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ABSTRACT

Standards are critical for consumers and business. The current standards process produces high quality standards, but with administration costs. Currently, standards administration is funded by publication (standards) sales. In the new world of word processing tools, E-mail, and the world wide web, documents (and especially standards) will be free. Standard Development Organizations (SDOs) need to adapt to a new business model, but they are unable to adapt incrementally. This paper proposes a trial experiment of *temporarily* funding certain SDOs in exchange for making their standards freely available. The temporary funding would last five years — enough time for an SDO to change is business model. If the experiment fails, there is no permanent damage because standards expire after five years, i.e., freely available standards can only damage the current issue of the standard. An important by-product is that the U.S. industry will enjoy a strong business advantage in the international marketplace because the world will be flooded with U.S. standards and the developers of the standards (in this case, U.S. companies) would have a strategic advantage just as U.S.-based internet-related companies enjoy now with the international popularity of the internet.

1. Standards are Good for U.S. economy

It goes almost without saying that standards are good for the U.S. economy: for industries and for consumers. Standards specify common requirements and capabilities of conforming products and services. Standards set common expectations for the seller and the buyer. Standards foster competitive and innovative environments — the manufacturer uses their creative resources to produce the cheapest, fastest, biggest, smallest, highest quality, etc., product or service that conforms to the specifications of the standard. The consumer has the widest choices possible, yet the consumer can expect the minimum requirements of the standards. Standards foster the development of interoperable components, from nuts and bolts to computer network clients and servers.

However, it is not well-known that standards and their related architectures (overall system design and plan) can provide a huge competitive advantage over non-participants in the standard process. A company that participates in the standards process has "inside information" about that range of products in that industry — it's not that participants discuss their business plans, but because standards take 3-5 years to develop, the participants (and

those that choose to respond to the public review) have usually 1-3 years advance practical knowledge of what the standard will be and, thus, an idea of products and services that can conform to the standard. Organizations that develop architectures (inside or outside the standards process) have an even larger advantage because they have set the overall framework of the products and services within the standard — and the products and services of *related* industries. Participating in the standards process can provide business advantage.

Consumers, too, can benefit from participating in the standards process: consumers' needs can be understood early on and incorporated into the standard and their related architectures. These knowledgeable consumers can have business advantage, too: consumers participating in the standards process have the same 1-3 advance knowledge of where the industry is going. The knowledgeable consumer can also influence the purchasing and roll out of products — consumers won't buy products that will be obsolete when the standard is completed and consumers may insist upon upgrade paths that protect their investment in trial-use products or products delivered prior to agreement on a standard, e.g., high-speed modems that can be upgraded (via chip or software) when the final standard is set.

The U.S. has a leadership role in information technology and, in general, in the global information infrastructure. One reason for this is that the U.S. has are large portfolio of information technology standards and their related architectures — primarily developed in the U.S.. The U.S. can maintain this leadership and increase its competitive advantage by supporting the standards process.

2. Standards: Development, Maintenance, and Administration

A standard is a specification that includes assertions, inquiries, and negotiations. Assertions describe what must be done, what must be included, or how a conforming product or service behaves. Inquiries allow the manufacturer or the user to determine or inquire about allowable variations in conforming products — variations that are necessary because either (1) they are insignificant with respect to the features of a standard, or (2) they support a competitive business model by allowing varying "quality of implementation" (e.g., cars must have gas tanks, but the manufacturer chooses a tank size, big or small, that provides that manufacturer the best features for their customers). Negotiations determine how products and services interoperate with varying levels of standard conformance, such as, how the old versions of the standard interact with new versions of the standard (e.g., black and white television sets needed to work with new color television broadcast equipment and color television sets needed to work with old black and white television broadcast equipment). Standards are specifications that are comprised, mostly, of assertions.

Standards are developed by accredited standards development organizations (SDOs). Other organizations, non-accredited specification development organizations, may develop standards-like specifications using a standards-like process (or not using a standards-like process), but these are not standards. However, specifications developed by the non-accredited organizations may have just as important effect on industry, the consumer, and

commerce. Collectively, standards and specification development organizations are called SSDOs.

De facto standards describe products and services, based upon general (but not formal) agreement among the industry participants. The notion of "PC-compatible" for personal computers is an example of a de facto standard: there is no written specification of what "PC-compatible" means, other than it runs the latest version of Microsoft Windows and common applications. Widely used proprietary specifications may become de facto standards.

An important legal motivation for accredited standards committees is: large U.S. corporations can join committee and participate together without antitrust problems.

2.1 Development

A standard is developed by interested parties, including, but not limited to: manufacturers, consumers, users, buyers, sellers, maintainers, consultants, conformance testers, industry organizations, related industries, and government.

