THE NATURE AND FUTURE OF ICT STANDARDIZATION

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By Sherrie Bolin

If you clicked on this link, or read the first line of this article in hardcopy, or even caught a glimpse of it on a banner from an airplane—or more likely from a Web site—you probably already feel that standards matter. Maybe you "do" standards for a living, buy mostly standards-based products, or actually believe in that magic word— interoperability. Or maybe you just like to read about standards, in which case you are probably trying to cure a chronic case of insomnia.

"Standards are the new field of competition all around the globe."

—Phil Bond, Undersecretary of Commerce for Technology

If you don't believe that standards matter, maybe you should take a moment to reconsider that thought. Why else would top government officials from the US and Europe, leading lawyers, key engineers including the inventor of the World Wide Web himself, and other information and communications experts convene in Cambridge, Massachusetts in mid-December for a day and a half talk on the nature and future of Information and Communications Technologies (ICT) standardization? Why would the likes of the Massachusetts Institute of Technology (MIT), the US Department of Commerce (DOC), and the Information Technology Industry Council (ITIC) sponsor such a conference?

The answer? Standards *do* matter and they are affecting your ability to work the way you want to work, your employees' productivity, your company's international competitiveness, your industry's growth rate, and even your country's gross domestic product.

On December12-13, 2002, not only did standards experts and government officials come together, but key industry leaders such as Sun Microsystems, Hewlett Packard, Oracle, IBM, and

Microsoft joined in discussions on the nature and future of ICT standardization. Granted, the opinions were varied and the arguments were a little heated. In fact, the only idea that they all agreed upon was that ICT standardization needs to change. The current processes and policies of Standards Setting Organizations (SSOs) and laws and regulations of countries around standardization do not meet the market and consumer needs of the ICT industry. It makes sense, doesn't it? How can processes designed to establish standards for bicycle helmets or levels of toxins in drinking water efficiently serve that of the ICT industry? They can't. And the reason can be simply stated in one word: interoperability.

When you consider that over 100 companies lay claim to patented technologies necessary to build W-CDMA radio stations, that challenge of interoperability, not to mention royalty fees, becomes a little more daunting. After all, a bicycle helmet only has to interoperate with your head. Your computer has to interoperate with numerous hardware and software platforms on a daily basis—and that's often just within your own company. To achieve truly seamless and transparent interoperability, we need standards. And to compete in today's marketplace, those standards need to be international.

So, what are the key areas to consider in ICT standardization? To begin with, they are Government, Structure and Process, Economics, and Legal Issues. Each area significantly influences the other, after all these areas must also interoperate, but let's start by examining the discussions and conference findings from each area individually.

A Proper Role for Government: Follow or Lead?

The question here is not whether government should be involved in standardization. No matter how much of a fan you are of voluntary standards, at some point your government and governments around the globe have a say in where you ship, how you ship, what you ship, and even the data you collect on your customers. Couple that with cultural preferences in a global market—Americans shrink from government involvement and embrace market determinism, while Europeans tend to trust the government more than corporations—and the role of government becomes even more convoluted.

So, the question becomes not *should* government be involved in ICT standardization, but h*ow* can governments most effectively participate in this arena? The panelists and the audience examined this question in detail. Presenting during this session were:

- Maryfran Johnson, Moderator: Editor-in-Chief, ComputerWorld
- Evangelos Vardakas: Director, Enterprise Directorate, General Regulatory Environment
- Ben Wu: Under Secretary for Technology, US Department of Commerce (DOC)
- Rhett Dawson: President, Information Technology Industry Council (ITIC)

Note that speakers from government organizations emphasized that their views and opinions expressed did not represent that of their respective governments.

Three Heads are Better Than One?

Governments around the world play a difficult role in standardization. On the one hand, they play the role of regulator— managing not only national regulations but also monitoring and influencing international regulations to strengthen their own economies. On the other hand, they collectively make up the world's largest consumer of information and communications technology. The Office of Management and Budget (OMB) is projecting that the US Federal Government will spend over $50 billion dollars on information technology this year alone (Information Week, March 8, 2003). With that kind of spending power, the US Government has the potential to heavily influence which standards will succeed and which will fail. Finally, in a round about way, governments play the role of employee in democratic societies as their jobs often depend on the votes of the masses and the currently elected administration. So the decisions that a government representative makes in regards to standardization may directly or indirectly affect their career prospects.

The US Government is projected to spend over $50 billion on IT this year alone. With that kind of spending power, the US Government has the potential to heavily influence which standards will succeed and which will fail.

Given the disparate roles of government and the differing cultural views on its involvement between Europe and the US, it is surprising how similar the views from the US and EU

participants were in regards to government's primary motivations and goals for ICT standards participation.

Motivation for Standards Participation

Whether used for international competitiveness, resolving regulatory issues, or promoting a healthy competitive environment, panel participants agreed that standards are a powerful tool. In fact, Phillip Bond, US Under Secretary of Commerce for Technology and the conference keynote speaker stated that, "Standards are the new field of competition all around the globe." The US is not alone in recognizing the value of standardization in a global marketplace. A representative from the European Union also believes that "Standards boost competitiveness of its own country's economy."

When it comes to regulations, most would rather hand the job over to lawyers than try to tackle the challenge themselves. If you have ever tried to comply with regulations for shipping product from one country to another, you know what a challenge it can be. Now consider the task of complying with regulatory issues for the ICT industry as a whole in which the convergence of the information technology, telecommunications, and broadband industries are taking place. Not only does each country have its own regulations, but most have different regulations for each industry within that country. This web of almost incomprehensible regulations can significantly drive up development and distribution costs and drastically slow down the pace of innovation. Both the EU and US recognize this problem and are looking to standards to help untangle or at least simplify international and national regulations. Vardakas stated that one of the government's interests in standards is to decrease unnecessary regulatory burdens. Wu's goal is to harmonize standards worldwide so that they can be used as a tool for regulatory issues.

Additional standards issues expressed by the US representatives included the establishment of a stable funding mechanism for standardization structures, a goal that the EU is already accomplishing. Finally, Wu asked, "Is there a need to create a new standards paradigm for the ICT industry?" This is a question that future conferences should address.

Primary Goals

Representatives from both the EU and US governments stated similar goals for ICT standards. Both called for open, transparent processes and voluntary standardization. This means that SSOs should (1) be open to anyone wishing to contribute, and (2) follow clearly defined standards setting processes that are established and communicated to all stakeholders in advance. By gaining consensus among competitors, the theory is that the best possible standards will emerge. And when products voluntarily comply with a standard, it then becomes up to the marketplace to determine whether the standard and products based on that standard survive or fail.

