

Balancing the Standards Development Process and U.S. Legislation

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August 8th, 2008

Sponsored by the American Society of Heating,
Refrigerating, and Air-Conditioning Engineers



Preface

About the Author

Pamela Androff is the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Washington Internship for Students in Engineering (WISE) intern for the summer of 2008. She is a senior Mechanical Engineering student at the University of Central Florida (UCF) with an expected graduation date of December 2008. Pamela has been involved with ASHRAE since August 2007 when she joined the UCF senior design team for the ASHRAE System Selection project. Since then she has become an active member of the ASHRAE at UCF section as well as the Central Florida section of ASHRAE. Pamela is also heavily involved with the American Society of Mechanical Engineers (ASME) and the Society of Women Engineers (SWE), holding various leadership positions in both organizations on the local and regional levels. In addition to her involvement in professional engineering societies, Pamela is a proud member of Kappa Alpha Theta women's fraternity. Pamela plans to pursue a full time career in the HVAC industry or another energy-related field and hopes to eventually pursue a Masters degree in Engineering Management. She will continue to remain an active member of her community, participating in advocacy activities as well as being a contributing member to ASHRAE, ASME, and SWE.

About WISE

The Washington Internships for Students of Engineering (WISE) program was founded in 1980. This collaborative effort among several engineering societies has become one of the premier Washington internship programs, rated as one of the top 100 internship opportunities in the country by the Princeton Review. Its goal is to groom future leaders in the engineering profession who are aware of and can contribute to the important intersections of technology and public policy. Please see <http://www.wise-intern.org> for more information.

Acknowledgements

This paper could not have been developed without the support and contributions of many different people. My society sponsor, ASHRAE, has been overwhelming helpful in developing this paper and in ensuring an incredible learning experience during this summer. I very much appreciate the contributions and assistance by the ASHRAE D.C. office staff: Doug Read, Ryan Colker, and Patricia Ryan. I have always been proud to be the ASHRAE intern because I knew that the people I was working with were the best match for not only my paper topic, but also my personality. I can contribute much of my satisfaction of this program to my wonderful society sponsor.

I would also like to thank the Faculty Member in Residence, Dr. Jeff King, for his advice and mentorship throughout the summer. My acknowledgements would not be complete without mentioning Melissa Carl, who taught us what it's really like to be a professional in D.C., and Erica Wissolik, who was a never-ending source of D.C. activities, laughs, advice, and of course, free food.

I would like to thank Megan Tosh and the rest of the Central Florida ASHRAE section for full-heartedly supporting me and my decision to pursue this internship. I would also like to mention the College of Engineering and Computer Science at the University of Central Florida for preparing me with the knowledge, both technical and not, to succeed at this internship and in life. I would like to thank my friends at UCF who constantly remind me of the potential that I have, and to never doubt

myself. I am most grateful to my family, who never questioned my decision to attend this internship for my last summer in college, and who support me in every endeavor I make.

Finally to my fellow WISE interns; the summer would not have been complete without you. I'm so lucky to have gotten the chance to live and work with such intelligent, ambitious, and thoughtful people. It was such a treat to have gotten to be such close friends over the past nine weeks, and how quickly it came to an end. My 2008 summer is flooded with wonderful memories, including navigating The Elephant metro stop for the first time, James' southern-style breakfasts, Legally Blonde: The Musical, swimming in the Potomac, watching Marc do front handsprings, eating hot-off-the-press Krispy Kreme donuts, having debates at Josh Groban's, staying in and playing dice, running home from Safeway in the pouring rain, jaywalking, stuffing ourselves into elevators, watching Eric gazelle-run, the dramatic lemur, "Remember when..." stories, and our group pot-luck dinners. There are so many additional memories that cameras can't capture (or simply didn't capture).

Believe it or not, I have learned many valuable life lessons and I really look forward to what everyone is doing in the next couple of years. I would especially like to thank my review team for their insight and recommendations on my paper and presentation; quality work could not have been achieved without you. I would also like to thank James, Marc, Eric, and Michaelangelo for serving as almost "older brothers" to me this summer; I appreciate you guys always looking out for me and my best interests. Most of all I'd like to thank Brooke, who put up with my incessant question-asking and can relate to some of my quirky personality traits. I'm so fortunate to have been forced to sleep four feet away from you all summer as I have found a friend for life.

I would like note that none of the interns ended up in the Washington Post; which I consider an accomplishment in itself.