A standard is developed in, usually, 3-5 years using a consensus building process. Standards development organizations use varying procedures, but all SDOs' procedures have three things in common: they are open, they are fair, and they have due process. Non-accredited specification development, proprietary specifications, and de facto standards aren't necessarily developed in environment of openness, fairness, and due process.

During the development process, drafts of the standard are made available to the public for general solicitation of comments. This public review allows all interested parties, regardless of their participation in standards committees, to have input into the development of standards.

After public review and balloting (formal voting), the standard is published and is available for purchase. Manufacturers may now claim their products' conformance to the published standard, and consumers may insist upon products and services that conform to published standards.

2.2 Maintenance

Once a standard is published, the standards process doesn't stop. The standard enters its maintenance phase for approximately five (5) years. During the maintenance phase, the standards committee may process defect reports (DRs) and requests for interpretation (RFIs). Typically, DRs and RFIs originate from users, manufactures, and conformance testers (those that determine whether products and services conform to the standard).

A defect report (DR) is the report of a bug, inconsistency, or missing feature of a standard. The standards committee can choose to fix the bug with a Technical Corrigendum — an update to the standard that is published along with the standard.

A request for interpretation (RFI) is a question posed to the standards committee regarding an ambiguity or a situation not clearly spelled out in the standard. The processing of RFIs is similar to one function of the U.S. Supreme Court: interpreting the Constitution (interpreting the standard).

DRs and RFIs can originate from any person, business, or organization, but are processed and handled by the standards administrator. The technical work is performed by the standards committee, but this official correspondence and tracking is performed by the standards administrator.

The maintenance phase can reveal the quality of a standard: a standard with many DRs and inconsistent responses to RFIs is a poor standard. Poor quality standards can produce poor products and services, wasted time and money by consumers and producers, and overall loss of faith in industries (and the standards process itself). While few defect reports and consistent interpretations is highly desirable, the quality of the standard is mostly affected by the development process used (open, fair, due process), the technical content (most assertions verified by conformance tests), and the administration to support the development process. Good development and good administration don't guarantee a high quality standard, but they are significant contributors.

In summary, most people focus on the development phase of a standard, but the maintenance phase is where the real quality of the standard is revealed.

2.3 After Five Years: Revise, Reaffirm, Or Withdraw

Five years is the lifetime for most technical standards. After five years (the maintenance phase), the standards committee is required to revise (add or change), reaffirm (keep the same standard), or withdraw (obsolete) the standard.

2.4 Administration

The development and maintenance of a standard requires more than just a technical committee. Technical committees are formed and disbanded, based on their individual standards. Technical committees may meet several times a year, but aren't generally available at other times. The public, related industries, national and international organizations all need to interact with the standards process year round. Standards administrators provide this longevity to the standards process.

Some of the services provided by standards administrators are:

- **Balloting.** Distributing and collecting the votes and comments on draft standards, resolutions, and such.
- **Liaison Support.** Administrators maintain long-term contacts with related standards activities and other industry participants. National standards administrators participate in international standards. Administrators are a clearinghouse of information for all standards participants.

- **Document Distribution.** Draft standards, publications, correspondence, etc., are distributed via administrators. When an individual or business, unrelated to the standards process, desired a copy of a document, draft standard, or approved standard, they contact the standards administrator.
- **Public Review.** The administrator is responsible for making copies of working drafts and draft standards available to the public so that the public make comment on standards being developed. The administrator is responsible for assuring the all public comments are responded to properly in a timely manner.
- **Process Administration.** Naturally, technical committees are interested in getting their standard developed and approved as quickly as possible. The administrator enforces the development process and verifies that the technical committees "do it by the book" (and there *is* a book).
- **Standards Publication.** Once a standard is approved, the administrator is responsible for the publishing, distribution, and sales of the approved standard.
- **Support Services.** The administrator handles services such as voting membership maintenance, duplication, and press releases — services that might be inappropriate or infeasible for technical committees to handle themselves.

3. Current standards funding

3.1 Technical Committees

Technical committees go to meetings several times a year and develop the document that becomes the approved standard. The main costs are:

- **Staffing** — who goes to meetings and does the standards committee work. Technical committees are usually comprised of volunteer members. The members' companies contribute their time and expense to the standards committee effort.
- **Duplication** — distributing copies of working papers (mailings) to the committee members during the development process. This direct cost is shared among members. In some committees members take turns handling the duplication. In some committees, members contribute a fee to a centralized duplication facility — most likely the standards administrator.