GOVERNMENT PARTICIPATION

Where the representatives from the EU and US diverge slightly is in governmental facilitation of these goals. Vardakas views the government's role as monitoring the process, not the content of standards. Since government officials are not the experts in information and communications technology, reliance on ICT experts to create the content of these standards not only saves the government considerable time and money, but should result in more realistic and market relevant standards. The government can apply its expertise, however, to ensure that all accepted standards and the processes that create them are compatible with current law. In regards to his views on consortia, Vardakas stated that this type of SSO might be at a disadvantage because there is insufficient information provided to the government about their processes, what constitutes a consensus, or what a consortium's true objective is. This problem is exacerbated by the sheer number of consortia that exist today. Vardakas suggested that these organizations begin with answering the question "What do consortia offer to international standardization?"

Wu touted a slightly different approach to ICT standardization, stating that the "… one word that defines the US Government's role in the standards setting process is *Partnership.*" His intent is for the Government to work in partnership with standards organizations and industry to ensure that there is a strong, cohesive, voluntary set of standards that will allow the US to be competitive worldwide. Wu believes that government should move away from mandating products that comply with government specific standards to using commercially available products where appropriate. Government may gain additional benefits by working in concert with industry to develop new products. In contrast to the EU, and perhaps in response to the

cultural preferences mentioned previously, the US government tends to shy away from controlling standardization processes, believing that market conditions will reward the most appropriate standards and processes. Where does the US government get involved? The National Institute of Standards (NIST), a government organization focusing on offering highly specialized technical assistance to promote voluntary standards, has recently attempted to create a national standards strategy in cooperation with the American National Standards Institute (ANSI). Whether the strategy is implemented and, more importantly, accepted by leading vendors and standards organizations remains to be seen. Looking forward, Wu stated that the US Government will ensure that the US has a level playing field in international standards. Additionally, it will help to adapt or create a standards setting system that is nimble enough to address the needs of the ICT industry. Finally, Wu explained that the government can best serve ICT standards by acting as a catalyst and a participant in the standards setting process to not only help shape the debate, but to also work in tight partnership with the entities involved in forming those processes.

As a consumer, the US government currently specifies that its employees can only purchase products that include standards produced in formal standards organizations. Products based on consortia-produced standards can be purchased, but employees must request a waiver from the OMB. For further information on this issue, see Chapter 41 of The Standards Edge™ by Carl Cargill. Of course, this may be changing as consortia begin to gain more power and the US government starts to emphasize its partnership with industry philosophy. In fact, these changes may already be occurring. According to Phillip Bond, in his article entitled "Government's Role in Support of Standards" (see The Standards Edge™, Chapter 3), "In some cases, industry-led consortia standards efforts are the preferred vehicle for developing needed standards, while in other cases, government agencies lend their technical expertise to the development of voluntary consensus standards through the formal voluntary standards development process."

There is one other prominent area where the EU and US diverge: *funding*. In the US, industry funds the majority of standards organizations and initiatives. With the exception of NIST, the government may participate in other relevant organizations, but they don't contribute greatly to funding the overall standardization arena. Vardakas reported that the European Communities

contributes funding to cover approximately 2% of the total estimated cost for standardisation (including administrative costs, experts from industry and other interested parties working in standards development bodies. etc.) in Europe. Since many of the different member countries of the EU develop their own national standards, Vardakas views the 2% investment in standardization as the glue that holds it all together.

Ideas on how the government can participate in ICT standards most effectively were heard from consortia, vendors, and standards setting organizations. Rhett Dawson believes that standards should be market led without government specifications or technology mandates. He views the government's role as a consumer who needs to communicate its requirements to vendors. In addition, the government can help to improve ICT standardization by contributing to research and development and using its international presence to facilitate trade and market access. It is the industry's role, Dawson believes, to find ways to engage the government in this area.

Others argue that the government's view of a standard is not highly significant. One engineer from Harvard University argued that it is not the standard itself that is important, but what industry players do with that standard that determines its success. Carl Cargill of Sun Microsystems expressed a similar view, stating that the measure of a standard's success is the number of competing implementations. After all, most of us agree that a standard car has a steering wheel, brakes, transmission, engine, and wheels. But the implementation we choose, whether it's a Ford Focus or a BMW Roadster, depends upon our personal preferences—and our pocketbooks! Why should ICT standards be treated any differently?

An International Standard for International Standards?

One issue that everyone in the room agreed upon, and nobody had a solution for, was the need for international or global standardization. An international standard would be accepted on a global basis and not subject to the different regulations of each country in most cases. In the current marketplace, where we often don't know which country a product originated from or whether a customer service agent is located in Iowa or India, products destined for the global marketplace must be customized to meet local regulations and standards. While this practice is time consuming and costly, the problem multiplies when you consider that the product's

licensing agreements, data collection processes, warranties, and so forth must also be reviewed and often revised.

A World Trade Organization/Technical Barriers to Trade agreement already states that government members must use international standards as much as possible when developing technical regulations. The problem is how do you define and recognize an international standard? What processes are viable? Which organizations, companies, or countries should participate and which organizations will ultimately keep track of the standards? Will registration and certification be required? If the standards are voluntary for private industry, how will compliance be encouraged? The WTO has applied several principals such as transparency, openness, and consensus to the concept of international standardization but a true definition of what constitutes an international standard needs to be discussed in future conferences.

While the definition of an international standard may be elusive, the benefits are not. In its "Standardisation Action Plan in Support of eEurope", the Commission of the European Communities states that, "Europe has an interest in international standardisation because of its potential to eliminate technical barriers to trade and to increase market access for all." Many standards setting organizations are taking the lead and producing significant benefits. Stop and think for a moment about the international standards developed and promoted by the World Wide Web Consortium (W3C). Without their efforts, luxuries that many already take for granted such as the World Wide Web and the technologies that enable it, would be nonexistent.

"Europe has an interest in international standardisation because of its potential to eliminate technical barriers to trade and to increase market access for all."

—Commission of the European Communities

Does this strong support for international standards mean that regional and national standards organizations will disappear someday? Not likely, but these organizations will also need to determine how they can most effectively participate in the evolution of ICT standardization.

Others at the conference spoke of *global* standardization and, exemplifying the need for common terminology, defined it in a different manner from *international* standardization. For example, Dawson defined global standardization as the freedom to choose where and how to standardize. By having the ability to choose an organization based on its processes, intellectual property policies, membership fees, and other factors—regardless of its geographic location—individual companies or groups can best meet their own needs and possibly that of the marketplace. In reality, the two terms are mutually dependent. Practicing global standardization without the promise of a standard becoming internationally accepted or even accepted within your own country is futile. Correspondingly, international standardization without the freedom to choose and participate in standardization organizations globally defeats the purpose.

Together, a definition of what constitutes an international standard that is accepted globally and the freedom to conduct standards activities anywhere in the world would go a long way in facilitating market delivery, cutting consumer costs, and speeding innovation. The benefits are numerous, except to those who earn a tidy profit from the current chaos. It is now up to industry players, government representatives, and consumers to find a working solution to the challenge.