Paper Citation

Androff, Pamela L. "Balancing the Standards Development Process and U.S. Legislation" *Journal of Engineering and Public Policy*, vol. 12, (2008) available at <http://www.wise-intern.org>.

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1.0 Executive Summary

Technical standards have been in development in the United States since the late 1800s. Standards are used as a baseline for a particular science or technology, what an engineer would often use as the minimum requirements in a design. American National Standards have followed guiding principles such as openness, balance, consensus and due process to develop and update standards. This democratic process has allowed stakeholders to participate in all aspects of standard-writing and produces a quality, widely accepted standard. Currently, Standard Developing Organizations (SDOs) update their standards when a new technology becomes so prevalent that it is seen as common practice.

Policy makers are aware of industry's extensive use of standards and their willingness to update their practices in accordance to new standard updates. Language in recent legislation, such as the Energy and Energy Conservation Tax Act of 2007, dictates set targets in the forms of timelines and percentages for the update of standards. This suggests that voluntary standards are no longer a baseline, but instead they become a above-and beyond requirement that some may struggle to meet.

There are several key conflicts and concerns in this legislation. If these types of legislation are passed, there is an infringement on the current standard developing process that is used by voluntary consensus standards for over a hundred years. Each member of the committee has an equal vote, and without the legislation, a member would have to convince a majority of the committee to meet a target or goal. The legislation serves as a stakeholder trying to get a larger piece of the pie by forcing their wants for a standard on the rest of the committee, and hence infringing on the current balanced process. Further, if the legislation were to pass, an immense amount of pressure would be placed on SDOs to meet the target timelines and percentages cited. Resources for SDOs are minimal, and the standards committee may be hard-pressed to find the new technology needed to meet the

goals. The biggest concern with the SDOs is the necessity for the committee to come to a consensus on the standard, which is the largest hurdle to overcome in this case.

Another key conflict is that there is minimal, if any, discussion in the legislation about how the government will go about writing the standard if it is found the SDO cannot meet the requirements set into legislation. There are no details about who will sit on the committee, who will maintain ownership of the standard, and if the process will be transparent. Furthermore, there has been government documentation that encourages the use of the voluntary consensus standards, such as the National Technology Transfer and Advancement Act and OMB A-119. These documents actually suggest the federal government forgo their own development of standards and use voluntary consensus standards instead. This is contradicts the legislation presented when there is language about requirements for standards.

It is important to look at the alternatives for this situation in discussing what can be done. It is possible that the U.S. government is looking to model the standard developing process like some other countries that have a more centralized process, like China. Although this may not be the intent of the legislation, the consequence of it passing could mean many more standards developed by the government as opposed to the private sector.

The recommendations presented in this paper for this issue are to eliminate the language from any current and future legislation, to redefine and reeducate stakeholders on the basics of standards, and allocate more funding to research and development. These recommendations will preserve the unique and dynamic standards process that America has. It will have the added benefit of a greater understanding of the use of standards and why we have them. Finally, the funding for research and development will allow standards to be developed in a more timely fashion because standards are updated when new technology becomes available and is easily implemented by all the stakeholders.

2.0 Introduction

Timelines, deadlines, percentages, and target numbers have become the focus of U.S. leaders. Throughout U.S. history, our leadership has continually made goals and set targets for the country, laying out their aspirations for what our country should be. These goals have become essential to achieve the progress and innovation that America is famous for. Some of our current, most pressing issues require the knowledge and expertise of those in the science and technology field. Innovation is not simply a suggestion; it is a requirement in order to develop a simple, elegant solution. However, there is sometimes a disconnect between U.S. leaders and the science and technology community.

One such example is the initiative to become more energy efficient. The Energy Information Administration breaks down America's energy use into four sectors: Residential, Commercial, Industrial, and Transportation. The commercial sector accounts for 18% of all energy consumed in the U.S. (Energy Information Administration, 2007). Figure 1 below shows the energy uses for the commercial sector, separated by type.

