop.

FOOTNOTES

n89 15 U.S.C. <sect> 1.

n90 15 U.S.C. <sect> 2.

n91 In the last 40 years, a revolution has taken place in economic thought about antitrust. Led by the Chicago School, which emphasized allocative efficiency as the sole goal of antitrust law, see Robert H. Bork, The Antitrust Paradox: A Policy at War With Itself (1978); Richard A. Posner, Antitrust Law: An Economic Perspective (1976), this revolution has brought economic thinking to the forefront of virtually all antitrust analysis, whether or not the analyst subscribes to the particular tenets of the Chicago School. See, e.g., Symposium on PostChicago Law and Economics, *65 Chi.-Kent L. Rev. 3 (1989).* The basic model is economic efficiency, though whose welfare should be considered and how remains a point of debate.

Other models of antitrust include the populist view that big is intrinsically bad--for example, because it concentrates wealth, because it reduces product diversity, or because it concentrates political power. See, e.g., Walter Adams & James W. Brock, The Bigness Complex: Industry, Labor and Government in the American Economy (1986). A related view treats the antitrust laws as essentially an unfair competition statute designed to protect small businesses from the ravages of competition, even at the expense of higher prices.

The social welfare model is subject to economic criticism for ignoring second-and thirdorder misallocative effects by focusing entirely on the market at issue. See, e.g., Richard Markovits, A Constructive Critique of the Traditional Definition and Use of the Concept of "The Effect of a Choice on Allocative (Economic) Efficiency": Why the Kaldor-Hicks Test, the Coase Theorem, and Virtually All Law-and-Economics Welfare Arguments are Wrong, *1993 U. Ill. L. Rev. 485.*

n92 15 U.S.C. <sect> 18.

n93 15 U.S.C. <sect> 2.

n94 15 U.S.C. <sect> 1. Both section 1 and section 2 of the Sherman Act are notoriously vague, and their contours have been defined almost entirely by court decisions. While section 1 of the Sherman Act by its literal terms prohibits all restraints of trade, the

Supreme Court rapidly concluded that such a restriction was unworkable, and deemed the statute to cover only unreasonable restraints of trade. See, e.g., *Standard Oil Co. v. United States, 221 U.S. 1 (1911).*

n95 See *Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979); United States v. Alcoa, 148 F.2d 416, 429-30 (2d Cir. 1945).*

n96 *Alcoa, 148 F.2d at 429.*

n97 *Id. at 429-30; Spectrum Sports, Inc. v. McQuillan, 506 U.S. 447 (1993); United States v. Grinnell Corp., 384 U.S. 563, 570-71 (1966).*

n98 See generally *Standard Oil Co. v. United States, 221 U.S. 1 (1911)* (conduct which itself violates the antitrust laws meets the "anticompetitive conduct" requirement).

n99 For example, in *Aspen Skiing Co. v. Aspen Highlands Skiing Corp., 472 U.S. 585 (1985),* the Supreme Court held that the defendant possessed market power in the market for ski facilities in the Aspen, Colorado area, and that it violated section 2 when it attempted to impose restrictive conditions on a "joint lift ticket" marketed with its sole rival in the area. The Court noted that while refusing to deal with a competitor is generally perfectly legal, see *Olympia Equip. Leasing Co. v. Western Union Tel. Co., 797 F.2d 370 (7th Cir. 1986),* a dominant firm that has a history of dealing with its competitor may be obliged to continue to do so. This result is somewhat puzzling.

n100 *148 F.2d at 429;* accord *Grinnell, 384 U.S. at 570-71; American Tobacco Co. v. United States, 328 U.S. 781, 786 (1946).*

n101 See, e.g., *Union Leader Corp. v. Newspapers of New England, 284 F.2d 582 (1st Cir. 1960).*

n102 See *American Football League v. National Football League, 323 F.2d 124 (4th Cir. 1963).*

n103 See *Ovitron Corp. v. General Motors, 295 F. Supp. 373 (S.D.N.Y. 1969).* In that case, however, the court went on to hold that defendant Delco had gone beyond possession of a natural monopoly and had engaged in predatory pricing with the aim of maintaining and extending its monopoly power once potential competition arose. See *id. at 378.*

n104 *Otter Tail Power Co. v. United States, 410 U.S. 366 (1973);* see also *Ovitron, 295 F. Supp. at 378* (predatory pricing by natural monopolist served to artificially maintain monopoly power, and therefore violated section 2).

n105 This effort was behind the consent decree breaking up AT&T in 1982. The government argued that AT&T's vertical integration allowed it to unfairly use the advantages of its entrenched local telephone monopoly to dominate the competitive market for long-distance service. *United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982),* aff'd sub nom. *Maryland v. United States, 460 U.S. 1001 (1983).*

There is considerable controversy attending the idea of "monopoly leveraging." Commentators have disagreed sharply over whether such leveraging is ever economically rational. Compare Bork, supra note 91 and Posner, supra note 91 (both concluding that leveraging only redistributes among two markets the profits a company could have made from one market) with Louis Kaplow, Extension of Monopoly Power Through Leverage, *85 Colum. L. Rev. 515 (1985)* (given market imperfections, monopoly leveraging can increase profits) and with Richard Markovits, An Ideal Antitrust Law Regime, *64 Tex. L. Rev. 251 (1985).* And at least one court has held that leveraging itself is not illegal, though it held open the possibility that the conduct described as leveraging could have anticompetitive effects which violated the antitrust laws in other ways. *Alaska Airlines v. United Airlines, 948 F.2d 536, 549 (9th Cir. 1991).*

n106 See Chesbrough & Teece, supra note 85, at 65-68.

n107 Arguably, there is nothing the courts should do about a company in this position. See infra notes 120-123 and accompanying text; see also Lopatka & Page, supra note 15, at 349.

n108 See *United States v. Microsoft, 159 F.R.D. 318* (D.D.C.), rev'd on other grounds, *56 F.3d 1448 (D.C. Cir. 1995).* In that case, the Antitrust Division challenged certain anticompetitive but minor aspects of Microsoft's sales and design policies. The District Court initially rejected the government's proposed consent decree with Microsoft on the grounds that it did not address the real issues with Microsoft's monopoly, but that decision was reversed by the D.C. Circuit on appeal. Most commentators have viewed the government's consent decree as ineffective. See, e.g., Kenneth C. Baseman et al., supra note 52, at 265.

n109 Clayton Act <sect><sect> 4, 16, 15 U.S.C. <sect><sect> 15, 26.

n110 See, e.g., 35 U.S.C. <sect> 271(d)(4) (patentee has the right not to license its patent); *Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263, 284-85 (2d Cir. 1979)* (monopolist in camera market is under no obligation to predisclose interface specifications of its new cameras to film makers, even though the result was to give monopolist temporary control over film market as well); United States Department of Justice and Federal Trade Commission, Antitrust Guidelines for the Licensing of Intellectual Property <sect> 2.2 (1995) (possession of market power does not impose an antitrust obligation to license intellectual property).

n111 Indeed, in the view of some commentators, the incentive to bring suit is too powerful. See, e.g., Thomas M. Jorde & David J. Teece, Innovation, Cooperation and Antitrust: Striking the Right Balance, 4 High Tech. L.J. 1 (1989) (suggesting plaintiffs be limited to actual damages for certain types of antitrust violations).

n112 Antitrust injury is a standing doctrine which requires antitrust plaintiffs to show that their losses reflect "injury of the sort which the antitrust laws were intended to prevent, and which flows from that which makes the conduct unlawful." *Cargill, Inc. v. Monfort of Colorado, 479 U.S. 104, 109 (1986); Brunswick Corp. v. Pueblo Bowl-O-Mat, Inc., 429 U.S. 477, 489 (1977).* Unless a court were to interpret the antitrust laws as intending to put the plaintiff rather than the defendant in a dominant position, a showing of antitrust injury in this situation is extremely unlikely. Cf. *Brunswick Corp. v. Riegel Textile, 752 F.2d 261, 267 (7th Cir. 1984)* (antitrust claim not viable where "Brunswick is asking, as a main part of the remedy, for an order transferring ownership of the patent from Riegel to itself . . . . There is nothing discreditable in this ambition but we do not see how consumers can benefit from its achievement.").

n113 See supra notes 76-82 and accompanying text (discussing problems with government regulation of industry); see also Pierce & Gellhorn, supra note 44.

n114 Sherman Act <sect> 4, 15 U.S.C. <sect> 4; Clayton Act <sect><sect> 15, 16, 15 U.S.C. <sect><sect> 25, 26.

n115 For example, the consent decree in United States v. AT&T, discussed supra note 105, involved all three types of relief.

n116 See Lopatka & Page, supra note 15, at 349.

n117 Cf. James J. Anton & Dennis A. Yao, Standard-Setting Consortia, Antitrust, and HighTechnology Industries, *64 Antitrust L.J. 247, 263 (1995)* (remedies in complex standard-setting cases might involve ongoing "regulatory"-style interventions in the market).

n118 See infra note 119 and accompanying text (identifying some such costs). See also *Alaska Airlines v. United Airlines, 948 F.2d 536, 547-48 (9th Cir. 1991)* (structural relief not appropriate in such cases).

n119 See Gifford, supra note 62, at 638-39.

n120 On the historical meaning of the Sherman Act, see, e.g., Adams & Brock, supra note 91; Victor H. Kramer, The Supreme Court and Tying Arrangements: Antitrust as History, *69 Minn. L. Rev. 1013 (1985);* F.M. Scherer, Efficiency, Fairness, and the Early Contributions of Economists to the Antitrust Debate, *29 Washburn L.J. 243 (1990).*

n121 *Brown Shoe Co. v. United States, 370 U.S. 294, 320 (1962).* Ironically, the Court made this statement only to disavow it, indicating that it was interested primarily in protecting small independent businesses, allegedly as a vehicle for promoting competition. Nonetheless, it is the statement and not the Court's holding that has survived to the present day. See, e.g., *Brooke Group v. Brown & Williamson Tobacco Co., 509 U.S. 209, 224 (1993)* (applying the Brown Shoe language to restrict predatory pricing claims); Dratler, supra note 29, at 682.

n122 Cf. *Brunswick Corp. v. Riegel Textile, 752 F.2d 261 (7th Cir. 1984).* In Brunswick, Judge Posner treated the partially analogous case of a patent allegedly obtained by fraud and used to dominate a market. He concluded that the antitrust laws were not concerned with such fraud if the only effect was to give the patent to the wrong party, since "the power over price that patent rights confer is lawful, and is no greater than it otherwise would be just because the person exercising the rights is not the one entitled by law to do so." *Id. at 265.*

It is not clear that Judge Posner is right. In certain circumstances, who owns patent rights (or, more relevant for our purposes, which product becomes a market standard) may make a good deal of difference in terms of social welfare. See supra note 119 and accompanying text. Nonetheless, the general point remains that attacking a monopoly cannot be justified on the grounds that that monopoly is bad if the outcome of the attack is a new monopoly which is not any better.