We began this discussion by asking, how governments can most effectively participate in ICT standardization? However, an equally important question now becomes relevant: How can you, the reader, and others affected by ICT standardization, work *with* government to ensure that their participation significantly and positively impacts this critical area?

ORGANIZATION AND STRUCTURE: HOW TO MAKE FORM FOLLOW FUNCTION

Ever experienced one of those awkward moments in which you walk into a business social event where you don't know anyone and can't think of a good conversation starter? Or, perhaps you've attended a similar function where the talk is constant but a bit on the boring side. The following are a few questions that you can use to spice up any business event—or at least those that revolve around standards: Standards Development Organizations or Consortia? Standards or Industry Technical Agreements? Open or Proprietary? De Jure or De Facto standards? Minimalists or Structuralists? Ask any of these questions in a room full of standards experts, sit

back, and watch the sparks fly. When it comes to how and where ICT standards should be produced, there is no shortage of opinions. And the conference on "The Nature and Future of ICT Standardization" was no exception.

Presenting during this session were:

- Maryfran Johnson, Moderator: Editor-in-Chief, ComputerWorld
- Tim Berners-Lee: Director of the W3C and Senior Research Scientist at the MIT Laboratory for Computer Science
  Ray Alderman: Executive Director, VMEbus International Trade Association (VITA)
- Andrew Updegrove: Partner, Lucash, Gesmer & Updegrove, LLC

If you are involved in standards, you understand the terms mentioned previously. If you are a user or work in a part of a vendor organization that is not heavily involved in standards, you may have a vague idea of these terms and a bit of curiosity about their definitions. Chances are, however, that you probably don't care what the terms mean or where the standards come from as long as the resulting implementations actually work. It is for this reason that the subtitle of this conference section was "How to Make Form Follow Function", which implies that function is more important than form. So, to determine which form is best, shouldn't we start by agreeing on a basic definition and function of a standard? After all, if you decided to create a new company wouldn't you start by defining your business and its functions and then determine the operations and processes necessary to support those functions?

Definition of a Successful Standard

The task of defining a successful standard also presents its challenges and a multitude of opinions. Forrester Research, in The Standards Edge™, defines a standard as, "A widely accepted specification of how a set of technologies that must interoperate should be implemented." A specification is, in the end, a piece of paper. It is what is done with that specification that measures the true success of a standard. According to Carl Cargill, Director of Standards for Sun Microsystems, success of a standard is

"Success of a standard is measured by the number of competing implementations."

—Carl Cargill,
Sun Microsystems

measured by the number of competing implementations that build upon that standard, not in the creation of the specification itself. Martin Libicki, in his article "Scaffolding the Web" (see The Standards Edge™, Chapter One) expressed similar views when he wrote, "…the true test of a standard is that it be widely used…"

Function of a Standard

So, what is the function of a standard? The function of a standard can simply be viewed as a specification that fulfills a business requirement, although this can be contested as there are standards designed to meet social and health needs. But for the most part in the ICT industry a standard that does not fundamentally meet a business need is destined for failure. During his presentation, Andrew Updegrove explained that, "Standardization is the mitigation of capital investment that allows companies to make safer decisions." And Ray Alderman stated that, "Standards either create markets or are a mechanism to change markets" (see chapter four of The Standards Edge™). So, if we combine these descriptions together, the functions of a standard are to meet a business need, enable companies to make safer capital investment decisions, and either create or change markets.

Whether readers agree with the definition and function of a standard as described in this article is irrelevant. The important point is that in order to evaluate an organization and a process for standardization, readers need to incorporate these two things into their thought processes. So, if you don't agree with the above, you probably at least have some very strong opinions about the definition and function of a standard. And, after all, the purpose of this conference was to begin generating discussions about key issues. Agreements and results can be achieved in future gatherings of this sort. With that in mind, let's take a look at what the three speakers had to say about the standards setting process.

Open and Free

TIM BERNERS-LEE: "FROM CERN TO W3C"

Many people turn to the proliferation of the Web and its technologies as a prime example of successful standardization. During his presentation, Tim Berners-Lee stated that, "The Web spread because of its openness." By allowing anyone to participate and contribute to its

development and growth, considerable technological advances were created in a relatively short period of time. Individuals and companies were willing to make these significant investments because they believed that control of the Web would not be captured or dominated by a single person or company. In addition, those making contributions to the Web insisted that the Web remain royalty free. Eventually, so many methods for performing different functions on the Web were created that fragmentation occurred. This fragmentation meant that companies often had to write code for three different standards instead of one. At that point, the effort began to standardize technologies, and companies proceeded to compete on implementations. So, openness and processes that instilled confidence and trust, along with standards, became part of the recipe for the Web's success. Martin Libicki of RAND, a nonprofit institution that helps improve policy and decision making through research and analysis, wrote that, "The widespread adoption of the Internet as a platform for business is due to its nonproprietary standards and open nature as well as to the huge industry that has evolved to support it" (see "Scaffolding the Web", The Standards Edge™).

"The Web is made of standards like the road is made of asphalt."

—Tim Berners-Lee, W3C

The Web was a revolution that impacted business models and even the way and concepts such as voice, Web services, and the Semantic Web are emerging according to Berners-Lee. Just as with the development of the Web, multiple resources need to contribute to this next revolution to make it a success. Berners-Lee believes that a proprietary model that commands royalties will not be successful when it comes to these and other Web technologies. For example, he attributes the failure of GOPHER to the University of Minnesota's decision to charge commercial users a small royalty fee. Others add that its lack of openness also frustrated developers and led them to invest their efforts in the Web instead.

In the end, Berners-Lee stated that, "The Web is made of standards like the road is made of asphalt." Just like the last revolution succeeded because of open standards, the next revolution can only come to fruition through the open standards process. While the Web is a shining

example of an effective standards process, others argue that one definition of a good standards process may not always apply to a given standard or organization.

Relevant and Synchronized

RAY ALDERMAN: "THE CREATIVE DESTRUCTION OF IPR"

Ray Alderman stated that "… the standards process is focused on the process itself and not results, … it's focused on maintaining the status quo and not progress, and … it's an asymmetrical relationship between an SDO's value network and its manufacturers' value network." Therefore, SDOs are being disintermediated because they no longer add value to their own value chain of manufacturers, standards developers, and users. While they do offer consensus and openness, it may be a case of delivering too much too late. And with the compression of technological lifecycles, this problem becomes even more exacerbated. As a result, new approaches with different processes are emerging such as consortia and industry technical agreements (ITA). As for Alderman, who somewhat sarcastically stated that, "My rule is that a standard has to be completed before the technology is obsolete," he may be a key person to help bring new and innovative approaches to fruition.