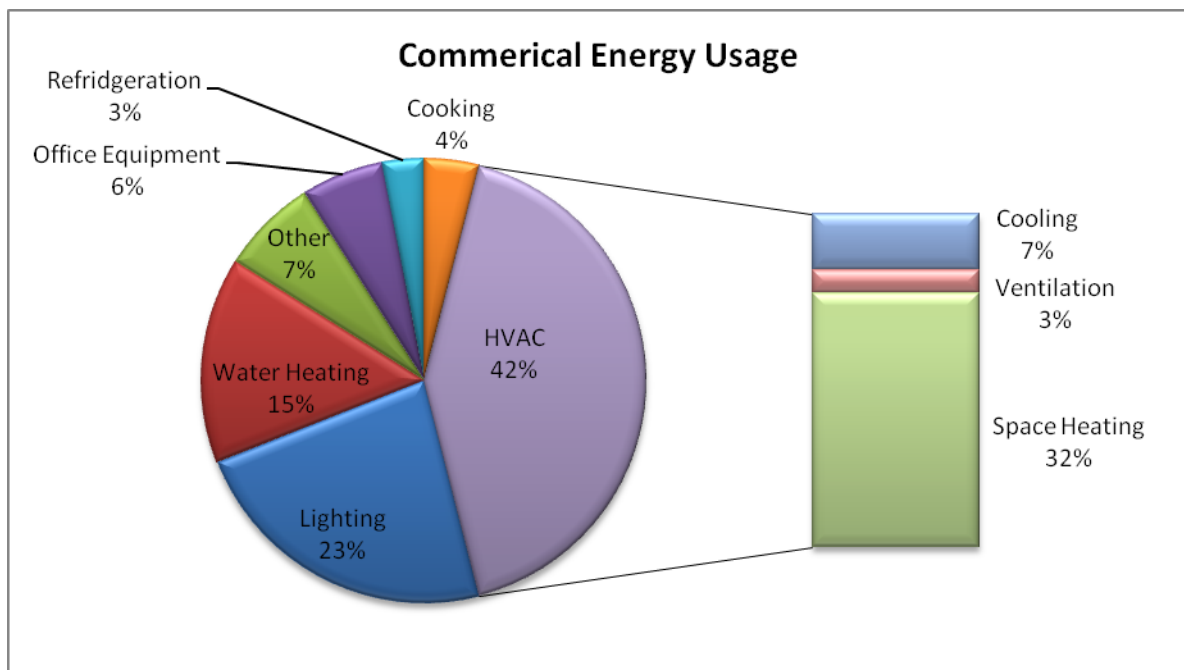


Figure 1: Energy usage for the Commercial sector (Energy Information Administration, 2003)

Heating, Ventilation, and Air-Conditioning (HVAC) is clearly the largest consumer of energy in the commercial section, which is why it should come as no surprise that many have directed their attention to how this number can be reduced.

The American Society of Heating, Refrigerating, and Air-Conditioning Engineers publishes ANSI/ASHRAE/IESNA Standard 90.1, a voluntary-consensus standard that provides the minimum requirements for the energy-efficient design of commercial buildings. In order to reflect changes in technology and industry practice, the standard is updated on a three year cycle, with the most recent version released in 2007. When a standard is referenced in a legislative document, it becomes code.

The Renewable Energy and Energy Conservation Tax Act of 2007 as originally presented (H.R. 3221) calls for stronger building codes and more energy efficiency in buildings. H.R. 3221, Section 9031 states,

“The Secretary shall support updating the national model building energy codes and standards at least every three years to achieve overall energy savings, compared to the 2006 IECC for residential buildings and ASHRAE Standard 90.1 2004 for commercial buildings, of at least—

(A) 30 percent by 2010;

(B) 50 percent by 2020; and

(C) targets to be set by the Secretary in intermediate and subsequent years, at the maximum level of energy

efficiency that is technologically feasible and life-cycle cost effective.

...If the Secretary makes a determination...that a code or standard does not meet the targets...then the Secretary shall within 12 months propose a modified code or standard that meets such targets.”

This provision demonstrates a new version of goal-setting: requiring the development of goal oriented standards through the legislative process. In the case of H.R. 3221, ASHRAE must meet the targets presented or else the Secretary of Energy will propose a new standard—likely impacting the relevance of the existing standards development process. This seems simple enough, but much is overlooked in this casual effort to increase energy efficiency.

Making target dates and percentages a requirement places an immense amount of pressure on Standard-Developing Organizations (SDOs). An open, balanced, and consensus-based process takes into account the opinions of all the stakeholders that are affected by a standard. Stakeholders include consumer groups, producers, users, government academia and SDOs themselves, along with many more stakeholders depending on the topic of the standards. Discussion and multiple revisions to the document to achieve a consensus takes a significant amount of time. Time must also be allotted for public comment and additions. It is unclear whether or not this process can be done more quickly and if so, it would require more resources that SDOs most likely do not have.