n123 Of course, Schumpeterians and others who oppose any application of antitrust law to innovative industries because they do not believe in competition in such industries will not find this "failure" particularly troubling. See Ramsey Hanna, Note, Misusing Antitrust: The Search for Functional Copyright Misuse Standards, *46 Stan. L. Rev. 401, 424-25 (1994).*

n124 "Rent-seeking" refers to the tendency of market participants to expend resources in an effort to capture supracompetitive profits. See generally Posner, supra note 91.

n125 See supra notes 59-60 and accompanying text.

n126 The "best" standard is somewhat tautologically defined here as the standard most preferred by consumers. Consumer preferences are complex things, and it may not be the case that the technically superior product will win the standards competition. See Dratler, supra note 29, at 718. Factors such as price, widespread availability, and ease of use will also influence consumer decisions.

n127 For discussion of the stakes in the current battle over Web browser standards, see Ramstad, supra note 23, at D8. According to the article, Microsoft chair Bill Gates "wakes up every morning thinking about browser market share."

n128 See Bar, supra note 19, at 243 ("This possibility of influencing the allocation of longterm returns makes de facto standards competitions such fertile ground for corporate strategy.").

n129 In *Matsushita Elec. Indus. Co. v. Zenith Radio Corp., 475 U.S. 574, 589 (1986),* the Supreme Court opined that "predatory pricing schemes are rarely tried, and even more rarely successful." Accord Frank H. Easterbrook, Predatory Strategies and Counterstrategies, *48 U. Chi. L. Rev. 263, 268 (1981);* Franklin M. Fisher, Matsushita: Myth v. Analysis in the Economics of Predation, *64 Chi.-Kent L. Rev. 969, 970 (1988);* Wesley J. Liebeler, Whither Predatory Pricing? From Areeda and Turner to Matsushita, *61 Notre Dame L. Rev. 1052 (1986);* John S. McGee, Predatory Pricing Revisited, *23 J.L. & Econ. 289, 295-97 (1980).*

n130 See *Brooke Group v. Brown & Williamson Tobacco, 509 U.S. 209, 224-25 (1993)* (requiring proof that predator will not only acquire market power, but will be able to raise prices sufficiently to recover the losses it suffered during the period it priced below cost). In the Court's words, "Recoupment is the ultimate object of an unlawful predatory pricing scheme; it is the means by which a predator profits from predation. Without it, predatory pricing produces lower aggregate prices in the market, and consumer welfare is enhanced." *Id. at 224.*

n131 See Farrell, supra note 13, at 43 (predatory pricing strategies are common in marketplaces characterized by standards competition between proprietary technologies).

n132 See supra note 37 (discussing the browser market share battle); Peter H. Lewis, Netscape Knows Fame and Aspires to Fortune, N.Y. Times, March 1, 1995, at D1 (Netscape giving away certain versions of its browser software). More recently, Netscape has begun charging corporate users of its product; Microsoft still does not. See Froomkin, Model, supra note 10, at 29-30. While giving a product away for free certainly appears to be "pricing below marginal cost," generally accepted as a prerequisite for predatory pricing, standardization effects might make such giveaways economically rational (and legal), particularly if price discrimination is possible. In particular, since making its product the market standard rebounds to the benefit of all adopters of the product, a company engaging in such pricing may in theory be able to make up the revenues it has lost by giving away a product by charging a higher price in another segment of the market (whose value and therefore willingness to pay has been increased by broad adoption of the standard). Such price discrimination is possible only to the extent that the company can prevent arbitrage, however, which seems unlikely in this industry. See generally Markovits, supra note 107, at 304-305 (cost of avoiding arbitrage makes price discrimination allocatively inefficient).

n133 Besen and Farrell model such competitive predation in terms similar to the "dollar auction" familiar to economists. They conclude that firm expenditures to predate in standardized markets may fritter away most of the value of capturing the standard. See Besen & Farrell, supra note 31, at 120 n.6.

n134 See supra note 37 (discussing browser competition). While it is possible to define belowcost pricing in such a way that giving your product away does not meet the test, see supra note 132, by most definitions the conduct engaged in by Microsoft constitutes below-cost pricing.

n135 Farrell, supra note 13, at 43.

n136 See Dratler, supra note 29, at 735. Of course, the dynamics in this market are somewhat more complicated than suggested in the text. In particular, the browser market may be valuable to companies like Microsoft not just for itself, but for the control it confers over other, more lucrative markets (such as the next generation computer operating system market). Thus, it may be that in considering market power, we need to look at more than just browsers alone. See infra notes 142-143 and accompanying text (discussing the possibility of leveraging to or from the browser market).

n137 See John Markoff, Microsoft Plans New Bid for Internet Control, N.Y. Times, June 13, 1996, at C4.

n138 See Dratler, supra note 29, at 672; Peter H. Lewis, New World Brought to You by . . ., N.Y. Times, July 30, 1996, at C7; John Markoff, Microsoft and the Web: Making Critical Mass Pay, N.Y. Times, July 29, 1996, at D1-D2.

n139 Indeed, a Microsoft spokesperson seemed to acknowledge this goal in a recent statement. See John Markoff, Tomorrow, the World Wide Web!, N.Y. Times, July 16, 1996, at D1, D6.

n140 See Bork, supra note 91; Posner, supra note 91. These scholars argue that a monopolist has no incentive to leverage her monopoly, since any profits she can coerce out of the new market, she could also take from the existing market.

n141 Cf. Kaplow, supra note 105. Kaplow offers persuasive reasons why monopoly leveraging may be anticompetitive in markets characterized by imperfections, or which do not possess the simple one-for-one vertical substitutability assumed in the basic Chicago model. See also Roger D. Blair & Amanda K. Esquibel, Some Remarks on Monopoly Leveraging, *40 Antitrust Bull. 371 (1995)* (leveraging which leads to significant market share, but not to monopoly, may still impose welfare losses).

n142 See Peter H. Lewis, Microsoft Gets a Big Boost on Internet, N.Y. Times, Mar. 13, 1996, at C1. More recently, Mocrosoft announced similar deals with AT&T, Netcom, and MCI. Laurence Zuckerman, Browser Moves by Microsoft Make Even Netscape Blink, N.Y. Times, Oct. 9, 1996, at C1.

There have also been allegations that Microsoft has attempted to leverage its market power in software operating systems directly into the Internet access market, by making it difficult for consumers to use software in a Windows environment to access

online services other than Microsoft's Network (MSN). The Justice Department investigated such complaints in 1995. See, e.g., James Gleick, Making Microsoft Safe for Capitalism, N.Y. Times Mag., Nov. 5, 1995, at 50; Michele Matassa, U.S. Investigates Microsoft's Handle on Internet, Austin Am.-Statesman, Dec. 5, 1995, at D1. More recently, however, the failure of Microsoft Network to make significant inroads against its competitors (and the fierce competitiveness of the related market for Internet service providers) has taken much of the steam out of these complaints.

n143 Some of Microsoft's recent actions, notably adapting its products to "embrace and extend" existing Internet standards and linking its OLE operating system technology to its browser, are consistent with this theory. See John Markoff, Microsoft Plans New Bid for Internet Control, N.Y. Times, June 13, 1996, at C4. Evidence that this is really what is going on might also be seen in Sun Microsystems' recent decision to make Java the core of a new computer operating system. See Ed Anuff, Windows Meet Java, 4.08 Wired 38 (Aug. 1996).

n144 Such a remedy was used to stop leveraging in the United States v. AT&T case, see *United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982),* aff'd sub nom. *Maryland v. United States, 460 U.S. 1001 (1983),* and has occasionally been proposed as a remedy for Microsoft's alleged leveraging from the computer operating systems market to the applications program market.

n145 Cf. *Union Leader Corp. v. Newspapers of New England, 284 F.2d 582 (1st Cir. 1960)* for an example of a court judging such a competition.

n146 See Lewis, supra note 138, at C7.

n147 See Gleick, supra note 142; Gotts & Fogt, supra note 67, at 18.

n148 See Eleanor M. Fox & Lawrence A. Sullivan, Cases and Materials on Antitrust 202-203 (1988) (describing history of the litigation).

n149 Clayton Act <sect> 7A, 15 U.S.C. <sect> 18.

n150 United States Department of Justice Merger Guidelines (1992).

n151 The time spent in investigating and prosecuting a monopolization claim involves learning about the industry and the specific acts at issue, often from disgruntled competitors or consumers; investigating the company and the industry, which generally involves issuing Civil Investigative Demands (CIDs) to obtain pre-litigation discovery from the investigation target and third parties; evaluating the evidence and the case, and obtaining bureaucratic and political approval to proceed; preparing and filing the complaint and supporting evidence; preparing for and holding a court hearing; and, in some cases, investigating compliance and engaging in further enforcement. Even if some of these procedures could be compressed or done concurrently, it is hard to imagine that the process can be accelerated dramatically.

n152 As noted above, there are also potential problems with group standard setting, including the danger that one company will capture the standard-setting process and the problem of discouraging leapfrogging improvements. See supra notes 86-87 and accompanying text.

n153 Public standard setting is not subject to the same form of scrutiny because it falls within the antitrust immunity afforded state action and efforts to petition the state. See generally David McGowan & Mark A. Lemley, Antitrust Immunity: State Action and Federalism, Petitioning and the First Amendment, *17 Harv. J.L. & Pub. Pol'y. 293 (1994).*

n154 See, e.g., *United States v. Container Corp., 393 U.S. 333 (1969); American Column & Lumber Co. v. United States, 257 U.S. 377 (1921); Standard Sanitary Mfg. Co. v. United States, 226 U.S. 20 (1912); National Macaroni Mfrs. Ass'n v. FTC, 345 F.2d 421 (7th Cir. 1965); Milk & Ice Cream Can Inst. v. FTC, 152 F.2d 478 (7th Cir. 1946).*

n155 See *Eastern States Retail Lumber Dealers Ass'n v. United States, 234 U.S. 600 (1914)* (exchange of information supporting a boycott of competitors at trade association meeting violated section 1); cf. *Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492, 500 (1988)* (describing standard-setting as an implicit form of product restriction); *National Soc'y of Professional Eng'r v. United States, 435 U.S. 679 (1978)* (trade association rules cannot be justified under rule of reason except on grounds that they are procompetitive).

n156 *Addamax Corp. v. Open Software Found., 888 F. Supp. 274, 281, 284 (D. Mass. 1995).* The court held that the OSF Unix standard presented a genuine issue of material fact with respect to the issue of monopsony power, despite the fact that the standard enjoyed virtually no sales in the UNIX market. *Id. at 284.*

n157 See S. Besen & C. Johnson, Compatibility Standards, Competition and Innovation in the Broadcasting Industry (1986) (discussing standards for AM radio broadcast).

n158 For conforming views, see Jack E. Brown, Technology Joint Ventures to Set Standards or Define Interfaces, *61 Antitrust L.J. 921 (1993);* Jonathan T. Howe & Leland J. Badger, The Antitrust Challenge to Non-Profit Certification Organizations: Conflicts of Interest and a Practical Rule of Reason Approach to Certification Programs as Industry-Wide Builders of Competition and Efficiency, *60 Wash. U. L.Q. 357 (1982)* (endorsing fact-specific rule of reason approach); Thomas A. Piraino, Jr., The Antitrust Analysis of Network Joint Ventures, *47 Hastings L.J. 5 (1995);* David J. Teece, Information Sharing, Cooperation and Antitrust, *62*