3.2 Administration

The standards administrator is responsible for all the services above: balloting, liaison support, document distribution, public review, process administration, standards publication, support services. Standards administrators have ongoing fixed costs (staffing, office, telephone, etc.). Standards administrators receive income, primarily, from two sources: membership fees and sales of standards.

3.2.1 Membership Fees

Members of technical committees and their parent organizations usually pay membership fees. In some cases, there are several tiers of fees (membership is the parent organization is one fee, membership in the technical committee is a different fee) and fees based upon company size (larger companies pay a larger share of fees).

The determination of the membership fee can greatly affect the quality of a standard: a fee too high can exclude many valuable participants, a fee too low can limit the effectiveness of standards administration.

3.2.2 Sales of Standards

Most standards administrators receive large portions of their income from the sale of standards an other publications. In fact, sales can contribute to over half the income of an administrator.

The pricing of standards can be just as difficult as determining membership fees: prices too high mean fewer sales, prices too low mean lower profitability and less effectiveness of standards administration.

In the past five years, the income from publication sales has become vulnerable with widespread document processing tools (word processors, web browsers) and widely available communication facilities (E-mail, world wide web, internet). The goal of technical committees is counter to administrators: technical committees would like documents distributed free or at minimum cost to support the development of their standard while administrators would like to maximize the profitability (even at the cost of reducing the availability of the standard).

As a consequence, technical committees make their documents available electronically over the internet (defeating sales) or avoid standards administrators with funding models the pose high prices for purchasing standards.

4. Alternative specification development

Specifications are now being developed in alternative forums. There are three primary reasons for choosing an organization outside of accredited SDOs:

- **Different development process.** Technical committees are formed outside of SDO because the committee needs to improve on some feature that would otherwise be unavailable in an SDO. For example, consortia and industry organizations are formed to "streamline" the standards process. There is no magic formula for creating a quality standard and many of these non-accredited organizations do not provide the level of openness, fairness, or due process that are part of accredited SDOs. Still, many good specifications are developed in these streamlined organizations.
- **Reduction in membership fee and price of standard.** These committees are primarily focused on wider participation (little or no membership fee for most participants) and wider distribution of specifications (freely available, such as internet specifications).

- **Reduction in participation.** Some technical committees seek to exclude general public participation by large membership fees that make it difficult for average companies or individuals to participate. The goal of this strategy is not altruistic: get a (standard-like) specification out by reducing the number of companies and/or individuals needed for approval. Typically, these organizations aren't open, fair, or committed to due process. The goal of the participants is to get something standard-like in an organization that is labeled standards-like for the purpose of maximizing the business advantage for the creators of a standard-like specification.

5. Problems

The main problem with existing accredited SDOs is their funding model for long-term standards administration. Many SDOs are overly dependent on the sale of paper standards and publications to support their administration. SDOs could try to raise the fees of technical committee members, but this brings strong resistance because of its immediate, negative affect on standards participation. Membership fees could be increased for the members of the parent bodies of the technical committees, but these large companies are resistant to paying higher fees. The effect of higher fees for larger companies isn't as immediate and as dramatic, but the effect is more pervasive and long-term: ultimately, the large companies abandon the large-scale standards participation in favor of lower cost alternative organizations, such as consortia (there is more experience now on avoiding antitrust issues in consortia, so this form of organization is available to large U.S. companies). Additionally, organizations such as American National Standards Institute (ANSI) pay approximately $2 million as the U.S. national body representative for International Standards Organization (ISO) — an administrative cost that is unlikely to diminish.

Because many people focus on the development phase, little attention is paid to maintenance phase. Because many of these organizations are new, few of these alternative organizations have been truly tested in their maintenance phase. Thus, the true quality of specifications developed by alternative organizations is yet to be determined.

Accredited SDOs have experiment will alternative funding paradigms, such as purchasing electronic copies of standards and annual subscriptions. These additional services have had little success in producing significant revenue. Another possibility is having members fund the direct cost of administration and making documents freely available. The American National Standards Institute (ANSI) Information Infrastructure Standards Panel (IISP) has done so successfully for three years, so this might be a viable alternative. The Internet Engineering Task Force (IETF) makes its specifications (requests for comment — RFCs) freely available, but the developers of the RFC, in effect, self-fund the development by coordinating activity and demonstration of technical feasibility with trial implementations.

Another possibility is to increase membership, but this is especially difficult when potential, new members see their future work largely unavailable due to the high price of standards (typically $70-$150 for a publication that would be freely available or sell for up to $20-$30 elsewhere) and alternative organizations providing a more attractive development process (new members, mostly, have limited sense of long-term commitment required for standards

and are unaware of standards maintenance, quality, or administration, so they focus of the features of the development process).

