The Case For New Economic Models To Support Standardization Efforts

By Clifford Lynch

Introduction

There is a growing view that standards documents are a type of "public good" created through consensus among a community of developers, rather than as an act of individual authorship. And as such, they should be available to the public for free, at least in electronic form where the duplication and distribution costs are negligible. While I strongly support this conclusion on a pragmatic as well as a philosophical basis, I believe that the benefits of broad availability of standards — to the standards development organizations as well as, to the public — are not significantly understood. The purpose of this paper is to make the case for new economic models to support standardization efforts, and to sketch some of the benefits that broad and ready public accessibility to standards documents are likely to bring.

My experience — as a standards developer, as an implementor, and as a teacher — is primarily with information technology and networking standards. I have drawn my examples from those areas, in part because there is a considerable body of experience with alternative economic models in the work of the Internet Engineering Task Force (IETF), and in part because I believe that these areas are harbingers of broader change. The communities concerned with information technology and networking standards have enjoyed relatively ubiquitous access to the networked information environment longer than any other community, and have made reliance on these tools a part of their culture for over a decade now. As other communities concerned with standards assimilate access to these tools, I believe we can expect their behavior to change in similar ways.

Herein, I speak of the "traditional" Standards Development Organizations (SDOs) and their behavior, often in a less than complementary light. I recognize that there is tremendous variety among these organizations, both within the US and internationally. Many are making an honest attempt — through a diversity of approaches — to grapple with the issues raised in this paper. I fear that many of these responses are too modest and too late. While it is possible to point to notable exceptions to the policies discussed here, it is still useful to speak of the "average" behavior of the traditional SDO in contrast to the activities of other organizations. Such a characterization will help illuminate the growing fault lines between these SDOs and their user communities, both traditional and nontraditional. My goal is to provide insight into the broad challenges facing the existing SDOs and to highlight strategies that may help to address these challenges, rather then to critique the policies and strategies of any specific SDO.

The Breakdown of Current Economic Models for Standards Development

Standards are not free. Indeed, as anyone who has participated in a standards process realizes, the intellectual labor required to develop a standard, and the organizational processes to manage and structure this intellectual labor are so great that the actual cost per page of the "first copy" of a written standard — the tangible product of a standards-making process — is enormously high.

Historically, these costs have been met through a combination of revenue sources. There are membership dues for most standards organizations; sometimes government or industry subsidies may also be available to help underwrite the operating costs of the SDOs. The time (and often the travel expenses) of the experts who actually develop and review the standards is contributed

by their employers. The value of this contribution is immense, and typically participation costs for a large organization actively engaged in standards development would dwarf any membership fees that the organization may pay. Standards documents are copyrighted and sold, usually at costs that seem expensive, perhaps excessive, relative to other publications – even the ever more costly scientific and technical literature – where costs in excess of a dollar per page are not unheard of.

In the past decade, there has been growing resistance to various elements of this traditional economic model for funding standards. Probably the greatest resistance has been focused on the high prices and restrictive distribution practices surrounding published standards — not only are they expensive, but you can't obtain them quickly, easily, or in convenient electronic formats. Part of the issue is that the networked information environment makes it possible to distribute standards, like many other materials, widely, instantly, and at virtually no per-copy cost; this new environment is raising expectations and creating changes that go beyond standards to the broader economics of all kinds of publishing. Further, by rethinking the structure and organization of standards as *electronic* documents rather than simply images of printed documents in electronic form it is possible to add value by making standards more usable. Because the shift to electronic distribution is perceived by most SDOs as a threat to their revenue base, (despite considerable evidence from other sectors of the publishing world that pre-electronic dissemination does not necessarily cannibalize print sales revenue), they have either ignored the Internet as a distribution medium or have awkwardly attempted to extend print publication practices to the networked environment.