Antitrust L.J. 465 (1994). Some commentators have gone further, taking the position that cooperation between competitors should be encouraged in high-technology industries as a means of promoting innovation. See Jorde & Teece, supra note 111 (encouraging lenient antitrust treatment of joint ventures).

n159 See supra notes 83-85 and accompanying text.

n160 See Farrell, supra note 63, at 3.

n161 For example, Annalee Saxenian describes the detailed efforts that went into standardization in the semiconductor industry in Silicon Valley. Annalee Saxenian, Regional Advantage: Culture and Competition in Silicon Valley and Route 128 49 (1994). Saxenian attributes the success of Silicon Valley and the failure of Route 128 in significant part to the existence of such a culture of cooperation in the former but not the latter.

n162 See *Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492 (1988); American Soc'y of Mech. Eng'r v. Hydrolevel Corp., 456 U.S. 556 (1982); Radiant Burners v. Peoples Gas Light & Coke Co., 364 U.S. 656 (1961).*

n163 There is a proposal pending in an IETF working group to revise this policy, allowing standards to be owned by private companies providing they offer licenses on "fair and reasonable terms." Mark Voorhees, Internet Task Force Wakes Up to Reality of Intellectual Property, Info Law Alert, Feb. 9, 1996 <http://infolawalert.com/stories/020996a.html>. For a general description of the workings of the IETF, see Froomkin, A Model of International Law and Society, supra note 10, at 16-22; Froomkin, The Internet as a Source of Regulatory Arbitrage, supra note 10, at 3; Borsook, supra note 10, at 110 (Oct. 1995).

n164 Section 1 analysis is in any event relying increasingly on a case-by-case, rule of reason approach, rather than the traditional rule that all horizontal restraints were illegal per se. See, e.g., Thomas M. Jorde & Mark A. Lemley, Summary Judgment in Antitrust Cases: Understanding Monsanto and Matsushita, *36 Antitrust Bull. 271 (1991)* (citing cases); Piraino, supra note 158, at 8.

n165 *Maple Flooring Mfrs. Ass'n v. United States, 268 U.S. 563 (1925).*

n166 See supra note 154.

n167 *Maple Flooring, 268 U.S. at 563;* accord *Clamp-All Corp. v. Cast Iron Soil Pipe Inst., 851 F.2d 478 (1st Cir. 1988) Addamax, 888 F. Supp. at 282, 283* ("It is clear that the effects of market standardization on the computer industry are extraordinarily difficult to gauge . . . . The sheer complexity of the industry cautions against a per se analysis here.").

n168 *441 U.S. 1 (1979).*

n169 *Id. at 23.* Joint ventures with arguably procompetitive effects have also benefited from rule of reason scrutiny rather than per se condemnation. See, e.g., *SCFC ILC, Inc. v. Visa USA, 36 F.3d 958, 964 (10th Cir. 1994); Northrop Corp. v. McDonnell Douglas Corp., 705 F.2d 1030 (9th Cir. 1983); SCM Corp. v. Xerox Corp., 645 F.2d 1195 (2d Cir. 1981);* see also 15 U.S.C. <sect> 4301 et seq. (providing special treatment to research, development and production joint ventures registered with the Department of Justice). Standard-setting organizations overlap to some extent in structure and purpose with joint ventures, such that antitrust treatment of joint ventures might be relevant in evaluating standards groups as well. See *Addamax, 888 F. Supp. at 280-81* (treating standard-setting organization as a joint venture for antitrust purposes); Andrew Updegrove, Forming and Representing High Tech Consortia: Legal and Strategic Issues, 11 Computer Law, Mar. 1994 at 8.

n170 But see James J. Anton & Dennis A. Yao, Standard-Setting Consortia, Antitrust, and High-Technology Industries, *64 Antitrust L.J. 247, 248, 262-63 (1995)* (arguing for antitrust review of the substantive merits of a group standard in some cases).

n171 Bar points to standards which are neither fully closed nor fully open, largely because some competitors have an information advantage over others. Bar, supra note 19, at 240. See also Lehr, supra note 10, at 121, 123 (most compatibility standards produce only partial interoperability).

One commentator distinguishes between nonpartisan "specification groups" such as the IETF, which "are primarily concerned with assuring the development of a usable, robust standard for the benefit of the industry generally," and "strategic consortia" formed by a subset of an industry to advance particular economic interests. Updegrove, supra note 169. Interestingly, Updegrove concludes that the impartial groups are longer lasting and more successful. Id. at 6. Of course, making such a determination requires some sort of benchmark for distinguishing between a non-partisan group and a strategically-dominated one, a benchmark which is hard to find in practice.

n172 See Joseph Farrell & Garth Saloner, Standardization, Compatibility, and Innovation, 16 Rand J. Econ. 70 (1985) (formal standard-setting risks manipulation by dominant firms in order to preserve dominance); Piraino, supra note 158, at 9 (suggesting that network joint ventures should be required to open their membership on nondiscriminatory terms).

n173 See, e.g., *Northwest Wholesale Stationers Inc. v. Pacific Stationery & Printing, 472 U.S. 284, 294 (1985).* For other statements of the confusion surrounding group boycott law, see Phillip Areeda, Antitrust Analysis 381 (2d ed. 1974); Lawrence A. Sullivan, Handbook of the Law of Antitrust 229-230 (1977).

n174 *Northwest Wholesale, 472 U.S. at 294.* Cf. *FTC v. Indiana Fed'n of Dentists, 476 U.S. 447 (1986)* (applying a "quick look" rule of reason to an agreement by dentists to deny information to insurers). The Court in Indiana Federation held the agreement unlawful because the dentists failed to offer a procompetitive justification for their actions.

n175 See *Silver v. New York Stock Exchange, 373 U.S. 341 (1963)* (refusing to invalidate NYSE restrictions on membership, in part because the Exchange was already subject to heavy SEC regulation).

n176 *United States v. Terminal R.R. Ass'n, 224 U.S. 383 (1912).*

n177 *MCI v. AT&T, 708 F.2d 1081 (7th Cir. 1983);* see Mark C. Rosenblum, The Antitrust Rationale for the MFJ's Line-of-Business Restrictions and a Policy Proposal for Removing Them, *25 Sw. U. L. Rev. 605, 608-11 (1996).*

n178 Areeda, supra note 173. See also McGowan, supra note 28 (arguing that essential facilities claims should be limited to natural monopoly situations). But see Farrell, supra note 63, at 8-9 (arguing that essential facilities claims may be justified in the circumstances of networked markets).

n179 See, e.g., *City of Anaheim v. Southern California Edison Co., 955 F.2d 1373 (9th Cir. 1992)* (access to electric power transmission lines not essential); *Alaska Airlines v. United Airlines, 948 F.2d 536 (9th Cir. 1991)* (access to airline computer reservation system not essential); *Illinois ex rel Burris v. Panhandle Eastern Pipe Line Co., 935 F.2d 1469 (7th Cir. 1991)* (natural gas pipeline facilities not essential, even though duplicating transportation system would have been infeasible); 3 Julian O. von Kalinowski, Antitrust Laws and Trade Regulation <sect> 19.05[3], at 19-124 (2d ed. 1995) (cataloguing essential facilities cases).

n180 See supra notes 100-23 and accompanying text (discussing limits on section 2 in the standardization context). But cf. Maureen A. O'Rourke, Drawing the Boundary Between Copyright and Contract: Copyright Preemption of Software License Terms, *45 Duke L.J. 479, 547 (1995)* (arguing for application of essential facilities rule in the software industry when a software developer has market power).

n181 See *Klors, Inc. v. Broadway-Hale Stores, 359 U.S. 207 (1959).*

n182 See, e.g., *Data Gen. Corp. v. Grumman Sys. Support, 36 F.3d 1147 (1st Cir. 1994).* Some unilateral refusals to deal have been found to violate the antitrust laws under section 2, rather than section 1. See *Aspen Skiing Co. v. Aspen Highlands Skiing Corp., 472 U.S. 585 (1985).*

n183 Cf. Robert Heidt, Industry Self-Regulation and the Useless Concept 'Group Boycott,' *39 Vand. L. Rev. 1507 (1986).*

n184 See James B. Kobak, Jr., Enforcers Focus on IP Issues, Nat'l L.J., May 6, 1996, at B7, B10. One way to avoid this result would be to compel competitor access only to the standard itself, and not to the group producing the standard. See generally Reidenberg, supra note 13. This approach would have the advantage of requiring less government intrusion into the workings of the private group. Whether it would be effective, however, may depend on the complexity of the standards at issue and the potential for group members to obtain a lead time advantage before the standard is announced.

n185 One possible approach to take in order to limit such claims is to allow government but not private suits for violations of the antitrust laws by standard-setting organizations. For a more general proposal along these lines, see Edward A. Snyder & Thomas E. Kauper, Misuse of the Antitrust Laws: The Competitor Plaintiff, *90 Mich. L. Rev. 551 (1991).*

n186 See *National Ass'n of Review Appraisers & Mortgage Underwriters v. Appraisal Found., 64 F.3d 1130 (8th Cir. 1995).*

n187 In more traditional products markets, capture of standard-setting organizations sometimes takes the form of controlling the organization and using it to vote down a competitor's standard. This is what apparently happened in *Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492 (1988),* discussed supra note 88. That approach will not have the same effect in industries such as the Internet software market unless the capturing party has intellectual property rights in the dominant standard. Absent such rights, competitors will alter their products to comply with the winning standard. This may require some time and expense, but the expense will be well worth it to competitors if the lock-in effects of the standard are significant.

n188 See In re Dell Computer Corp., No. 931-0097 (F.T.C. 1996).

n189 Id. Many standard-setting organizations, including the American National Standards Institute (ANSI) and Semiconductor Equipment and Materials International (SEMI) have similar rules. See AIPLA, Testimony Before the Federal Trade Commission on Antitrust and Intellectual Property (submitted October 1995).

n190 Whether Dell in fact knew this is a matter of some dispute. In her dissent to the Commission's proposed consent decree, Commissioner Azcuenaga claimed that there was "no evidence to support such a finding of intentional conduct." *Dell Computer, supra* note 190 (Azcuenaga, Comm., dissenting). A Dell spokesperson indicated that after the FTC investigation, the company was "revising its procedures to ensure that its employees are 'completely up to speed on all of our patent portfolios.'" Darlene Superville, Dell to Drop Patent Claim to PC Design Feature, Austin Am.-Statesman, Nov. 3, 1995, at C2.

n191 Network Working Group Request for Comments No. 1602, March 1994, <http://ds. internic.net/rfc/rfc1602.txt.> To be sure, such an agreement is enforceable only against companies participating in the IETF process, or which offer their technology as a

standard. It is conceivable that a patent owner not affiliated with IETF could shut down the Internet by asserting its intellectual property rights against critical Internet standards.