In Alderman's article, "The Disintermediation of the Standards Value Chain" (see The Standards Edge™, Chapter Four), Ray proposes that imbalances in standards organizations are resulting in the formation of new organizations and value chains.

Many people believe that consortia are the answer to current standards problems because their reputations for faster processes more readily meet the stringent time to market needs of new technologies. Alderman states that, "The reason consortia could completely displace SDOs is that SDOs appear to value the process more than the results. The consortia seem to value the results more than the process." Secondly, Alderman believes that imbalance occurs when the "standards process is out of

"The value-networks of producers and users have changed, while the value-networks of standards developers have remain unchanged."

—Ray Alderman, VITA

synchronization with the users." This imbalance coupled with the lack of marketing and public relations traditionally conducted by formal standards bodies tends to narrow the chances for mass user adoption.

In addition to the imbalances occurring within the current standardization system, Alderman proposes that the number of patents approved annually by the US Patent and Trademark Office (PTO) alone make it difficult to conduct patent searches or compete without infringing on other's rights. And, Alderman has a point. When you can't even exercise your cat by moving a laser beam on the floor without infringing on a patent, see Patent No. 5,443,036, we may have a problem. The good news is that you can still use this method to exercise your dog, which works well on the ball-fetching types such as Labrador Retrievers, without infringing on a patent—yet.

Conditions such as the ones previously mentioned are contributing to the destruction of the current standardization system. For example, Alderman sees the disintermediation effects spurring a move from SDOs, to consortia, and eventually to business partnerships. He believes that formal processes will become informal, and that open technology will become licensed technology. VITA itself is considering including intellectual property in their standards. And new business models are already threatening, or promising, depending on your point of view, to further encourage the use of IP for revenue generation. For example, intellectual property asset management, which Gartner calls IPAM, is predicted to increase IP-related revenue by at least 50% for those who adopt the software. (Forbes Magazine, June 24, 2002).

Alderman also predicts that disintermediation will cause larger markets to become fragmented and that we will move from standards to agreements. For example, the International Electrotechnical Commission (IEC) now has a process and documents called Industry Technical Agreements (ITA), for which VITA is an approved ITA submitter.

The bottom line, according to Alderman, is that, "The value-networks of producers and users have changed, while the value-networks of standards developers have remained unchanged. This has created asynchronization and asymmetry between the SDOs, the users, and the producers in many ways." Should SDOs be eliminated all together? Not according to Alderman. Instead, he

recommends an overhaul of SDOs coupled with an education in marketing, market analysis, and business cycles to match the new environment that we operate in today. And what about the value of standards themselves? Ray explained that, "Standards are the mechanism for the creative destruction of invested capital. Standards create markets."

Function Determines Form

ANDREW UPDEGROVE: "THE EVOLUTION OF FORM AND FUNCTION IN STANDARDS SETTING"

Unlike Alderman, Updegrove believes that, "Standards mitigate the destruction of capital because they enable companies to make safe strategic decisions." He states that, "Standards are about allowing industries to progress quickly, efficiently, with a minimum number of false steps to the best results. However, the industries and the companies within them cannot achieve these benefits without first conducting an evaluation process for choosing standards setting organizations.

Updegrove recommends starting this evaluation process with an examination of a company's goals for standardization and then identifying several organizations that can help reach those goals. In addition, companies should determine their desired level of participation and match that to the requirements of the potential organizations. Finally, the selection should include a membership level necessary to achieve its goals. In general, the higher the membership fee, the more influence a company has over the results. For example, a strategic membership will cost approximately $15,000-$50,000 in a consortium and bring with it a guaranteed board seat either at present or in the future. At the other end, an informational membership provides a company with periodic information about the group and standards but does not include any voting or meeting attendance rights. This level of membership generally costs around $500. Once goals and participation commitment are established, the type of standards organizations and activities can be chosen.

Types of Standards Organizations

In general, de jure standards, which are produced by standards development organizations, tend to value an open, more detailed process with an emphasis on consensus building. In Updegrove's view, consortia allow for a narrower, mission-specific focus that often uses more varied processes. However, the choice is not as simple as SDO versus consortia. Even within the

consortia category, organizations offer different specialties and focuses. For example, consortia with a *technology industry focus* generally have a single objective focus, such as W3C, or an industry focus such as Cable Labs. *Promotional consortia* strive to condition and educate the market to stimulate rapid product development and drive market demand. While these types of consortia can grow quickly, they can also fail just as quickly. Other consortia focus on *business processes* such as Open Buying on the Internet (OBI), which develops open standards for business-to-business Internet commerce. Finally, if you already have a large market share *and* a powerful marketing department, de facto standardardization may be the best choice. As exemplified by Microsoft, these standards, which are not endorsed by a standards organization, usually achieve mass deployment and may offer the required functions and interoperability at an affordable cost.

Future of Consortia

Updegrove predicts that consortia will be increasingly influenced by the Open Source community-based processes. Other models may evolve such as the LLC called United Linux, which allows the companies involved to combine their R&D budgets towards creating a business version that all member companies will sell. The group will also form a consortium around this effort that will allow intermediaries, users, and vendors to provide input on the evolution of the source code so that the next version of Business Linux will meet market demands. Finally, interactions between government and consortia will increase.

A New Form for Standards Organizations

In the end, it may be beneficial to move beyond the debate of SDOs versus consortia and the other debates mentioned at the beginning of this article. After all, with the exception of a few governments, do most users know or care to know where a standard came from? Can you imagine an engineer refusing to work with a specification because it was from a consortium instead of an SDO or vice versa? Do purchasing agents favor standards created from one type of an organization over another? The answer to these questions is *no*. Why? Because users, engineers, and purchasing agents choose products that meet their individual or company goals. Companies that choose standards organizations would benefit from doing the same.

The attitude that "one solution fits all" in such a wide and diverse industry as ICT seems ludicrous and unattainable. Besides, just when the debate was settled and a specific type of SSO was chosen, a new type of organization would emerge to compete. Markets are always evolving and this is no more evident than in ICT.

In a rare show of consensus, most conference attendees agreed that the standards setting process as a whole is broken. However, there are parts of those processes that work for different situations. What would the advantages be if those parts were captured and communicated, perhaps in the form of best practices? Could best practices in the areas of process, consensus building, speed, meeting structure and methods, and even financing and marketing be captured and shared across the standardization industry? Could standards organizations then modify or develop their processes based on proven models to meet their current goals? Finally, could companies creating their standards strategies access a common resource to determine which practices are likely to help them achieve their goals and then locate organizations that are either currently offering those practices or would be willing to?

In standards organizations, competing vendors are asked to cooperate, share information, and even donate intellectual property for the *good of the market*, for the *sake of technology*, or to *increase market size and uptake*. Perhaps the members of those organizations should now ask the standards setting organizations to do the same.