In summary, membership fees can't increase, publication prices can't increase, costs are difficult to reduce, and new and old members are looking elsewhere.

6. A Solution: An Experiment

The standards community should recognize its strengths and weaknesses. Its strengths are:

- Long-term viability.
- Proven track record.
- High quality process.
- Adaptable to rapid changes in technology.
- Open, fair, due process.
- Provides public good.

Its weaknesses are:

- High internal cost.
- Over dependence services not related to administration (publication sales)
- Widespread availability of tools and electronic communication ==> documents, especially standards and specifications will be free.
- Conflict of interest with current funding model: technical committees need widespread publication and availability of their documents, current funding model causes administrators to inhibit this.
- Reduction in corporate and individual membership due to competing organizations.

6.1 New Funding Model

Long-term, the funding model for standards administration should be self-funded by the participants. The ANSI IISP and the Internet IETF are two examples of a workable funding strategy. With the understanding that standards will be freely available, accredited SDOs would be more attractive to new participants: long-term viability, proven track record, high quality process, open, fair, and due process.

The question becomes: how do standards administrators continue if they just start giving away their standards?

6.2 The Plan

The strategy is a five step process:

1. SDOs give away for free electronic versions standards on the internet.

2. SDOs receive *temporary* funding (up to five years) from the U.S. government (e.g., Department of Commerce) to make up for the shortfall in income and to cover royalties associated with document distribution.
3. SDOs change their business strategy and funding model to assume freely available standards and self-funding technical committees and administration.
4. SDOs actively solicit new members and technical committees.
5. Because standards have a lifetime of five years, only five years of sales income replacement are necessary. If the experiment stops, the old, freely available standards expire after five years, so it is possible to go back to the old funding model.

The first candidates for funding should be areas where the U.S. already has a lead, such as information technology. Leading information technology SDOs, such as National Center for Information Technology Standards (NCITS, formally X3) and the Institute for Electrical and Electronic Engineers (IEEE) Computer Society, have a large, widely-used portfolio of information technology standards. The sales replenishment of these organizations and significant SDOs could be funded, as an experiment, for approximately $40 million to $50 million over five years. The benefits to the U.S. industry and economy would easily outweigh cost.

One important concern for accredited SDOs: if the U.S. temporarily funds the sales replenishment, the U.S. government cannot assert influence over the standards process.

6.3 Benefits

There are several important benefits:

1. Because the internet is international, the world would retrieve and use U.S. standards. Like the internet, the U.S. would be in a strong position of setting international standards because the standards are freely available — why purchase European or Asian national or international standards we U.S. standards are available for free?
2. Because the standards were developed in the U.S., the standards participants (U.S. companies, organizations, and individual) would enjoy a natural business advantage over other countries and their industries. This would create a boon for U.S. business (thus, possibly funding by Department Of Commerce).
3. The long-term interests of the public would be met because accredited SDOs have high-quality development, *maintenance*, and *administration* over non-accredited organizations.

6.4 What If The Experiment Fails?

The experiment can fail if:

1. SDOs are unable to adapt to a new business strategy.
2. The technical committees are unable to adapt to a self-funded standards administration.
3. There is little interest in providing new products and services based on new, freely available standards.

If the experiment fails, the SDOs can revert to the current business strategy and funding model. Because standards have a lifetime of five years, making standards available can only hurt sales for five years, thus, the need for five years of funding commitment.

7. Conclusions

Standards make good sense for industry and consumers. The participants developing a standard have business advantage over outsiders. Standards development, maintenance, and administration have a complex and soon-to-be obsolete business model. Standards administration is mostly funded by the sale of standards documents and publications. The world (e.g., world wide web) is moving toward free distribution of documents such as standards and specifications. High-quality standards development is desirable, but standards administration is necessary to direct and enforce the process. Self-funding of standards administration is a better business model, e.g., ANSI IISP and Internet IETF. SDOs can't get to the new model (free standards, self-funding) incrementally — SDOs need to take a leap. A temporary funding source, such as Department of Commerce, would help support standards administration while the SDOs adapt to a new business model. The Department of Commerce would be a good funding source because the world would adapt U.S. *national* standards as *international* standards. Because the standards were developed in the U.S., U.S. companies and industries would have a business advantage over other international competitors in an international economy.

In other words, in exchange for temporarily funding the sales replenishment (lost sales because standards are given away), the U.S. would be able to flood the market in many areas (not just the internet) which would have a huge competitive advantage for U.S. industries. The temporary funding would easily be overshadowed by the increase in U.S. business activity in the world market.

This opportunity is ripe for the taking — let's not squander it.