n192 Competitors to GIF at the time included a standard called JPEG, which suffered from certain disadvantages relative to GIF. See Michael Console Battilana, The GIF Controversy: A Software Developer's Perspective (1996) available from mcb@cloanto.it. More recently, a number of developers have come up with a variant of GIF called PNG which does not use the compression technology covered by the Unisys patent. Id.

n193 Unisys spokespersons now claim that they acted against Compuserve as soon as they became aware that LZW was incorporated in GIF. See Battilana, supra note 194; Bob O'Leary, Unisys Clarifies Policy Regarding Patent Use in On-Line Service Offerings, message posted to cni-copyright listserv, Jan. 10, 1995, at 10:50 a.m.

n194 See Pat Clawson, An Open Letter to Our Colleagues in the Online Communications Community, message posted to cyberia-l listserv, Jan. 3, 1995, at 1:00 p.m.

n195 Indeed, the future of the GIF standard is unclear. A number of software developers have stopped using the standard since Unisys' announcement. It may be that the (presumably public domain) PNG standard will replace GIF.

n196 The FTC's claim against Dell was not for violation of either section of the Sherman Act, but rather was brought under section 5 of the FTC Act, which gives similar powers to the Commission. See *FTC v. Sperry & Hutchinson Co., 405 U.S. 233 (1972).*

n197 *Spectrum Sports v. McQuillan, 506 U.S. 447 (1993).*

n198 Even where intent is in question, as it apparently was in the Dell case, an antitrust claim might be worth pursuing. An actual intent to monopolize is difficult to prove, and in some cases can be inferred from conduct. See, e.g., *Handgards, Inc. v. Ethicon, Inc., 743 F.2d 1282, 1293 (9th Cir. 1984);* cert. denied, *469 U.S. 1190 (1985); William Inglis & Sons Baking Co. v. ITT Continental Baking Co., 668 F.2d 1014, 1027-28 (9th Cir. 1981),* cert. denied sub nom. *ITT Continental Baking Co. v. Willaim Inglis Baking Co., 459 U.S. 825 (1982);* see also Dratler, supra note 29, at 686 ("It is therefore the means of excluding rivals, not the underlying intent, that really matter.").

n199 See Kobak, supra note 184, at B7, B9 ("a deliberate effort to sandbag competitors into adopting a standard which would then be used to exclude the same competitors from the market seems easy to condemn under monopolization and attempt-to-monopolize principles . . ."). While such a determination is speculative, the same can be said of any attempted monopolization case. Factors such as the collective market share of members of the standard-setting organization or the past success of group standards may be evidence of likelihood of successful monopolization.

By contrast, Henry Perritt, Jr. distinguishes the situation in which an intellectual property owner merely encourages the adoption of its standard by an independent agency, without any misrepresentations or intent to deceive. Absent such conduct, benefitting from a standard-setting body's decision does not seem to create a section 2 case. See Perritt, supra note 43, at 36870.

n200 Where information is imperfect, markets based on that information will be imperfect also. Those in possession of the information can use their knowledge to the advantage of their competitors or consumers. See Mark R. Patterson, Product Definition, Product Information, and Market Power: Kodak in Perspective, *73 N.C. L. Rev. 185 (1994).*

In the context of patents and standard-setting organizations, it is useful to distinguish two different sets of circumstances. Where the party in question possesses a patent application, it would be virtually impossible for competitors to acquire information about this potential intellectual property right, except from the patent applicant herself. Where a patent has been issued, on the other hand, it is possible for the standards group to search the patent literature themselves to ensure that no patents cover the proposed standard. However, such a search is costly and imperfect, and will therefore not necessarily prevent the patent owner from using lack of information to her advantage.

n201 See, e.g., Louis Kaplow, The Patent-Antitrust Intersection: A Reappraisal, *97 Harv. L. Rev. 1813 (1984).*

n202 See, e.g., *Int'l Salt Co. v. United States, 332 U.S. 392 (1947).* In light of this, it is somewhat surprising that the Antitrust Division has taken a position in favor of allowing intellectual property ownership of group standards by a member of the group. In a series of negotiations regarding rules promulgated by the European Telecommunications Standards Institute (ETSI), the United States put substantial pressure on ETSI to back down from its original rule requiring disclosure and nondiscriminatory licensing of member intellectual property rights embodied in ETSI standards.

To be sure, this approach has precedent in some earlier U.S. cases condemning patent pools and cross licenses. See *United States v. New Wrinkle, 342 U.S. 371 (1952).* Further, there were apparently some legitimate complaints about the reciprocity of the ETSI licensing provisions. See Allen N. Dixon, The ETSI Complaint and the European Commission's Communication on Standardization (Working Paper, 1995); Cortien Prins & Martin Schiessl, The New Telecommunications Standards Institute Policy: Conflicts Between Standardisation and Intellectual Property Rights, 8 Eur. Intell. Prop. Rev. 263 (1993). Nonetheless, the Division's approach seems at least to be in some tension with the FTC's arguments in the Dell case, in which the government opposed efforts by one party to use intellectual property rights to capture group standards with market power. For discussions of the evolving ETSI rule on intellectual property rights, see Epstein, supra note 69, at 873-76; Raymond T. Nimmer, Standards, Antitrust and Intellectual

Property, in Intellectual Property Antitrust 1995 (P.L.I. Intellectual Property Antitrust Practice Course Handbook Series 1995); Shurmer & Lea, supra note 83, at 391-96.

n203 See In re Dell Computer Corp., No. 931-0097 (F.T.C. 1996).

n204 For example, Eolas Technologies owns a patent which allegedly covers the technology of embedding executable content in the World Wide Web, and which (if valid) would allow it to control the production of "applets" by Sun and others. Eolas has agreed to license the patent royalty-free to any company which will adopt a particular open applications program interface (API). In effect, Eolas is using its potential control over the applet market to force the industry to an open rather than a closed set of standards. See Michael Doyle, Proposing a Standard Web API, Dr. Dobb's J., Feb. 1996.

n205 In rare cases, a rule precluding patents on standards might be found to be anticompetitive. In *American Soc'y of Sanitary Eng., 106 F.T.C. 324, 328-29 (1985),* the FTC alleged that a standard-setting organization could not refuse to consider revising its standards to include a new product solely on the grounds that that product was patented. The case was settled by consent decree. It is significant that the standard in question was inclusive rather than exclusive, and so allowing the complainant's product to be included would not have restricted the rights of other members to make use of other technology covered by the standard. Nonetheless, the case should serve as a caution for rules such as IETF's requiring participants to relinquish their intellectual property rights.

n206 On this point, see McGowan, supra note 28; see also Penelope Preovolos, Litigation in the Interface: Connecting to Essential Facilities <http://www.portal.com/recorder/preovolos.html> (antitrust is a "blunt instrument" to be used only when other alternatives are insufficient). The doctrinal value of this argument is not clear. Federal law does not ordinarily defer to state law remedies, except in certain highly specialized constitutional circumstances not relevant here. On the other hand, to the extent that the argument is over the desirability of extending antitrust to a particular type of cases, the fact that there are non-antitrust ways of dealing with those cases is certainly relevant.

n207 See AIPLA Comments, supra note 191.

n208 Restatement (Second) of Contracts <sect> 302 (1981) distinguishes between intended beneficiaries, who may enforce contracts, and incidental beneficiaries, who generally may not. Non-members of VESA presumably fall within the latter category.

n209 Contract damages are ordinarily conceived as "expectation damages." In this case, the expectancy is somewhat speculative, since it is difficult or impossible to predict what would have happened if the patent had been disclosed. In such a circumstance, one might envision a remedy of restitution, under which the defendant disgorges its profits to the group. Restitution is a remedy that is doctrinally available in contract law, despite its tension with contract theory. See generally Doug Laycock, Modern American Remedies 553-57 (1994). However, even a restitutionary remedy is, in theory, insufficient to compensate society for the loss it suffers from anticompetitive pricing, since the cost to society from such pricing exceeds the benefit obtained by the defendant. This excess loss is referred to as the "deadweight loss" from monopoly.

n210 See Robert P. Merges, Contracting Into Liability Rules: Institutions Supporting Transactions in Intellectual Property Rights, 84 Cal. L. Rev. (forthcoming 1996).

n211 See *Stambler v. Diebold, Inc., 11 U.S.P.Q.2d 1709, 1714-15 (E.D.N.Y. 1988),* aff'd, *878 F.2d 1445* available in *Westlaw No. 89-1045, 1989 WL 50518 (Fed. Cir. 1989)* (unpublished); *Potter Instrument Co. v. Storage Technology Corp., 207 U.S.P.Q. 763, 766 (E.D. Va. 1980),* aff'd,*641 F.2d 190 (4th Cir. 1981);* see also *Wang Lab, Inc. v. Mitsubishi Elec. Am. Inc., 29 U.S.P.Q.2d 1481, 1495-96 (C.D. Cal. 1993)* (equitable estoppel claim raised triable issue of fact). The Fourth Circuit did not reach the equitable estoppel issue in Potter, but indicated in dictum that it would be inclined to find such an estoppel. *641 F.2d at 192.* Estoppel from misleading silence is possible, but rare, under Federal Circuit precedent. See *Jamesbury Corp. v. Litton Indus. Prods., 839 F.2d 1544, 1553-56 (Fed. Cir. 1988)* (minority opinion).

n212 See *Stryker Corp. v. Zimmer, Inc., 741 F. Supp. 509 (D.N.J. 1990).*

n213 For example, the Federal Circuit has never adopted it in the context of standard-setting, and it is not clear that it would apply to copyright as well as patent cases.

About the World Wide Web Consortium (W3C)

The World Wide Web Consortium was created in October 1994 to lead the World Wide Web to its full potential by developing common protocols that promote its evolution and ensure its interoperability. W3C has more than 500 Member organizations from around the world and has earned international recognition for its contributions to the growth of the Web.

Nearby: W3C in Seven Points | Process Document | W3C in the press | W3C press releases | Contact W3C

Below, you'll find answers to these questions:

Background
How W3C got started.
Mission
What are W3C's goals and its role in the development of the Web? What are some of the design principles that guide W3C's work?
Activities
In what Web activities is W3C involved? What challenges does it face for tomorrow?
Organization
How is W3C organized? What process does it follow to produce technical reports? What do W3C Members do? Who's on the W3C Team? What is the TAG? What does the W3C Advisory Board do? How do the W3C Offices promote W3C internationally? How can the general public get involved?

Background

In October 1994, Tim Berners-Lee, inventor of the Web, founded the World Wide Web Consortium (W3C) at the Massachusetts Institute of Technology,Laboratory for Computer Science [MIT/LCS] in collaboration with CERN, where the Web originated, with support from DARPA and the European Commission. For further information on the joint initiative and the contributions of CERN, INRIA, and MIT, please see the statement on the joint World Wide Web Initiative.

In April 1995, the INRIA (Institut National de Recherche en Informatique et Automatique) became the first European W3C host, followed by Keio University of Japan (Shonan Fujisawa Campus) in Asia in 1996. W3C continues to pursue an international audience through its Offices worldwide.