Important details about the Secretary writing the standard are not covered in the provision, such as if the Secretary will use a transparent, open, consensus-based standard writing process. Some or all of the stakeholders could be ignored in the process. This could be considered an infringement on the standards-writing process that is currently in use in

America, especially if provisions like H.R. 3221 Section 9031 become the norm for distributing requirements for standards.

Further, government documents like OMB A-119 and the National Technology Transfer and Advancement Act of 1996 that encourage the use of technical standards by government bodies are not mentioned in the provision. It appears that provisions like H.R. 3221 Section 9031, disagree with these previously implemented policies.

For all these reasons and more, setting requirements for standards in legislation is an important topic of discussion. This paper will provide a comprehensive analysis about requirements for standards in legislation and the possible implications of doing so. In the next section, the Background will discuss further details as well as a historical review of this topic. The following section, Key Conflicts and Concerns, will explore future implications on this topic and different aspects of this issue. The paper will conclude with Recommendations to mitigate the issue.

2.1 Background

Imagine that each device in your home required a different screw that would require you to own a large-sized toolbox filled with different types of screwdrivers. Any do-it-yourself work would require a decent amount of time and understanding simply to choose the correct tool for the job. This is only one of many reasons why standards exists.

Standards are developed to address and encourage six items in the area of science and technology:

- Commodification
- Compatibility
- Interoperability
- Safety

- Repeatability
- Quality

The development and use of standards is directly related to many groups of people within the industry. Following standards is voluntary, but these stakeholders have their own reasons for the use of standards. Stakeholders include but are not limited to the following groups of people:

Producer: The person or group of persons using a standard is called a producer. A producer uses a standard in order to be successful in their market.

Users: Users are companies who buy products that are affected by standards or are using standards for the production processes. The use of standards by companies can be very beneficial by contributing to their efficiency.

Standard Developing Organizations (SDOs): Standard Developing Organizations are integral in the production, distribution, and enforcement of a standard. SDOs serve as a recognized provider of standards, therefore increasing the reliability of any standard.

Government: Although standards are voluntary, a standard can become code, or lawfully enforced, if the standard is referenced in a policy or legal document. The federal, state, and local government is a key stakeholder in the standards world, especially for widespread acceptance and use of a standard.

Consumers and Consumer Protection Groups: As a consumer country, Americans have set expectations for products. Standards assure a customer that they are receiving a safe and quality product. Consumer Protection

Groups, such as the American Council of Consumer Interests (ACCI) represent consumers in standard developing processes.

The International Community: Standards are important to the US stakeholders listed above, but they also hold value when considering use by the international community. As global trade increases, the U.S. is a significant market so manufacturers are likely to make to U.S. standards. Many U.S. standards also can serve to differentiate “quality products.”

Stakeholders are key in the discussion of balancing the requirements for standards in legislation. Ultimately the decision in developing or updating a standard will lie in the hands of the stakeholders. This will be discussed further in the next section.

2.2 History of Standards Writing Processes in the US

In the late 1800s engineers began forming themselves into groups focused on discipline. The purpose of these groups was to eliminate confusion between producers and engineering accidents that were prevalent during the time. The main groups developing standards in this time period were the American Institute of Electrical Engineers (now IEEE), the American Society of Mechanical Engineers (ASME), American Society of Civil Engineers (ASCE), American Institute of Mining and Metallurgical Engineers (AIMME) and the American Society for Testing Materials (ASTM). In those early days, and still today, engineers who had particular expertise in a topic would help to develop the standard in their area. Discussions to coordinate national standards development in the United States date back to 1911 and the American National Standards Institute (ANSI) was established in 1916 (formerly known as the American Engineering Standards Committee).

The history of standards development has a direct correlation to the policy issue being addressed in this paper: requirements for standards in legislation. The

proposed legislation would lead to a change in the standards development process that has been an integral part of U.S. engineering history.

2.3 The Current U.S. Standards Process

Standards in the U.S. are divided between two major categories: standards developed by the federal government and standards developed by the private sector. Of the private sector standards, only about 20% are American National Standards.¹ American National Standards must be developed utilizing the principles of consensus, balance, openness, and due process.