It is important to recognize that the difficulties involved in obtaining access to standards have become particularly acute as standardization efforts have begun to produce large, evolving suites of documents that are interrelated in very complex ways; thus, making it hard for a standards user to tell which documents he or she really needs. Ordering one group of documents, only to realize that another group will be also be needed in order to understand or to implement something, is infuriating and impractical in a rapidly-moving business environment if each order costs hundreds of dollars and means weeks or even months of delay.

Large corporations and other organizations have long been participants in both the standards development process and the standards development organizations as members. They are increasingly furious at the cost and inconvenience that they face in obtaining products that they have already underwritten through SDO membership and committee participation, and are turning to standard development arenas such as the IETF or industry consortia that are not burdened with these costs and inconveniences. While the traditional SDOs are beginning to realize the amount of ill will that they have created among their traditional constituencies and to search for ways to address this problem, they rather myopically regard their member organizations as the only legitimate stakeholders in standards development and overlooking the broader picture.

This revolt has been most evident in the areas of information technology and networking standards, where the Internet Engineering Task Force (IETF), which is unquestionably now the dominant standards force in most areas of computer networking, has consistently, aggressively and proudly repudiated the traditional economic model for standards-making. A number of other, younger organizations such as the World Wide Web Consortium (W3C) and a vast array of more narrowly focused, ad-hoc consortia have followed the IETF's lead and have garnered major support; in many areas of information technology and networking outside of the IETF's scope. They are now the major fora in standards development.

The IETF exploits networked information technology not only to disseminate its standards, but as a key tool in their development. The IETF has relied on government and industry support for its secretariat functions and on volunteer labor (both in management of the standards process and in participation in standards development efforts) to a greater level than some other standards

organizations. It makes all of its work products, both in draft and final form, available to the public via the Internet. It is worth noting that the IETF also follows rather different procedures for standards development than those used by the traditional national and international standards bodies, which the IETF believes produces "better" standards — more precisely documented, more pragmatic, more timely, and of superior technical quality. An analysis of these claims goes beyond the scope of this paper, but it is certainly worth noting that for whatever reasons, the IETF standards are dominant in the markets they address.

It is important to recognize that the question of access to standards is not fundamentally a legal one, but about whether standards should be copyrighted and if so who should hold copyright to them. Certainly, copyright is used by many current SDOs as a means of controlling and limiting distribution, and of ensuring that they are paid for copies of standards that are distributed – the classic role of copyright and protecting publishers. The only potential legal issue is whether the SDO really has clear claim. (Many SDOs have recently begun requiring committee members to sign copyright release agreements to reduce the ambiguity here.) Rather, the issue that is creating the rift between SDOs and their communities is whether their standards are usefully accessible — in legal terms the use to which copyright is put.

Indeed, copyright can be employed as a powerful tool in support of accessibility. The IETF experience here is instructive. For a long time, IETF standards (i.e. Requests for Comments) did not normally carry a copyright statement. Within the last year or two, a copyright statement has been added. The copyright statement is carefully crafted to ensure broad and continued accessibility to the documents (including the ability of libraries or other organizations to archive them) and that while the documents may be widely used and repackaged, their integrity is preserved. By and large, I believe that the IETF community, which has long been articulately vocal about the importance of the accessibility of standards, is comfortable with this copyright statement and the objectives that it supports.

New Uses and New User Communities for Standards
I believe that any reasonable standards organization should view its mission as facilitating the development of responsive, high-quality standards and the subsequent broad understanding, use and implementation of these standards. Unfortunately, for too long, standards development organizations have viewed the community that will understand, implement and use a standard as the same community that developed it. In effect, there is a belief that the standards community is relatively static and often made up mostly of very large organizations; and further, it is the responsibility of these organizations to educate individuals about key standards, the standards process, and to phase these individuals into the community as institutional representatives.

Standards, at least in the information technology and networking areas, have become very complex and pervasive, and now form an essential part of the engineering knowledge base for many disciplines. An engineer, product developer, student, or researcher working on a problem may need to consult literally dozens of different standards documents in the course of his or her work; often they will be standards with which the individual and his or her employer have had little or no prior experience. Troubleshooting a problem may require reference to an extensive portfolio of standards documents.