Related background and historical information:

- About the Web
- Web History
- Virtual Library
- CERN Server

W3C Mission

By promoting interoperability and encouraging an open forum for discussion, W3C commits to leading the technical evolution of the Web. In just over five years, W3C has developed more than 35 technical specifications for the Web's infrastructure. However, the Web is still young and there is still a lot of work to do, especially as computers, telecommunications, and multimedia technologies converge. To meet the growing expectations of users and the increasing power of machines, W3C is already laying the foundations for the next generation of the Web. W3C's technologies will help make the Web a robust, scalable, and adaptive infrastructure for a world of information. To understand how W3C pursues this mission, it is useful to understand the Consortium's goals and driving principles.

W3C's Goals

W3C's long term goals for the Web are:

1. *Universal Access*: To make the Web accessible to all by promoting technologies that take into account the vast differences in culture, education, ability, material resources, and physical limitations of users on all continents;
2. *Semantic Web* : To develop a software environment that permits each user to make the best use of the resources available on the Web;
3. *Web of Trust* : To guide the Web's development with careful consideration for the novel legal, commercial, and social issues raised by this technology.

W3C's Role

As with many other information technologies, in particular those that owe their success to the rise of the Internet, the Web must evolve at a pace unrivaled in other industries. Almost no time is required to turn a bright idea into a new product or service and make it available on the Web to the entire world; for many applications, development and distribution have become virtually indistinguishable. At the same time, easy customer feedback has made it possible for designers to fine tune their products almost continually. With an audience of millions applying W3C specifications and providing feedback, W3C concentrates its efforts on three principle tasks:

1. *Vision*: W3C promotes and develops its vision of the future of the World Wide Web. Contributions from several hundred dedicated researchers and engineers working for Member organizations, from the W3C Team (led by Tim Berners-Lee, the Web's inventor), and from the entire Web community enable W3C to identify the technical requirements that must be satisfied if the Web is to be a truly universal information space.
2. *Design*: W3C designs Web technologies to realize this vision, taking into account existing technologies as well as those of the future.
3. *Standardization*: W3C contributes to efforts to standardize Web technologies by producing specifications (called "Recommendations") that describe the building blocks of the Web. W3C makes these Recommendations (and other technical reports freely available to all.

Design Principles of the Web

The Web is an application built on top of the Internet and, as such, has inherited its fundamental design principles.

1. *Interoperability*: Specifications for the Web's languages and protocols must be compatible with one another and allow (any) hardware and software used to access the Web to work together.
2. *Evolution*: The Web must be able to accommodate future technologies. Design principles such as simplicity, modularity, and extensibility will increase the chances that the Web will work with emerging technologies such as mobile Web devices and digital television, as well as others to come.
3. *Decentralization*: Decentralization is without a doubt the newest principle and most difficult to apply. To allow the Web to "scale" to worldwide proportions while resisting errors and breakdowns, the architecture(like the Internet) must limit or eliminate dependencies on central registries.

These principles guide the work carried out within W3C Activities.

W3C Activities

W3C does most of its work with an explicit mandate from the Membership. As described in the Process Document (refer to section 3.1 of the 8 February 2001 version), the Members review proposals for work called "Activity proposals". When there is consensus among the Members to pursue this work, W3C initiates a new Activity.

W3C Activities are generally organized into groups: Working Groups (for technical developments), Interest Groups (for more general work), and Coordination Groups (for communication among related groups). These groups, made up of representatives from Member organizations, the Team, and invited experts, produce the bulk of W3C's results: technical reports, open source software, and services (e.g., validation services). These groups also ensure coordination with other standards bodies and technical communities. There are currently over thirty W3C Working Groups.

To facilitate management, the Team organizes W3C Activities and other work into five domains:

Architecture Domain
The Architecture Domain develops the underlying technologies of the Web.

Document Formats Domain
The Document Formats Domain works on formats and languages that will present information to users with accuracy, beauty, and a higher level of control.

Interaction Domain
The Interaction Domain seeks to improve user interaction with the Web, and to facilitate single Web authoring to benefit users and content providers alike.

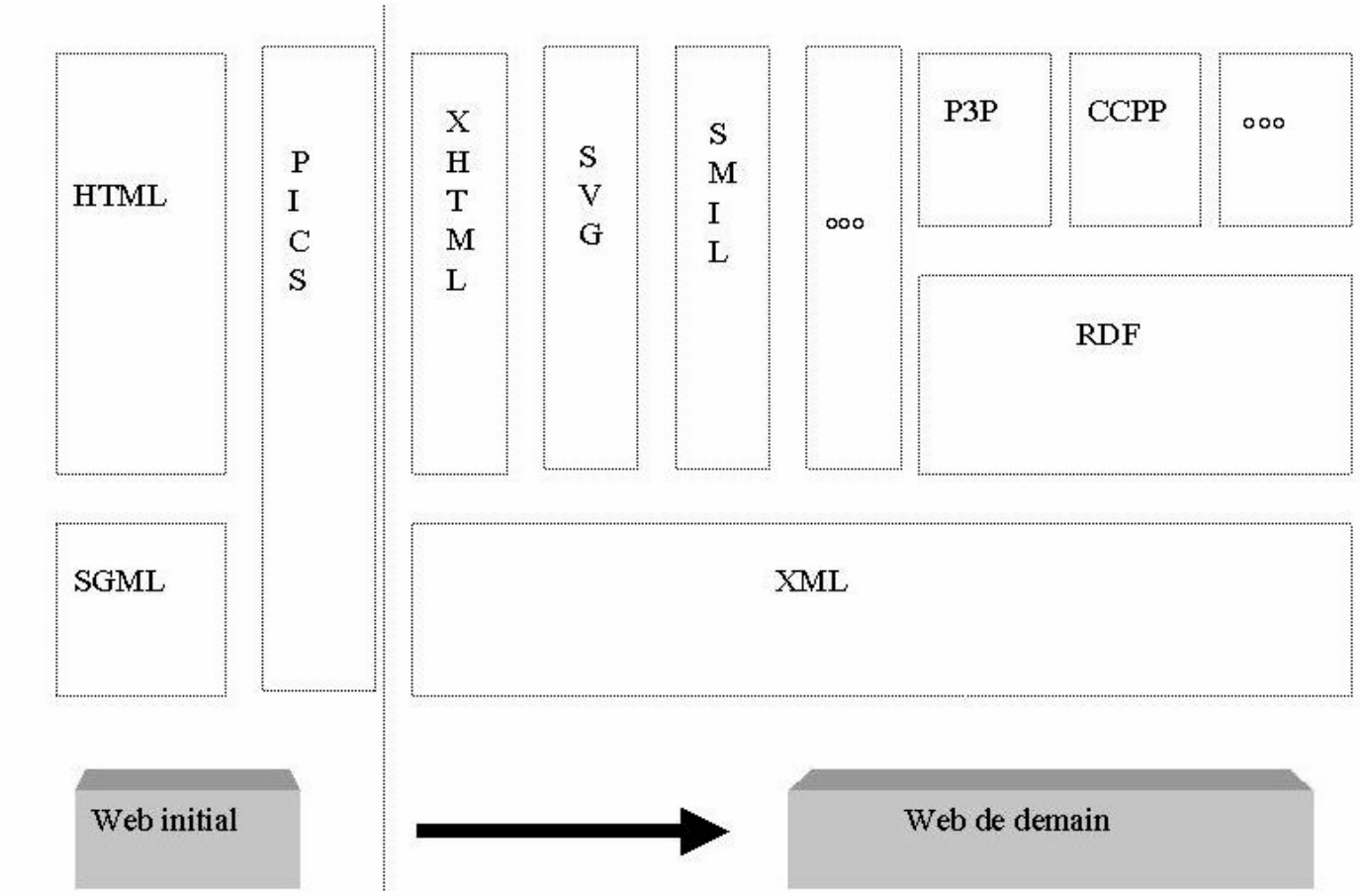
Technology and Society Domain
The W3C Technology and Society Domain seeks to develop Web infrastructure to address social, legal, and public policy concerns.

Web Accessibility Initiative (WAI)
W3C's commitment to lead the Web to its full potential includes promoting a high degree of usability for people with disabilities. The Web Accessibility Initiative (WAI), is pursuing accessibility of the Web through five primary areas of work: technology, guidelines, tools, education and outreach, and research and development.

For information about the Activities of each domain, please refer to the domain's home page.

W3C Recommendations to date

Guided by these design principles, W3C has published more than twenty Recommendations since its inception. Each Recommendation not only builds on the previous, but is designed so that it may be integrated with future specifications as well. W3C is transforming the architecture of the initial Web (essentially HTML, URIs, and HTTP) into the architecture of tomorrow's Web, built atop the solid foundation provided by XML.



W3C Recommendations to date include:

- HTML : Three versions of HTML have stabilized the explosion in functionalities of the Web's primary markup language. HTML 3.2 was published in January 1997, followed by HTML 4 (first published December 1997, revised April 1998, revised as HTML 4.01 December 1999). XHTML 1.0, which features the semantics of HTML 4 using the syntax of XML, became a Recommendation in January 2000.
- CSS : Two versions of CSS offer site designers a rich palette for styling Web pages. By allowing the separation of structure and presentation, style sheets make site management easier and promote Web accessibility. CSS1 was published in December 1996, and CSS2 in May 1998.
- PNG and WebCGM : These are two of W3C's specifications for graphics on the Web, published in October 1996 and January 1999 respectively.
- DOM : The DOM is an application programming interface for providing access to document structure, style, events, and more. Because it does not rely on a particular programming language, it facilitates the design of active Web pages and provides a standard interface for other software to manipulate HTML and XML documents. DOM Level 1 was published in October 1998.
- XML 1.0 : The XML 1.0 Recommendation (published in February 1998) was the first step towards the next generation Web, allowing each community to design languages that suit their particular needs and integrate them harmoniously into a general infrastructure based on XML. Since XML 1.0, a number of Recommendations have added to the XML infrastructure: XML Namespaces was published in January 1999, Associating Style Sheets with XML documents was published in June 1999, and XSLT, for XML transformations, was published in November 1999.
- MathML 1.0 : MathML, published in April 1998 and revised July 1999, is the first example of an XML application for marking up mathematics on the Web.
- SMIL 1.0 : SMIL 1.0, which allows authors to create synchronized multimedia presentations on the Web, is another XML application, published in June 1998.
- Web Accessibility Guidelines: The Web Accessibility Initiative has published two Recommendations to promote access to the Web for people with disabilities. The principles of these guidelines also benefit all users and are very similar to guidelines for mobile access. The Web Content Accessibility Guidelines 1.0, which explains how to author accessible Web pages and sites, was published in May 1999.
  The Authoring Tool Accessibility Guidelines 1.0, which explains how to build authoring tools that produce accessible content and are accessible to users with disabilities, was published in February 2000.
- PICS : Several PICS (Platform for Internet Content Selection) specifications (October 1996, December 1997, May 1998) describe a mechanism for allowing users to select and filter labeled Web content. PICS provided a first example of using metadata on the Web.
- RDF : The Resource Description Framework Model and Syntax specification (published in February 1999) is the first Recommendation on which the Semantic Web will be built.