Consensus: In a technical committee with the purpose of creating a standard, all of those involved must come to a consensus, or a general agreement, on the material being presented. Once there is an agreed-upon set of material, the group is then called the consensus body. In the U.S. the consensus body is made up of as many stakeholders as possible.

Balance: Standards developed in the U.S. should balance the interests of those who will implement the standard with the interests and voluntary cooperation of those who own intellectual property rights that are essential to the standard.² Many times this means that accessibility to the standard for the communities of interested implementers is limited either by membership to an organization or the payment of a fee.

Openness: The open and fair ANSI process ensures that all interested and affected parties have an opportunity to participate in a standard's development. Openness mainly refers to the collaborative and consensus-driven effort given by the committee. Openness does not imply "free" from monetary compensation or

¹ (Toth, Putting the U.S. Standardization System into Perspective: New Insights, 1996)

² (ANSI)

other reasonable and nondiscriminatory license terms. As discussed in the balance section above, an open standard may involve the payment of a fee to obtain a copy of the standard. Such fees are sometimes used to offset the costs associated with managing open standards development process.³

Due Process: Due process is the key to ensuring that standards are developed in an environment that is equitable, accessible and responsive to the requirements of various stakeholders. Due process is ANSI's way of monitoring the SDO's in their individual processes of developing standards.

These guiding principles are the most important part of the American National Standards that the U.S. is known for. These key items will come into play in the next section, when discussing the need and ability of a government agency to follow these same principles.

2.4 Current Government Involvement in Standards

Currently the government produces approximately 47% of standards in the United States.⁴ Recognizing that discipline-focused groups are developing standards using the expertise of their members, policy was created to encourage the use of voluntary-consensus standards created in the private sector.

2.4.1 National Technology Transfer and Advancement Act

In 1996 the National Technology Transfer and Advancement Act (NTTAA) was signed into law. The NTTAA directed that, " ...all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical

³ (ANSI)

⁴ (Toth, 1996)

standards as a means to carry out policy objectives or activities determined by the agencies and departments." Standards developed by voluntary agencies prove advantageous to federal office because the cost is most usually carried by the group developing the standard.

2.4.2 OMB A-119

Circulars are instructions from the Office of Management and Budget (OMB) to Federal agencies. OMB CircularA-119 establishes policies on Federal use and development of voluntary consensus standards and on conformity assessment activities and was originally developed in 1998.⁵ The effect of the circular does not reach into non-voluntary standards. In this document, it states "All federal agencies must use voluntary consensus standards in lieu of government-unique standards in their procurement and regulatory activities, except where inconsistent with law or otherwise impractical."

⁵ (Office of Information and Regulatory Affairs, 1998)

3.0 Discussion

With the rapidly changing pace of technology, it is up to the SDO to remain cognizant of these changes for their standards to remain relevant. New standards are constantly requested, and the current standards must keep practical for the use of the industry. Because industry so heavily relies of voluntary consensus standards for their work, a new or updated standard could potentially have a huge influence on the way that business, and engineering, is conducted. Politicians have also noticed this widespread impact that standards have on the industry; more and more government offices and federal agencies are referencing standards in their language for new policies and bills. This demonstrates support from the government of the current process for developing standards in the U.S.

A new controversy has arisen in the practicality of recent language that has shown up in several different provisions. The language in the provision is suggesting required numerical changes and deadlines for standards development. Furthermore, if the standards do not meet these requirements, a federal government agency is obligated to provide revisions to the standard. In general, SDOs update standards when they can or when the industry demands them to, but it is not often they are working toward a particular goal or deadline. The most important question is if a requirement for a standard set in legislation infringes upon the current standards developing process.

As discussed in previous sections, the U.S. standards development process relies heavily on the four principles of consensus, openness, balance, and due process. In the case that provisions with this language are passed into law, SDOs are sure to do their best in meeting the requirements that are set for them. However, many SDOs and committees would be unwilling to waiver in the current process in favor of meeting a deadline or requirement. On the other hand, if an SDO fails to meet the requirements of the law, there are no guarantees that the federal agency chosen to replace them will use the four guiding principles. Of most concern is

consensus as many federal agencies, such as the Department of Energy, already develop and produce their own set of technical standards without consulting all stakeholders.