ECONOMICS: WHY WE WANT TO BELIEVE IN STANDARDIZATION

Imagine, for a moment, that you are the owner of a profitable health insurance company. Many of your customers have asked that your company start covering preventive health services such as regular examinations, testing, and inoculations. Would you pay for these preventative health services? To answer this question from a profit perspective, you would need to know whether these services would improve disease prevention rates, enable earlier detection of diseases, and if early detection would result in lower treatment costs. Or, would preventative health services not only create additional costs, but actually increase the need for expensive treatments for conditions that may have remained undetected? On the other hand, perhaps the addition of preventative services would attract new members or enable you to raise membership fees enough

to actually increase your profits. But what happens if a patient did have a previously undetected disease and the claims department of your company captured that information in its database—would you be faced with a lawsuit if your membership renewal department, which did not have access to that database, subsequently cancelled that patient's policy? What about the qualitative side of this analysis? Would patient's lives be improved by preventative medicine and would this ultimately benefit society by increasing the overall health of the population? Obviously, the return on investment (ROI) for offering preventative health services is more difficult to determine than the ROI for opening up a new call center or increasing your sales budget by a specific percentage.

Similarly, when it comes to corporate activities such as advertising, marketing, and research and development, it is often easy to measure the ROI. But try to measure a return on other activities such as training or standardization, and you are faced with a challenge similar to the health insurance example above. According to Joseph Farrell, Professor of Economics at the University of California at Berkeley, measuring the ROI of standards activities calls for a difficult mathematical model—one that anticipates the results of participation versus what would have happened if the company had participated differently or not at all. And even if a company attempted to measure the ROI of its own standards activities, in reality the benefits usually extend to other corporations including their competition and potential users. Regardless of whether a company participated in the standards setting process or not, it can attempt to increase its market opportunities by implementing a publicly available standard in its products. So, will an investment in the standards setting process produce a higher return than nonparticipation? That is a question that each company must attempt to answer on a situational basis.

On a broader scale, standards can help to increase innovation or market uptake of a technology by enabling companies to create on top of a specification, rather than spending valuable resources developing the specification on its own. And, potential users benefit by gaining access to a selection of products by multiple vendors, which can drive down the price point. No wonder the US Office of Technology Assessment (OTA) viewed standards, like education, as a combination of public and private goods. A standard not only brings value to participating corporations, but may also offer benefits to non-participants and possibly society as a whole. If,

as in the example above, your customers or Board of Directors asked you whether your company should participate in standards, what would your answer be and how would you justify that answer? This section of the conference focused on addressing this very question.
Presenting during this section were:

- Maryfran Johnson, Moderator: Editor-in-Chief, ComputerWorld
- Gail Levine: Deputy Assistant General Counsel for Policy Studies, Federal Trade Commission (FTC)
- Joseph Farrell: Professor of Economics and Chair of the Competition Policy Center, University of California at Berkley (UCB)
- Joel West: Associate Professor of Technology Management, San Jose State University (SJSU)

While all three speakers addressed the public and private benefits of standardization, three perspectives were basically represented: that of the public, the participant, and the user.

ROI for Public Interest

The value of standards, from Levine's point of view, is that they foster interoperability and grow markets. Although the exact measurement of how much standardization contributes to interoperability and market growth is difficult to determine, most people recognize that when competitor's products interoperate, users benefit through an increase in "best of breed" buying opportunities that provide more flexibility for meeting business needs. In addition, the more the products interoperate, the larger the potential market growth due to a network effect—a situation in which the product's value to a user increases as more users adopt the product or technology. The network effect, in turn, benefits the public by offering more value at a lower price. Finally, standards can decrease development time and costs, which ultimately provide the public with more technologically advanced products at affordable prices. The difficulty comes in finding a way within the standards setting process to maximize these benefits

Achieving this balance…is similar to walking a tightrope blindfolded without a net. You hope that you have anticipated all the turns and twists, but one wrong step could result in a deadly fall.

while complying with organizational policies and government laws and regulations. Achieving this balance, it turns out, is similar to walking a tightrope blindfolded without a net. You hope that you have anticipated all the turns and twists, but one wrong step could result in a deadly fall.

In an effort to shape innovation and competition policies, the US Federal Trade (FTC) Commission and the US Department of Justice (DOJ) held hearings on antitrust and intellectual property in 2002. While some people view these two elements as completely separate, Levine believes that both elements promote innovation. Intellectual property spurs innovation by guaranteeing inventors ownership of their inventions and the potential to earn back invested resources and possibly a profit. Antitrust promotes innovation by ensuring that companies must compete for market share—and that market share is often gained by innovative products, ideas, or services. Problems may arise, however, when SSOs try to foster interoperability and grow markets while providing products at a reasonable cost to consumers. It is then that the rules, at least in the US, become a bit difficult to navigate according to many of the conference attendees. For example, if an SSO requires disclosure of IP before a standard is finalized, then the working group has the opportunity to withdraw its recommendation for that particular technology in order to avoid royalty fees. On the other hand, the working group could choose to enter ex ante negotiations and determine the licensing agreement terms before including the IP in the standard. However, this practice can lead to antitrust allegations.

Would it make a difference if any undue antitrust fears were alleviated for ex ante negotiations?

—Gail Levine, FTC

Without clear government guidelines, most SSOs try to maintain a balance between disclosure policies and antitrust fears— a balance that often leads to vague disclosure policies that are open to court interpretation and increase a company's vulnerability to future IP law suits or unforeseen royalty fees. "Would it make a difference if any undue antitrust fears were alleviated for ex ante negotiations?" asked Levine. Or, Levine wondered, are there business and economic reasons for keeping the current practices in place? According to Farrell, firms don't have economic

incentives to bargain down royalty fees. Therefore, policies that leave room for interpretation may be to a company's advantage.

Do the current standards setting processes and government regulations, especially in regards to IP and antitrust policies, enable standards to most effectively foster interoperability and grow markets? What return on investment, whether it is quantitative or qualitative, does the current system allow standards to deliver to standards participants, industry, users, and the public as a whole? The FTC/DOJ will repeat its hearings on IP and antitrust this year. Perhaps then we will be able to determine if more clearly defined IP and antitrust policies by governments, or even by SSOs, will yield a higher return on investment. And if so, a higher return for whom?

ROI for Standards Participants

As mentioned previously, trying to measure the quantitative ROI for standards is a challenging task at best. Standards foster compatibility, the benefits of which include an increased market size, the selection of best of breed products, and reasonable prices for buyers. According to Farrell, the question that we should be focusing on is, "Why and in what circumstances do individual participants care about standards?"