Challenges for tomorrow

In other specifications, W3C is addressing these challenges for the Web of tomorrow.

- *Ensure access to the Web by many devices.* Since 1998, W3C has been working on technologies that will make the Web available to users of devices other than computers, such as mobile devices, television, etc. The modularization of XHTML, the development of the CC/PP framework (Composite Capability/ Preference Profiles), and the rise of XSLT, Web Accessibility Guidelines, and HTML 4 Guidelines for Mobile Access all contribute to the effort to ensure access to the same information space from a variety of terminals with different characteristics.
- *Promote best practices.* W3C cannot ensure the implementation of its specifications unless the community of developers and users are convinced of their worth. Promotion and education are critical to W3C's success. Part of this effort includes publishing guidelines for good practices (including the Web Accessibility Guidelines already available), offering validation services (developed within W3C or by its partners), test suites, prototype and sample applications, and responsiveness to public input and questions. W3C's work does not stop when a Recommendation is published, but continues through the promotion, support, maintenance, and improvement of its specifications.
- *Coordinate with international regulatory bodies.* The integration of the Web into people's daily lives requires consistency with existing regulations and those in development (e.g., for the protection of personal information). An ongoing dialog between legislators and Web developers is necessary to ensure a regulatory environment that is fair, precise, and realistic.
- *Account for cultural diversity.* To ensure access to the Web by people speaking different languages, with different writing conventions, and having different cultural backgrounds, W3C will continue its important work in the Internationalization Activity.
- *Encourage research.* The Web owes some of its rapid growth to advances in research achieved over the last thirty years. Continued evolution at a comparable rate will require new research in the areas of

knowledge representation, protocol optimization, and, in general, architecture design for large-scale distributed systems.

W3C Organization

To meet its goals (universal access, semantic Web, Web of trust) while exercising its role (vision, design, standardization) and applying its design principles (interoperability, evolution, and decentralization), W3C process is organized according to three principles:

1. *Vendor neutrality*: The W3C hosts (MIT, KEIO, INRIA) are vendor and market neutral, as is the Team. W3C promotes neutrality by encouraging public comment on specifications during their entire life cycle.
2. *Coordination*: The Web has become phenomenon so important (in scope and investment), that no single organization can or should have control over its future. W3C coordinates its efforts with other standards bodies and consortia such as the IETF (Internet Engineering Task Force), the WAP Forum (Wireless Application Protocols Forum), the Unicode Consortium, the Web3D Consortium, and several ISO committees.
3. *Consensus*: Consensus is one of the most important principles by which W3C operates. When resolving issues and making decisions, W3C strives to achieve unanimity of opinion. Where unanimity is not possible, W3C reaches decisions by considering the ideas and viewpoints of all participants, whether W3C Members, invited experts, or the general public.

W3C Process

These organizational principles are embodied in the Member contract and the W3C Process Document, which govern W3C's operations. The Process Document is a public document that describes the W3C Organization, W3C Activities and Groups, how consensus governs W3C work, the W3C Recommendation Track, and the W3C Submission Process.

W3C Members

Through investment and active participation in W3C Activities, the Members ensure the strength and direction of the Consortium. Members include vendors of technology products and services, content providers, corporate users, research laboratories, standards bodies, and governments, all of whom work to reach consensus on a direction for the Web. These organizations are typically investing significant resources into the web, in developing software products, in developing information products, or most commonly in its use an enabling medium for their business or activity. There has a been a strong desire that the stability of the Web should be maintained by a competent authority, and many prospective W3C Members have expressed their desire to provide funding in support of that effort. W3C is thus financed primary by its Members and, to a lesser extent, by public funds. W3C Membership is available to all organizations.

Some benefits of W3C Membership include:

- A seat on the W3C Advisory Committee ("AC"). The AC consists of one representative from each Member organization. The Advisory Committee representative is the official link between the Member organization and the Team. The Advisory Committee reviews proposals for new Activities and proposed Recommendations.
- The ability to provide strategic direction to the Consortium
- Access to the Member Web site (*Members only*) containing information on events, technologies, software releases, working groups, forums, mailing lists, news and announcements.
- W3C news services, which include updates on W3C activities, announcements for meetings, workshops and conferences; calendar of events, and team information is sent directly via email to AC Representatives and posted on the Member Site.
- Participation in Interest Groups, Working Groups, and Workshops
- The right to use the W3C Member Logo on your Web site and to participate in press releases.

For more information about Membership, please consult these resources:

- Frequently Asked Questions (FAQ) about W3C Membership
- How to Join W3C. Membership is open to any organization which signs a Membership Agreement.
- The list of current W3C Members
- The Member home page (*Members only*).

W3C Team

The W3C Team includes more than sixty researchers and engineers from around the world who lead the technical Activities at W3C and manage the operations of the Consortium. Most of the Team works physically at the three host institutions (MIT/LCS in the United States, INRIA in France, and Keio University in Japan).

Led by the Chairman (Jean-François Abramatic) and the Director (Tim Berners-Lee), the Team has a number of roles, including:

- To provide direction to W3C by keeping up-to-date on new technology, market fluctuations, and the activities of related organizations;
- To organize and manage W3C Activities so as to optimize the achievement of goals within practical constraints (such as resources available);
- To ensure cooperation between Members while promoting innovation;
- To manage the W3C Web site: http://www.w3.org;
- To communicate W3C results to the Members and the Press:
  - W3C press releases
  - W3C in the press
- To market W3C results to gain wide acceptance for them in the Web community.
- To market W3C and attract new Members -- the larger the member base, the easier it will be to promote W3C Recommendations.

For more information about the Team, please consult these resources:

- People of the W3C
- Conflict of Interest Policy
- Presentations given by the W3C Team
- Upcoming events with W3C participation
- How to Contact W3C
- Job openings at W3C

W3C Technical Architecture Group (TAG)

The W3C Technical Architecture Group (TAG) was created in July 2001 to provide stewardship of the Web architecture. The TAG will document cross-technology Web architecture principles, and resolve architectural issues. Chaired by the W3C Director, the TAG will consist of five elected and three appointed participants, with the nomination period expected to start in August 2001. Like other W3C Working Groups, the TAG will use the W3C Recommendation track to build consensus around its documents. The TAG will conduct most of its work on a public mailing list.

For more information about the TAG and Architectural Recommendations, please consult the TAG home page.

W3C Advisory Board

The W3C Advisory Board was created in March 1998 to provide guidance to the Team on issues of strategy, management, legal matters, process, and conflict resolution. The Advisory Board, which is elected by the Advisory Committee, is not a board of directors and has no decision-making authority within W3C; its role is strictly advisory. The Advisory Board also proposes changes to the W3C Process to the Advisory Committee.

As of the date of this document, the Advisory Board is composed of Ann Bassetti, Carl Cargill, Paul Cotton, Renato Iannella, Ora Lassila, Håkon Wium Lie, Larry Masinter, David Singer, and Steve Zilles. The Advisory Board is chaired by the W3C Chairman.

W3C Offices

In order to promote international involvement in Web development and in W3C, a number of countries have established W3C Offices. These local points of contact help ensure that W3C and its specifications are known in those countries. Each Office works with its regional Web community to develop participation in W3C Activities.

Please consult the Offices home page for more information about the role of the Offices and current Office locations.

W3C and the Public

The Web community extends far beyond the technical development happening at W3C. From the start, new Web technology has been created and has spread through grass roots efforts. There are many ways for people interested in the Web but who are not employees of a Member organization to pursue their interest through W3C:

- *Participate in discussions on public W3C mailing lists.* The Consortium hosts discussions on a number of public email lists. Please read the archives to see if your questions or comments have already been addressed.
- *Contribute to W3C open source software.* Early implementation of new technology in open source makes a huge difference to the market, to the credibility of the technology, and to the ability of people anywhere, in commercial or academic labs or at home, to build one each step by experimenting with the next. If you make a trial implementation of a Working Draft, you provide invaluable feedback on the specification, and you get into the edge of the edge.

  If you make a definitive contributed implementation of a standard at any stage in the process, then you further test it, but also you create a platform which allows anyone developing code a way of picking up the new functionality - in a standard way - very fast. Also, by seeding the marketplace with initial implementations, you put pressure on manufacturers to stick to the spec too, leading to a more interoperable Web.

- *Translate a technical report.* Contribute to the list of translations of technical reports, and find out how to volunteer and collaborate with other translators.
- *Participate in a Working Group as an invited expert.* If you have a high level of expertise in a specific field which is being addressed by a current W3C Working Group, you may ask the Chair to invite you to participate, even if you do not work for a Member organization. This status is reserved for those prepared to devote significant time toward the the Working Group. It is not to be taken on primarily as a learning activity. You'll need to sign the invited expert agreement to take care of IPR issues before you can start. Please contact the Chair or the W3C Team Contact for the relevant Working Group for more information. Their email addresses should be on the home page of the managing Activity.
- *Attend conferences where W3C participates.* The Consortium generally runs its own "W3C Track" of sessions a the International World Wide Web conferences. The public is invited to attend, to ask questions, to give feedback, and to talk with the Team. To find the next one, check the International WWW Conference series home page

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W3C is hosted by the Laboratory for Computer Science at MIT, by INRIA and Keio University with support from DARPA and the European Commission.

Ian Jacobs Created March 2000
Based on a French version by Jean-François Abramatic, created December 1999
Last updated: $Date: 2001/07/19 14:55:54 $ by $Author: slesch $

Will W3C mean dollar signs?

By Margaret Kane
Staff Writer, CNET News.com
October 5, 2001, 4:00 a.m. PT
http://news.cnet.com/news/0-1005-200-7412848.html?tag=prntfr

A new proposal that would let companies charge royalties on technologies used in standards may not necessarily bring them big bucks.

Internet developers have been in a frenzy over a new proposal from the World Wide Web Consortium (W3C) that would allow just such a policy.

The W3C is made up of technology companies, researchers, government organizations and others, who work to create standards for the Web. To date, either those standards have not been based on patented technology, or the holders of patents have chosen to not enforce patents in order that the standards be widely adopted.

But a new proposal would allow companies to enforce patents and charge royalties for technologies used in W3C standards, providing that they agree to certain rules and charge the fees in a "nondiscriminatory" manner.

Opponents to the policy--and there are many, judging by the criticism it has received on developer Web sites and the W3C's own posting board--argue that it puts too much power in the hands of large software companies that are heavily involved in creating standards, and would essentially set up a whole new revenue stream for them, even if the fees are "reasonable."

It sounds like a potential cash cow, but analysts say that setting up the fees may pose a challenge.

"Many companies will say, 'Oh, our patent is very valuable, and we're going to charge nondiscriminatory licenses--but for a large amount of money,'" said Rich Belgard, an independent consultant based in Saratoga, Calif. "I think it's important that any royalty rates be (decided) as part of the standards process. You can't do it after the fact, because these companies always think (patents are) worth more than (they) are."

Show me the money
So who does stand to profit? Not surprisingly, the bigger the company, the more likely it is to make money off the new policy, analysts say.