Consider, as an example, networking standards. Every computer science undergraduate, and certainly every graduate student, is going to need to be familiar with many of the key standards documents in computer networking. They will perhaps know a few in great depth, and likely many more at a very superficial level concentrating on the overarching architectural principles and interrelationships between standards rather than the details of individual standards. Engineers and product developers need to make reference to these documents in developing new products. System integrators use a large range of standards documents in trying the knit multiple products together, or in trying to evaluate whether such linkages are even possible, and if so what

technical strategies might be most fruitful. There are a huge number of people who may read popular or professional accounts of new developments in computer networking technologies and who may wish to delve more deeply by consulting relevant draft or final standards documents.

The comprehensive output of the IETF is available to every one of these individuals for the cost of nothing more than a few clicks through a web browser. These standards have become a basic part of the *educational* literature — the community knowledge base, if you will — for any network engineer or network software programmer, or anyone aspiring to become one. They are readily available to specification developers or purchasers concerned with conformance and interoperability. Every small, one or two person startup company can consult them quickly and easily. The ideas embodied in the standards developed by the IETF are a basic part of the intellectual foundation of computer networking. Indeed, it's common to see students, implementors or others actively working with IETF standards to download copies of relevant materials and to create a local "personal digital library" of standards documents which can be searched to answer questions. In addition, many standards now contain pseudo-code, code fragments, and other materials that can literally be cut and pasted into program development tools.

When seen in this light, it is clear why the competing Open Systems Interconnection work from the traditional SDOs, *even if it had not been profoundly flawed from an engineering viewpoint*, would have ultimately failed in the marketplace. If you are a student learning about networking, are you going to use an absolutely up to date and comprehensive digital library that is readily available for free from your computer? Or are you going to try to make reference to a vast series of printed documents costing many thousands of dollars and where you never seem to have up to date materials, and the next volume takes two months to obtain? As a faculty member preparing a list of readings and reference materials for a course, you will of course prefer to point students at materials that are readily available over the network at no cost.

As a byproduct of an active engagement with standards as part of the educational process students not only learn what current standards say, they also learn how to write, analyze, and use a standard. All of these skills will be important to their future professional careers. This means a much broader base of future contributors to the standardization efforts and of knowledgeable users of the existing product of standardization work.

Thus the next generation of systems coming out of the research and development world would not be based on the inaccessible OSI documents but rather the familiar, readily available IETF knowledge base. And the next generation of products being developed by recent graduates from the universities, coming out of startup companies, or out of organizations that did not already have a strong investment in and commitment to OSI, would not have been based on the unfamiliar, inaccessible OSI standards. As new standards were needed, they would be developed within the well-known IETF framework.

This is a "mindshare" issue. Current economic models which market standards as expensive printed works not only alienate today's users of standards — the very people who have invested large amounts of money to develop them — but perhaps even more importantly disenfranchise tomorrow's potential users, the students learning the craft of engineering and the role that standards play in that base of knowledge. It is a competitive environment. Just as we are seeing scientific and scholarly journals becoming readily available on the network and taking mindshare away from hard-to-obtain printed journals, we are seeing inaccessible, expensive, print-only standards fade into irrelevance in the minds of the next generation of standards users and developers.

There is also the question of participation. At least in the networking and information technology areas, standards documents often represent a focus for the best ideas emerging from the research world into broader commercial implementation. If draft documents are publicly available in electronic form, coupled with an effective forum for comments and discussion such

as an electronic mail based list, it is possible for students and faculty worldwide to enter the discussion — even though they do not have the financial resources to participate in face-to-face standards committee meetings. While this can lead to a difficult-to-manage, anarchic process ultimately I believe that the benefits of the broader community participation outweigh the convenience of a relatively closed standards process. Placing standards development into the networked information context makes this broad participation possible. It is interesting to note that the open, network-based IETF standards development work engages not only working professionals, but also some of the best minds among the graduate students in computer science and allied fields. The closed processes of the traditional SDOs, which emphasize face-to-face meetings, have largely failed to reach out to this community. What is needed is a direct bridge from the implementor community both to the research world and to the community of students that will become the next generation of commercial implementors; the IETF has put such a bridge in place while the traditional SDOs have largely failed to do so. And the building of this bridge begins with broad access to both the existing base of completed standards and the drafts of standards under development, along with a viable means of commenting on these drafts.