While the reasons that participants care about standards are numerous, Farrell focuses on just two. First, if there is a contest to convince users and complementary companies that your product will succeed, then companies don't necessarily have to compete on price or features. Second, companies participate in the standards setting process because they care about whether the process succeeds or fails. Participants will attempt to influence the outcome of that process by either encouraging the adoption of a standard or killing the process depending upon its potential impact on their interests. And whether that process survives or not, can have a significant impact on your market share, revenues, and even your stock price.

Examples of this impact in standards participation can be seen throughout the ICT industry. From a market growth perspective, Bluetooth, a standard developed to enable short range networking, is projected to show a one year growth rate of 250% in chipset shipments from 11.2 million in 2001 to over 35 million in 2002 (InStat/MDR, January 14, 2003). MPEG, a standard

for compressing, transmitting, and then decompressing digital motion video and audio signals for traditional video delivery, will help to increase the MPEG video chip market from $1 billion in revenues in 2001 to $3 billion in 2007, according to In-Stat-MDR (for further examples, see Deepak Kamlani's article in The Standards Edge™).

From a company perspective, standards participation can result in reduced research and development costs, a competitive advantage by gaining early access to a specification or user requirements, and the opportunity to influence the development of a standard to their company's advantage. Participation can also be used to exclude the competition from key markets. For example, Nokia, Ericcson, and Motorola were very active in setting the GSM standard and owned most of the IPR, which kept the Japanese out of the European cell phone market for a decade, according to Joel West.

"It is not from the benevolence of the butcher, the brewer or the baker, that we expect our dinner, but from their regard to their own interest" (Adam Smith, as quoted in chapter 9 of The Standards Edge™ by Joseph Farrell). Society, at least American society, and many economists assume that when companies act in their own best interests, a good outcome for everyone will result. After all, isn't this one of the basic premises of capitalism? Farrell, however, cited lesson learned kindergarten: "If everyone is selfish and behaves selfishly, you usually get bad outcomes." For example, Farrell attributes one reason for the delays in the standards setting process to those that represent and fight for their company's commercial interests. The stronger the IPR, theorized Farrell, the harder people will fight for control and royalties from the standard. Couple that with personal agendas to preserve a member's power or a staff member's job in an SSO as mentioned in Ray Alderman's article in The Standards Edge™, and the return on investment can be quickly minimized.

Alternatively, nonparticipation can also bring rewards. Labeling this the "free-rider" problem, Farrell explains that non-participants also gain access to a standard once it is published, enabling them to create compliant products without the cost of standards participation. If the anticipated returns of participating in the standards setting process are not high, then it makes sense for a company to wait until the standard is published. In addition, non-participating companies may

experience a higher return if their IP is included in a standard and they are not bound by policies of the SSO such as reasonable and nondiscriminatory (RAND). The solution to this problem, argues Farrell, is to increase the rewards for participating such as allowing access to beta testing or providing earlier releases of interface information. As with any incentive, the rewards must be of significant value to potential participants—and with a conscious regard for antitrust regulations. Finally, sometimes the benefits of participation are outweighed by other market priorities. For example, Compaq has been highly involved in standards, yet Dell retains more market share despite its minimal participation in standards activities. While standards are certainly important, Dell's lower research price point has provided a strong market advantage without incurring SSO fees. Just as in the insurance example at the beginning of this section, SSOs and their current members need to determine whether their own return on investments will increase significantly if additional incentives to overcome nonparticipation advantages are offered.

ROI of User Participation

Do users experience a significant return on investment if they participate in standards? If they have a large budget for purchasing ICT products, such as the US Government, then the answer is probably **YES**. Large user companies usually recognize the power of standards, although their level of participation in standards is relatively low compared to that of vendors. In a survey conducted late last year of CIOs in Europe and the US, "respondents overwhelmingly agreed that a vendor's support of standards is extremely important to them, because this allows IT departments to integrate products and avoid getting locked into one vendor's products" (ComputerWorld, December 9, 2002). In fact, users can gain significant returns on standards participation influencing vendors to shape future products towards their own needs and implementing innovative solutions ahead of their competition in an effort to attract new customers and expand market share. For a detailed analysis of the expected ROI from consortium membership for end-user companies, see Jon Siegel's article in The Standards Edge™.

Updegrove cited examples of user participation in standards such as when potential customers began favoring banks that had more ATMs. On an industry scale, the CAD Framework Initiative

enabled CAD purchasers to demand their collective requirements from prospective vendors. Farrell believes that users vote by purchasing or not purchasing products. However, this vote is usually indirect as most users are either unaware or do not care about the underlying standards. For example, users don't seem to care about the standard for CDs. The actual CD label can only be placed on a CD-ROM if it meets Phillip's specifications. Indeed, consumers seem to purchase CD-ROMs regardless of whether they carry the official "CD" label. As long as it looks like a CD and acts like a CD (and interoperates with standard CD players), West explained, users don't seem to care about the underlying standard.

From Small and Medium Enterprises (SMEs) to the average end-user, the anticipated return of participating in the standards setting process appears small. After all, these types of users do not have the budgets and the industry influence that companies like Boeing, an active participant in standards, command. Nor do they have the time or resources to invest in potential standards that are not guaranteed to meet their needs. Instead, most of these users vote indirectly for a specific standard by the products that they purchase.

Do users care *where* a standard is created? The answer to that question may lie in another question—do users experience a larger return on investment from products based on standards that derive from traditional SDOs versus those derived from consortia? In looking at several examples, it would appear that users perceive no difference in value based on the SSO that produced the standard but rather judge the value on the perceived functionality, interoperability, and cost effectiveness of the actual product. For example, Microsoft Office has become the de facto standard for desktop productivity software without the help of an SSO. HTML and other Web technologies created in the W3C have become the accepted standards for viewing content on the Web. And the wide spread use of Ethernet (IEEE 802.3), which was created in an SDO, is an example of a popular de jure standard for accessing local area networks (LAN), which among other things, enables users to access the Internet via a DSL or cable modem.

Carl Cargill, Director of Standards for Sun Microsystems, asked, "How do users price standards in their specs and how do they know how much a standard is worth? What would a procurement professional favor?" Cargill believes that it depends on whether the procurement professionals

would have to answer to the engineers who specify a standard. If an engineer does not specify a standard, won't procurement professionals, like the majority of end users, choose products that offer the most functionality for the least price?

Regardless of whether the users perceive a significant return on investment from standards participation, several speakers and members of the audience viewed user participation as significantly benefiting the standards setting process as a whole. As Farrell explained, there is currently a lack of user participation and an imbalance of political influence in the standards setting process. If end users participate, process concerns become less severe and organizations can therefore become more flexible with procedural rules. Vendor participants also increase their benefits by learning about user requirements early in the development process. And, finally, SSOs also benefit. David Schell, President and CEO of the Open GIS Consortium (OGC), explained that his consortium succeeds and produces standards more quickly due to its requirements-based process that places users in the middle.