"Patenting and going through the effort of patenting software is a long process. It's costly and takes a lot of effort and time to do," said Kathy Harris, an analyst at Gartner. "The companies that would normally be able to do that are the ones that are larger companies and have more resources. It's not just money, but having the people to package (the deal) and carry it through."

Microsoft and IBM, both which were on the W3C working group that came up with the proposal, have worked closely with the consortium over the past several years on technologies being considered or used as standards, said William F. Zachmann, vice president at Meta Group, a consulting company.

Microsoft declined to comment on the proposal. Bob Sutor, director of e-business standards strategy at IBM, said that Big Blue does not plan to change its strategies regarding its own patents and standards as a result of the new proposal.

"In the past IBM has worked in both royalty-free and RAND (reasonable and nondiscriminatory) environments," Sutor said. "Depending on the particular technology involved, we'll evaluate the licensing terms involved."

Sutor said IBM does take issue with some aspects of the new proposal and, in fact, the company submitted a minority recommendation to the working group that addresses these concerns. The main issue, he said, is that the proposal is too complex.

"It needs to be simple--a page or two. It has to be something that when I send my technologist to go work on a technology

specification, I don't also have to send them to law school," he said. "Things should be very straightforward." he said; if a company starts a project with one working group--be it royalty free or RAND--it should continue with that same working group.

Intellectual debate
But while companies do stand to profit if the new proposal is passed, Zachmann argued that the criticism surrounding the proposal is not so much about the revenue possibilities as it is about the importance of intellectual property rights. Much of the criticism of the new proposal stems from adherents of the free-software and open-source movements, who generally oppose any software patents.

"It isn't likely to be some huge amounts of money here really. It's less a matter of huge financial opportunity that somebody will capitalize on; it's more of an ideological issue than a financial issue," Zachmann said. "The people who are against it are against it because they're opposed in principle. But that's not necessarily a position that will have a lot of pragmatic clout in the industry," he said.

The proposal's authors include several major technology companies, including Microsoft, Apple Computer and Hewlett-Packard.

But while a few million dollars here or there may not be much to companies of their size, it's still important.

Gartner's Harris said, "I think if it were really about property rights, then copyright protection takes care of that. The money piece is probably the most important. Otherwise there (wouldn't be talk of a) charging as well as protecting."

A glimpse of what's to come
But even backing of major tech companies may not ensure smooth sailing for the proposal. Patents and standards have come into conflict before in the tech world--and not always with quick results.

The W3C itself faced just such a battle a few years ago with its Platform for Privacy Preferences (P3P) standard, which sets technical specifications so that Web browsers can communicate automatically with Web sites about privacy.

The proposed standard faced a patent challenge from Intermind, which argued that the standard violated a patent it held on "push" technology. At the time, the W3C claimed that companies would be deterred from supporting P3P if they were forced to pay a licensing fee to Intermind. The consortium asked its members to help search for evidence that the technology was not original so it could defeat the challenge, and it was eventually successful.

And even when standards bodies do allow patented technologies, it doesn't necessarily make things simpler, as most recently demonstrated by the fight over the patents of chip designer Rambus.

Rambus sued Infineon, Hitachi, Toshiba and other companies last year alleging violation of patents for synchronous dynamic RAM (SDRAM) and double-data rate SDRAM. Infineon argued in a countersuit that Rambus had secretly patented technologies developed with the Joint Electronic Device Engineering Council, which oversees standards and specifications for memory technology and is now called JEDEC Solid State Technology Association.

A judge recently ordered a new trial in that case, overturning a jury decision that found Rambus guilty of fraud.

And that's just the sort of fighting that could offset any benefit a business may get out of patenting technologies used in standards, experts said.

"People are looking for all kinds of ways to generate cash. As the economy gets lousy, people look around for ways to generate revenues, and patents are the easiest way to get them," Belgard said.

The working group discussing the issue will meet Oct. 15. A final decision is expected by February 2002.

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Abstract

The Internet offers a model of minimal governance to ensure interoperability. If, as Lawrence Lessig suggests, code is law, then standards bodies are legislative bodies. Pursuing this analogy further, in this paper we examine standards making processes as if these processes were legislative processes. In the end, we suggest that by studying the legislative or standard setting process, some of the characteristics that define a standard or law can be predicted.

Note: This draft represents part of a work in progress. Comments are welcome and should be directed to Charles Vincent charles_vincent@ksg.harvard.edu or Professor Jean Camp jean_camp@ksg.harvard.edu.

Setting Standards:
Looking to the Internet for Models of Governance[1]

Charles Vincent and Professor Jean Camp
Fall 1999

Technically, what the Internet achieves sounds almost oxymoronic: decentralized interoperation[2].

- Sharon Eisner Gillet and Mitchell Kapor
  The Self-Governing Internet

One of the challenges that governments and public sector agencies face as they continue to invest significant resources in the development of information technologies, is how to establish and disseminate technical standards that ensure interoperability and flexibility in a decentralized decision-making environment. Without a centralized body with the authority to dictate standards across political or functional boundaries, how can any organization ensure its systems will be compatible with other systems and open to change/upgrade as standards evolve? As the ultimate experiment in creating interoperable standards in a decentralized decision-making environment, the bodies and processes through which Internet standards are set offer several models that may inform public sector organizations in responding to this challenge.

If, as Lawrence Lessig suggests, code is law, then standards bodies are legislative bodies. Pursuing this analogy further, just as the rules and norms governing a traditional legislative process help shape the laws that are passed, so too, the rules and norms under which standards bodies operate help shape the standards that are produced. In this light, it is important that public sector organizations understand how the rules and norms of these "governing" bodies impact and shape the standards they produce.

[1] This paper is derived from a Reading and Research project undertaken in Fall, 1999.

While there are many different bodies that claim varying degrees of authority in setting standards for interoperability on the Internet, this study will focus on four organizations that serve as "models of governance" for developing standards in a decentralized decision making environment.

- International Telecommunications Union (ITU): The Government Model
- World Wide Web Consortium (W3C): The Commercial Model
- Institute of Electronic and Electrical Engineers (IEEE): The Industry/Interest Group Model
- Internet Engineering Task Force (IETF): The Open Model

By assessing the standard setting processes involved in each of these models, we can predict some of the characteristics that a hypothetical standard produced by each model would possess. We begin this work with a discussion of the democratic implications of each process. We then turn to consider how each model would shape their resultant standards in terms of openness and interoperability.

A. WILL THE STANDARD BE ADOPTED BY GOVERNMENT?

Broadly speaking, if a standard is to be adopted by government, the standard setting process needs to be compatible with the democratic requirements of public sector decision making in that society. In other words, the rules that govern the standards process must be consistent with the degree of transparency, inclusiveness, and accountability required by other decision-making processes in the public sector. Therefore, in assessing each model we need to consider the following questions: (1) Who has a voice in the process? (2) How open or transparent is the standard setting process? and (3) Where does the final authority lie for approving standards? In

[2] Sharon Eisner Gillet and Mitchell Kapor, "The Self-Governing Internet" Coordination by Design," in

considering these questions, however, it is important to keep in mind that they do not lend themselves to a single correct answer. The democratic requirements of public sector decision-making vary both across different political jurisdiction and different situations.

(a) Who has a voice in the process?

Participation in the ITU-T[3] standard setting process is limited to ITU-T membership – namely national governments (members) and select telecommunications companies (sector members).[4] Members and sector members are the only organizations with a direct voice in the standard setting process. Unless called as an expert consultant, non-ITU members do not have an avenue for participation. Since the ITU representatives of member states are also public officials, the general public can voice their opinions and thoughts indirectly through their domestic political process. However, given the distance between the general public and the ITU standards process, this link is tenuous at best.[5]

The IEEE[6] limits participation in the standard setting process to the electrical and electronic engineers that form its membership. In fact, the right to participate in setting standards is considered a benefit of membership. Valuing a diversity of opinion in the standard setting process, the IEEE does invite public sector agencies to become members of the IEEE Standards

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Coordinating the Internet ed. Brian Kahin and James H. Keller (Cambridge, MA: MIT Press, 1997), 6.

[3] The ITU-T is the Telecommunications Standardization Sector of the ITU. Factual information pertaining to the ITU-T was collected at http://www.itu.org unless otherwise noted.

[4] While sector membership is formally controlled by the home national government, there are no instances when a telecommunications company has been denied sector membership.

[5] Valerie Shuman and Richard Jay Soloman also note that the ITU standardization process is highly political. See "Global Interoperability for the NII and ITS: Standards and Policy Challenges." In ***Converging Infrastructures***. Ed. Lewis M. Branscomb and James H. Keller. Cambridge, MA: MIT Press, 1996.

[6] Factual information pertaining to the IEEE was collected at http://www.ieee.org unless otherwise noted.

Association. Nevertheless, participation is still limited to fee-paying members, whether individuals or invited organizations.[7]

Similarly, membership is a requirement for participation in the W3C[8] standard setting process. Membership is open to any organization willing to pay the $US 50, 000 annual membership fee ($US 5000 for government agencies and non-profits), but is dominated by private companies. While the W3C agenda is largely member driven, even members do not tend to participate in the development process itself. The W3C Teams that are responsible for developing standards are composed of the Consortium's technical staff (full- and part-time employees around the globe, though primarily at MIT, INRIA and Keio) along with visiting engineers from Member organizations, consultants and students. Member input is sought primarily through periodic working drafts and through the approval process. The W3C will also publish drafts to seek comments from the public, but this practice is not a required step in the standards process.

In sharp contrast, the IETF[9] standard setting process is open to any interested individual. The IETF does not have a formal membership. Anyone who wishes to participate in the standards process through working group mailing lists and tri-annual meetings is free to do so. Furthermore, since working groups are established from the bottom-up by groups of interested individuals, the direction of the IETF is almost entirely dictated by the participants.[10]

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[7] IEEE membership fees range from $US113.00/year for full members to $US19.00/year for students.
[8] Factual information pertaining to the W3C was collected at http://www.w3c.org unless otherwise noted.
[9] Factual information pertaining to the IETF was collected at http://www.ietf.org unless otherwise noted.
[10] Scott Bradner, "The Internet Engineering Task Force," in ***Opensources: Voices from the Open Source Revolution***, ed. Chris DiBona, Sam Ockman and Mark Stone (Cambridge, MA: O'Reilly and Associates, 1999), 51.

(b) How open or transparent is the standard setting process?

Just as participation in the IETF standard setting process is open to all interested individuals, so too the documents (RFCs), mailing lists, and meetings of the IETF and its working groups are open and accessible to the public.[11] Every step and document in the IETF standards process is open for consideration by participants and observers alike.[12] Since the majority of standards work is done through the mailing lists of working groups, the core of the IETF standards process is completely transparent. Moreover, mailing list archives ensure interested individuals can review the process and thoughts that led to a particular standard or decision.

In practice, the W3C's standards process incorporates some elements that foster openness. For example, the periodic publishing of drafts for public consumption and comment give non-members a window into what the W3C is working on. Besides publishing their research agenda and these periodic drafts, however, the W3C process is entirely insular. The W3C Teams responsible for developing standards do not make the substance of their meetings or debates public, leaving non-members (and many members) without any indication of the path that was taken to arrive at a standard or the reasons behind design and development decisions.