Conclusion: new economic models for the standards process

It is clear that the failure of traditional standards development organizations to embrace convenient electronic distribution is reducing the value of their products for many current participants in the standards development and implementation process. These organizational participants are beginning to vote with their feet. The move to nontraditional venues like the IETF, the World Wide Web Consortium, and the endless series of ad-hoc industry consortia and away from traditional standards processes is clear. This is not based simply on the slow speed and lack of agility that characterizes traditional standards development. It is also the result of an end product that fails to meet marketplace needs and is priced and distributed in such a way as to infuriate the organizations that played a key role in its creation.

More easily overlooked, however, are the changing user communities for standards and ways in which these user communities employ standards documents. Exploring these shifts, it becomes clear that the traditional economic model of limiting access to generate income through the sales of standards documents is now actively counterproductive to the broad understanding, implementation, and use of standards. This is particularly relevant in areas such as information technology and networking where few standards exist in a vacuum. Rather, we are seeing large sets of standards that fit within broad intellectual and architectural frameworks which interrelate in complex, continually evolving ways, and that are the core knowledge base of the discipline.

So, what are the characteristics of a viable economic model for the development and dissemination of standards in the networked information age? It should be clear that charging for access to drafts or to final standards documents via the network is a disastrous error. This does not mean that there is no place for a print publication strategy. There is compelling evidence that people will still pay for a nicely printed and bound, reasonably priced copy of a standard or other document even though it may be available for free downloading via the Internet. The publication strategy must compete with the personal laser printer, however, rather than offering the proposition that the print publication is the *only* way to obtain the document. To meet this challenge, prices need to move into line with other types of published works. In so doing, compendiums of many useful standards in printed form are likely to enjoy a more robust marketplace as reference handbooks rather than highly priced, standalone standards documents. It is still cheaper to produce and distribute relatively large books through traditional channels than to have users print them on demand. And there are many opportunities to add value through tutorial or interpretive material that might be added to the standards proper, perhaps producing something that is closer to a textbook than a standards document. But the point here is to position

products that compete with, and in fact compliment, freely downloadable documents that can be printed on demand at the end user's expense or used directly in their electronic format.

The overhead of the secretariat and editorial activities of the SDOs in reviewing standards, editing them and placing them on the Internet will still need to be underwritten either by SDO membership fees or by outright subsidy from government or industry. It seems inevitable that the size of the overhead costs will undergo new scrutiny, as well as opportunities to simultaneously open up, streamline, and reduce the expenses of the standards development process through information technology. I believe that when the case is made for the importance of standards not only to the narrow immediate implementor community but indeed to the much broader community that includes students, educators, researchers, and the general public, and once the standards development organization can make the case that it has redesigned its processes and dissemination strategies to be responsive to these broader communities, such support should be easier to obtain.

Finally, I believe that there is hope for marshaling increased government and higher education support for standards as part of a rethinking of economic models. The National Science Foundation in the US, for example, has a group that is working on the conceptualization of a digital library to support undergraduate science, mathematics, engineering, and technology education. It seems clear that standards need to be an essential part of the corpus of materials that would comprise such a digital library. This is a new opportunity to link standards and education.

Standards today, particularly in information technology and networking, are part of the knowledge base of education, research, and industrial development; it is in everyone's interest that they be broadly available. We need a new economic model that continues to insure financial support of the standards process but not at the expense of access, particularly at a time when the new networked information environment offers so much opportunity.

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