Why Do We Care About Standards?

In the end, we care about standards because they ultimately yield a return on investment for the public, private industry, and the end-user by creating larger markets, expanded choices, increased innovation, and lower price points. A final question was asked of the economist panel—"How can we change standards to create better access to markets and make more money?" Farrell's response was to make all standards compulsory and only allow one firm to use a specific standard. Although Farrell stated that he does not support this idea, the statement silenced the audience. Preventing this type of scenario alone offers a strong return on investment incentive for standards participation by government, private industry, and end-users.

LEGAL: OPEN SOURCE, RAND, AND ALL THE REST

Abraham Lincoln once stated that patents added the "fuel of interest to the fire of genius" by promoting the creation of new and useful inventions. What he didn't realize was that patents might also serve to fuel the bank accounts of patent lawyers—the only people who can make sense of the current patent process—and end up bogging down or discouraging the innovation process all together. Each patent search costs between $10,000 and $15,000 per search,

according to Therese Hendricks, Partner in the IP Law Firm of Finnegan, Henderson, Farbow, Garrett and Dunner. Multiply the cost of a patent search by the number of new patent holdings for major vendors such as IBM's 3,000 plus patents, or Micron Technology's 1,643 patents, or Sony Corporation's 1, 363 patents for the year 2001 alone, and it is easy to imagine how navigating the patent system might become extremely costly and time consuming. No wonder many corporations are encouraging a "don't ask, don't tell" policy with their engineers. With patents being issued for almost anything, it is likely that any innovation will infringe on a previously filed patent. And this doesn't even begin to address the additional concerns caused by copyrights and trademarks.

Numerous participants at the conference called for a reform of the US Patent and Trademark Office (PTO) and several of their European counterparts cited similar problems with the European Patent Office. Views on patents and when they should be disclosed in the standards setting process were as numerous and as varied as the participants themselves. Despite the fact that the title of this segment included all legal aspects having to do with standards, the majority of the panel and the audience focused on the issue of intellectual property rights (IPR). Indeed, that very subject managed to work its way into every section of the conference.

Presenting during this session were:

- David Clark, Moderator: Senior Research Scientist, MIT Laboratory for Computer Science
- George Arnold: Former Vice President of Standards and Intellectual Property and current Industry Consultant, Lucent Technologies; Vice-Chairman of the Board of American National Standards Institute (ANSI); Chairman of ANSI's International Committee
- Karen Hersey J.D.: Senior Intellectual Property Counsel, MIT
- John Kelly: President, JEDEC
- Bruce Perens: Open Source, Open Software Evangelist
- Scott Peterson, Hewlett Packard (HP)
- Oliver Smoot: Vice President for External Voluntary Standards Relations, Industry Technology Industry Council (ITIC); President-elect, International Organization for Standardization (ISO); Chairman of the Board, ANSI

- Danny Weitzner: Director of the World Wide Web Consortium's (W3C) Technology and Society activities

The Problem

As stated previously, the patent process today may actually be discouraging innovation. The sheer number of patents issued makes it almost impossible to know when an idea may infringe on an existing patent. In fact, most large companies are not even aware of all of their patent holdings. Often in the standards setting process, these companies have to perform patent searches just to determine if they own any IP in the proposed specification. Considering that the number of patents issued annually by the US PTO alone increased by over two and a half times from approximately 66,000 patents in 1980 to approximately 175,000 patents in 2000 (Timothy J. Muris, Chairman, FTC, November 15, 2001), it is no wonder that those trying to navigate through IPR policies and regulations are getting lost in the process.

The problems presented by the increasing number of patents are exacerbated by rising incidents of patent abuse. These abuses can include such practices as "patent farming", which occurs when a company inserts its own patents into standards. In these situations, it is the SMEs that suffer most. While most large corporations hold cross licensing agreements that exempt each other from paying royalties, small companies don't enjoy this privilege. Even if the licensor offers royalties in accordance with RAND, the costs can become prohibitive to SMEs when you consider that it takes 30 patents just to support any Web click, argued Perens. "Submarine Patents" are a hidden obstacle, occurring when patent holders do not participate in the working group. Companies may wait until after a standard is implemented before asserting its IP rights. Since the patent holder was not a participant, it is not subject to the specific SSOs policies and has the opportunity to make a handsome profit. The ICT industry has continued to spur the creation of new business models, and models that take advantage of the patent frenzy are no exception. "Patent Parasites" are companies that buy or make patents but never actually create their own IP. Thus, they can collect on the royalties without ever investing time or money in the creation of intellectual property.

Each patent search costs between $10,000 to $15,000.

Couple the problems of patent proliferation and abuse with fears of antitrust allegations and it easy to understand why many SSOs have vague IPR policies. While some try to provide guidance such as a recommendation for early IP disclosure and the type of licensing agreements such as royalties, RAND, or royalty free, the definition of when early disclosure should occur or what constitutes RAND often remains undefined. This leaves the SSO vulnerable to potentially high royalty fees or IP infringement law suits. On the other hand, SSOs that create a strict and detailed IPR policy may be subjected to antitrust allegations.

Earlier in the conference, Gail Levine of the FTC asked whether government alleviation of antitrust fears around ex ante negotiations would benefit the standards process. A similar question might be asked of SSO participants. Would clearly defined IP policies by each SSO benefit individual members and the standards setting process as a whole? If significant benefits resulted, would additional benefits be gained if all SSOs adopted similar IP policies? If one policy is adopted, when is the optimum time for disclosure and which licensing approach would be the most suitable: royalty free, RAND, or royalties? What about the Open Source model? Is that the answer to the problems previously stated? Even if the policies are left up to the individual SSO, which policies produce the highest return on investment? The following section examines the case for Open Source, royalty free, RAND, and royalties.

The Case for Open Source

Many people hear the term "Open Source" and picture developers selflessly working around the clock to write code free-of-charge. Others may picture an empty wallet, a bank account balance of $0, or a bankrupt company. After all, the Open Source model can't *make* money, can it? But perhaps they should think carefully before answering that question. Industry heavyweights are beginning to embrace Open Source and its resulting products such as Linux. Although Linux is a product derived from the Open Source process, plenty of vendors are making profits from the operating system. For example, US Linux server sales grew to $384.6 million in the fourth quarter of 2002, up $182.4 million from the same period a year

"Open Source rules optimize collaboration, not monetization."

—Bruce Perens, Open Source

before. While the total sales still pales to HP's $1.2 billion in server sales during the same time period, the 90% growth in Linux server sales far outshined the 5% in server sales growth experienced by the rest of the industry (Gartner Dataquest; February 11, 2003).