Like the W3C, the research agendas for ITU-T study groups are also published for public consideration.[13] Similarly, official decisions and recommendations to the ITU-T can be found at the ITU web site. Draft recommendations and discussion papers, however, are only available to members and are password protected on the web site. Moreover, there is no record of the

[11] All RFCs and IETF documents can be found at http://www.ietf.org/rfc.html and are available in ASCII format.
[12] The IETF does permit Design Teams to meet without taking minutes.
[13] ITU-T Study Group information can be found at http://www.itu.int/ITU-T/index.html

discussions and debates that occur via email or in the meetings that form the core of the standards development process.

The majority of the IEEE standards process also happens behind closed doors. Whereas members have access to all working documents produced by working groups, these documents are not available to the public at large. Like the ITU standards, those who want to use the standards see nothing of the process that developed them, and are privy only to the final product.

(c) Where does the final authority lie for approving standards?

On the surface, the models do not appear to differ significantly in terms of where final authority lies for approving standards. Each uses a form of working group to develop standards, which are then approved by a review committee. When we consider where these review committees – and in turn the standards – derive their authority, however, the models vary dramatically from a democratic perspective.

The review committee that approves IEEE standards is an appointed body that derives its authority from the IEEE Standards Association (IEEE-SA) Standards Board. While the Standards Board is also a non-elected body, the Board of Governors – who are elected by the IEEE membership – appoints these members. The distance between the Review Committee and any elected body already brings the democratic nature of the decision-making process into question before we consider the fact that the Board of Governors is elected by fee-paying members – a group that is not likely to be representative of the general public.

The ITU-T has a similar approval process to the IEEE-SA, where an appointed review committee derives its authority from a governing board that is elected by the membership. Since the ITU is an international geopolitical body whose members include public officials from 189 nations, the approval process would seem to have some semblance of a democratic foundation. This link, however, is weak when we consider the distance between the review committee and the public. Moreover, with only 189 of the world's 266 countries as members, the ITU cannot even claim to be completely representative of all nations.

Final authority for W3C standards (or recommendations) formally lies with the Director. That said, the Director's decisions are informed by the W3C membership through the W3C Advisory Committee, and specifications are generally accepted by the membership through a formal approval process that focuses on consensus. While the focus on consensus from the entire membership suggests an opportunity to broaden the base of authority, the W3C's membership cannot be considered representative. Dominated by large companies, the W3C only has 390 members.

The IETF motto is "rough consensus and running code." Standards are set through rough consensus and there is no formal voting procedure in working groups. Standards are officially sanctioned by the IESG whose members are appointed based on recommendations from the broader membership, but the "rough consensus" is achieved within the membership of the working group (all interested individuals) when there is running code.

As RFC 2026 (The Internet Standards Process) notes, "an Internet Standard is a specification that is stable and well-understood, is technically competent, has multiple, independent, and

interoperable implementations with substantial operational experience, enjoys significant public support, and is recognizably useful in some or all parts of the Internet."[14] As such, final authority for IETF standards lies with the Internet community and is based on the merits of the standard. If consensus cannot be reached on a proposed standard or if it does not have significant public support, it does not become an Internet Standard.

(d) Summary

As mentioned in the introduction, it is important to keep in mind that these models do not lend themselves to a single correct answer. The democratic requirements of public sector decision-making vary both across different political jurisdiction and situations. Therefore, the "adoptability" of a hypothetical standard produced by any of these models will depend on the government and society in question. However, if the democratic character of a process is measured by the degree of transparency, inclusiveness, and accountability it embodies, the IETF "open model" appears the most democratic. Each of the other models limit participation to members, release only a fraction of their working documents, and give final authority to bodies distant from anything that can be considered the public.

[14] Scott Bradner, "The Internet Standards Process: Revision 3," Updated October 1996, < ftp://ftp.isi.edu/in-notes/rfc2026.txt> (cited 10 January 2000).

B. WHAT WILL THE STANDARD LOOK LIKE?

Having considered the democratic nature of a hypothetical standard produced by each model, we turn now to a discussion of openness and interoperability as qualities or characteristics of a hypothetical standard.

(a) Openness

In the context of this paper, openness refers not to whether the standard is distributed without cost, but to the standard's technical openness. In short, once obtained do users have complete access to the standard's specifications so that they can use it in anyway they want and develop or build something compatible with the standard?

In comparing the four models in question, it is important to reiterate the point that openness does not mean free of charge. Both the ITU and the IEEE charge a fee for the documentation that details the standards they develop. Once purchased, however, the user is free to use ITU and IEEE standards in any way they wish. The user has access to the standard and its specifications, and can use this information to construct systems that are compatible with these standards.

This is not to say that restricting access to standards by charging a fee and maintaining intellectual property rights does not have implications for the standard in question. The fees that the ITU charges for documentation, for example, effectively serve as a barrier to use and adoption by developing nations. Moreover by maintaining intellectual property rights over their standards, the ITU and IEEE licenses stunt the dissemination, and arguably the evolution, of their standards within the Internet community. In fact, some have argued that the driving force

behind the adoption of Internet protocols such as TCP/IP was their open and free availability.[15] The point is, however, that a standard can be open and not free of cost.

The W3C makes the specifications of their standards freely and openly available to users. Going a step further than the IEEE or the ITU, however, W3C standards include running code before they are approved. Therefore, in addition to the raw specifications, users have access to implementations illustrating how the standard can be used in the real world.

The IETF standards process is similarly focused on the need for running code – "to fly before you buy."[16] What each of the other models lacks in terms of technical openness, however, is access to the documents and debates that lead to the final specifications. As noted above, all IETF documents are available over the Internet. This includes both Technical Specifications and Applicability Statements. Combined with mailing list archives and draft papers, these documents give users a more complete understanding of the standard and what it is designed to do. As Bradner stresses, "restricting access to work-in-progress documents makes it harder for implementors to understand what the genesis and rationale is for specific features in the standard, and this can lead to flawed implementations."[17]

(b) Interoperability

A second characteristic to consider is the degree to which a hypothetical standard produced by each of these models would be interoperable with other standards. Without a centralized body with the authority to dictate standards across political or functional boundaries, how can a

[15] Eisner Gillet and Kapor, 8.
[16] Bradner (1999), 51.
[17] ***Ibid***., 52.

government be sure that the system it is building will be compatible with other systems and subject to evolving standards?

The interaction between the IEEE and the IETF offers an interesting case study in the interoperability of standards. The IEEE publishes the 802 family of specifications that define standards for local area networks (LANs) dealing with the physical and data link layers. Since the specifications of these standards are open to those who purchase them, the IETF was able to study them and define new standards that are compatible with the old standards. For example, RFC 1042 defines new standards for how IP datagrams and ARP requests and replies can be transmitted over 802 networks.[18]

By making standards open, each of these models makes it more likely that their standards will be considered by other bodies looking to set standards. As the GSM/CDMA debate highlights, however, openness does not ensure future interoperability. While the ITU-established GSM (Global Standard for Mobiles) standard for digital mobile systems is used throughout Europe, the dominant standard in the Americas is CDMA (Code Division Multiple Access). In fact, including PDC and D-AMPS there are four dominant standards for digital phone systems, none of which are compatible with any of the others.[19] It will be interesting to see whether the ITU is more successful with its IMT-2000 standard for third generation systems (3G).

[18] J. Postel and J. Reynolds, "A Standard for the Transmission of IP Datagrams over IEEE 802 Networks," updated February 1998, ftp://ftp.isi.edu/in-notes/rfc1042.txt (cited 17 December 1999).
[19] ITU Telecom Conference, "Backgrounder:Third Generation Mobile," www.itu.int/telecom-wt-99/homepage.html (cited 24 November 1999).

Table 1: Digital Mobile Standards

Americas	Europe, Africa, Middle East	Asia-Pacific	
		Japan	Others
CDMA	GSM	PDC	GSM
D-AMPS	DCS1800	CDMA	CDMA
PCS1900	DECT	PHS	CT2
CT2, PWT, PACS	CT2		

In terms of interoperability, the W3C's ongoing experience with P3P (Platform for Privacy Preferences) is another example to watch carefully. While industry leaders (and W3C members) such as Microsoft and Netscape appear likely to integrate P3P into their browsers, there is significant criticism of the standard from the Internet community and groups such as the Computer Professionals for Social Responsibility (CPSR).[20] Whether this criticism is enough to either dissuade one/both companies to abandon the standard or give other non-P3P compliant browsers a competitive edge is yet to be seen. Regardless, the P3P experience highlights the risk to interoperability created by the W3C's decision to maintain an insular process dominated by a small number of corporate members. If a standard does not share wide spread support it may not be accepted or adopted by other standards setting organizations.

As Scott Bradner points out, "it is only the standards that meet specific real-world requirements and do well that become true standards in fact as well as in name."[21] With this in mind, the IETF's practice of inviting all interested individuals to participate, and its requirement of multiple independent implementations as well as substantial public support, suggests that IETF standards stand a better chance of becoming standards in fact. By focusing on the merits of a

standard, the IETF process produces standards that are more likely to be accepted and adopted by users. As "standards in fact," other standards organizations are likely to make future standards interoperable.

C. Conclusion

The goal of this paper is not to promote one standards process as the "right" standards process, but to paint a picture of the implications each model would have for a hypothetical standard in a public sector context. If code is law and standards bodies are governing bodies, then the rules and norms under which these bodies operate will shape the laws we live under on the Internet.

As Table 2 summarizes, while there are similarities between them, the four standards processes differ on several fronts. If we interpret these standards processes as models of governance, the differences are especially significant. A government must consider the varying degrees of participation, transparency, and accountability embodied in each model when determining which are acceptable in the context of a democratic society. In addition to democratic adoptability, the choice of standards process has consequences with respect to technical openness and interoperability.

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[20] Computer Professionals for Social Responsibility, "Some Frequently Asked Questions About Data Privacy and P3P," updated 7 November 1999 http://www.cpsr.org/program/privacy/p3p-faq.html (cited 21 December 1999).
[21] Bradner (1999), 47

	ITU	W3C	IEEE	IETF
Participation	❑ National governments and industry reps.	❑ Corporate and academic members	❑ Fee paying Electrical and Electronic Engineers	❑ All Interested Individuals
Transparency	❑ Agenda and Recommend-ations	❑ Agenda and Periodic working drafts	❑ Agenda	❑ All working documents, meetings, and email lists
Authority	❑ Review Committee (*membership)*	❑ Fee-paying members	❑ Review Committee (*membership)*	❑ Review Committee (*rough consensus of Internet community)*
Openness	❑ Open Specs	❑ Open Specs ❑ Open implement-ations	❑ Open Specs	❑ Open Specs ❑ Open Implement-ations ❑ Open Working Documents and Archives
Interoperability	❑ Openness promotes interoper-ability	❑ Openness promotes interoper-ability	❑ Openness promotes interoper-ability	❑ Openness promotes interoper-ability ❑ Based on merits ❑ Inclusive Process ❑ Implement-ations that address real problems

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