Increased sales revenues aren't the only benefits of using products derived from Open Source. "Open Source rules optimize collaboration, not monetization" reports Perens. Considering that most software development is conducted in corporate cost centers and is never sold, collaboration across companies on non-differentiating cost center software can save companies significant money. Perens believes that Open Source outperforms consortia for many software development efforts because it allows competing, proprietary standards to cooperate. But for Open Source to be successful in the standards setting environment, some things would have to change. As an example, Perens indicated that the current standards processes are designed for proprietary software business models and are fundamentally hostile to the Open Source model. Just the act of achieving consensus alone would be challenging due to the different models and would likely necessitate vote counting to achieve this objective.

The Case for Royalty Free

Perens discussed two solutions for creating a royalty free organization. The first involves following Open Source policies, which does not collect or pay patent royalties. Instead, they adopt policies that prohibit patent farming and ensure that royalty free is offered to everyone for the purpose of implementing the standard. Open Source disclosure agreements allow a company to grant a global royalty free declaration up front, which eliminates costly patent searches. Its policy also places the responsibility of the patent search on the patent holder and allows companies to remain silent about patents in progress during the key period where secrecy is advantageous. Perens has created the Free Standards Group, which promotes a royalty-free policy and is supported by IBM and HP. Information can be found at www.perens.com.

Perens recommends that royalty free or RAND agreements are limited to the scope of a specific standard. Similar to W3C's patent policy, participants can use the patented IP for free only for the implementation of the standard and must pay a royalty fee for additional implementations. However, submarine patents can still occur, driving up the price of royalties beyond a reasonable

cost. At this point, the working group's only defense, according to Perens, is to withdraw the recommendation.

The W3C implemented its new IP policy approximately one year ago and most members have willingly complied. Because most people come to W3C expecting a royalty free environment, the number of patent problems has been limited. Weitzner was quick to point out that in W3C royalty free means free of fees but not free of the exchange of value.

Those in favor of royalty free standards believe that all companies will benefit from faster market growth driven by increased interoperability between different vendor's products and a lower price point for consumers. In addition, they believe that the owner's prior knowledge and experience with the IP yields a strong competitive advantage in the form of faster time to market and the perception of the IP holder as a market leader in the specific area of technology. However, for some companies, first mover advantage is not enough return on their investment to justify the loss of royalties.

RAND: A Suitable Compromise?

Reasonable and Nondiscriminatory (RAND) licensing indicates that a company will license its IP for reasonable fees that are nonexorbitant and available for all implementers upon request. Proponents of this solution argue that it allows IP holders to reap financial benefits from their innovations while enabling other companies to use that IP for a nominal fee. Those that oppose RAND argue that inventors are entitled to collect full royalties since they own the IP and made the initial investment. Others oppose RAND for the opposite reason. In the case of software standards where a single technology can contain numerous IP, the individual royalties based on RAND can quickly add up to cost-prohibitive licensing fees. These fees may stifle market growth if those costs are passed onto consumers.

Of course, an SSOs policy doesn't have to dictate just one approach. JEDEC, for example, encourages either royalty-free or RAND licensing and limits the license to the implementation of the standard. The Internet Engineering Task Force (IETF) takes a more customized approach, according to Scott Bradner, an Area Director in the Transport and Sub-IP Areas of the IETF and

Senior Technical Consultant at Harvard University. Participants in the process are required to disclose any IPR that they should reasonably and personally know, including both patents and patent applications, and are requested to grant RAND licensing if their IP is included in a standard. It is then up to the working group to evaluate the situation and decide how to proceed. In general, the majority of IETF working groups tend to favor technologies without known IPR constraints.

The Case for Royalties

Not everyone is in favor of royalty free policies or even RAND. After all, even the FTC views IP as a means to encourage innovation. George Arnold believes that infrastructure standards must be available to everyone at a cost low enough to permit mass adoption. However, Arnold also stated that royalty free licensing is not necessary to achieve these goals. As an example, he explained that CDs and DVDs each require a 3 cent royalty fee per disc, a fee that is not noticed by the consumer. While this is a reasonable cost, it is an example of a hardware standard. In software, the costs can quickly become unreasonable. For example, if we take that 3 cents and multiply that by the 30 technologies in a Web click, as cited by Perens, the cost increases to 90 cents. And since that Web click is just one of the technologies needed for access to the Internet or to the contents stored on a computer, it is easy to see how software royalties, even offered at RAND, can quickly become cost prohibitive. In regards to a software example, Arnold cited that the licensing pool for MPEG2 charges a royalty of 3-4 cents per DVD, which has not prohibited the widespread use of DVD and other technologies that depend on MPEG2. Others, such as Ollie Smoot, agreed with Arnold's beliefs, stating that IPR is all about making money. Smoot stated that the goal of standardization is to produce documents that will be implemented by the users and grow the market. Therefore, patent policies are simply a tool to achieve this larger end.

From an academic's perspective, Karen Hersey provided insight into the IP policies and practices of universities. Approximately 100% of university programs are externally funded, 80% of which are funded by the Federal Government. As with all business transactions, this funding comes with terms and conditions that, in the universities' case, include IPR and patent requirements. If a university chooses not to file a patent on one of its inventions, the funder then

has the option to claim ownership. Once ownership is declared, that funder, often the US Federal Government, can then license that patent to the highest bidder.

Issues around IPR currently command the attention of governments, the media, vendors, and users. Our core ideas about innovation, ownership, and the sacrifices required for the public good, or at least market growth, are up for examination. At the center of this debate are standards setting organizations around the globe. It is their policies and opinions that will significantly shape future IP practices and government regulations. Shouldn't the members of these organizations then take the time to consider the options, develop alternative approaches, and make a concerted effort to create and promote the most effective solution or solutions? At the end of the nineteenth century, the head of the US patent office declared that, "nearly everything that will be invented has been invented." Will those involved in promoting standards and refining the current IP policies and regulations make the same mistake—assuming that every solution to IP problems that will be invented, has been invented?

WHAT IS THE NATURE AND FUTURE OF ICT STANDARDIZATION?

SSOs, vendors, governments, and users of ICT technology have an incredible opportunity—and a responsibility— to influence the direction of standardization on an international level. Based on the discussions at this conference, it is clear that the standards setting process, economic incentives for participation, IP and antitrust policies, and the role of government must evolve to meet the changing standardization needs of the ICT industry. The task, when viewed as a whole, seems insurmountable. But by breaking the task into parts, discussing possible solutions, and identifying and following through on key action items as future conferences will attempt to do, steady progress can be made. So, what is the nature and future of ICT standardization? As Alan Kay once said, "The best way to predict the future is to invent it.."

ABOUT THE AUTHOR

Ms. Sherrie Bolin is President of The Bolin Group, a strategic communications consulting firm, and editor of The Standards Edge™ series, a series designed to explore information and

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