3.1 Key Conflicts and Concerns

A requirement of law in the development of standards can place an immense amount of pressure onto a committee that is developing a standard. Committees generally work to ensure that standards are practical and logical for the practicing engineer. Therefore, when a standard is updated, it is most often simply reevaluated on its practicality of use in the everyday engineer's work. Sometimes standards have very little updates or changes with the committee recommending only updating the standard to mimic what engineers in the field are already practicing.

The added pressure of a goal could have several effects on a committee. This may be the first time the committee is trying to reach a certain outcome, for example, making the standard 50% better. The committee will need to do additional work to find new technologies that are applicable to all industries. Furthermore the whole committee must come to a consensus on the new material, which is a hurdle to jump over in itself.

Many members of standards committees are simply volunteers with their own full time careers and other obligations. A speedier deadline and additional research needed to meet the requirements will place a much higher demand of time on the members of the committee, especially the secretary. In most cases, it can be done, but not without the full dedication of the entire committee. And certainly, government-set requirements could not become the norm for the development of standards without the members of the committee having to dedicate more and more time to it.

More requirements also mean that the SDOs will need more funding to pursue the goal. A standard requires a decent amount of time to put together; in America, the average

time is around 6-12 months. In Van Bruggen's book on standardization, he states that "cost is, to a large extent, related to the time needed for standards development."⁶ In order to effectively progress in the development of a standard, the active participation of a secretary is sometimes necessary. Many U.S. SDOs have a paid employee in charge of this particular duty as it is too much administrative work for a volunteer. Although the recent developments in technology allow for virtual meetings, face-to-face meetings are always preferable in the development of standard, especially while putting together the specific numbers and language for the standard. Therefore, some SDOs may help alleviate the cost of or completely fund a trip for a meeting at which those on the committee can meet. For non-profit organizations, this can add up quickly and be an expensive but beneficial endeavor for the group. These costs are covered by member dues and the sales of other standards.

Another point to consider is whether or not this will become the normal way that the government asks SDOs to update their standards. SDOs that are against said provisions will argue that the government need only contact the SDO, not go to such extremes as putting requirements into a bill. If government officials are not technically sound and a request to an SDO would become a groundbreaking effort for the industry, some standards will need careful consideration prior to updating. It may be possible that the U.S. does not have the technical knowledge or capability to adjust a standard to new, record-breaking numbers. The responsibility of finding new technology to meet the U.S. goals does not lie in the hands of SDOs.

Requests from the government that are put into law may not be technically unrealistic, but instead logistically unrealistic. In the case that a committee simply needs to input more time and effort to satisfy the government's request, the SDO will require additional funds to make it possible. The current provisions do not have any language that provides SDOs with additional funding to meet the requirements. Perhaps the

⁶ (Bruggen, 1996)

politicians in support of the provision do not feel the goals are unrealistic or outside of the normal workings of an SDO. It is also possible that the politicians are uneducated on the due process of standards development and are unaware of any increase in cost to develop a standard to their requirements. At the present, there is no funding set aside for additional costs and there does not seem to be a promise for funding in the future.

The current provisions lend themselves to the possibility of government written standards that are used just as widely as those produced by the SDOs. Prior this language being developed, there should have been a broader discussion on the possible implications of the federal government becoming involved in the writing of standards. There is no mention of who the government will consult in the development of a standard, or if a balanced, open, consensus based process will be used to do so. It is questionable as to whether the government could produce a 'better', more widely-accepted standard than a discipline-focused SDO.

Another item to consider is the cost benefit to the government writing a standard. SDOs produce standards for free as a non-profit organization; most of the members of the technical standards committees are volunteers. It seems absurd to fund a government project that is already being performed for free just to get it done more quickly; and still the faster process may not be the most effective.

In addition to all of the other issues discussed, a provision that lends itself to a federal agency writing a standard violates existing policy set in this area. The NTTAA and OMB A-119 that were mentioned in the background information clearly encourage federal agencies to use voluntary consensus standards as opposed to developing their own, government-specific standard.

3.2 Outside the United States

Each country develops their standards differently. The U.S. is unique in its different entities that develop standards. Bob Toth, an expert on the U.S. standardization

process, discusses in many of his articles about the differences between the decentralized American system and standard developing processes in other countries. The table below gives an overview of four different types of standard developing systems that can be seen in different countries.

Table 1: Forms of Standard Developing Organizations

Form of Organization	Characteristic
Autocracy	The boss decides
Bureaucracy	Guided by formal rules and procedures
Diplomacy	Personal processes to determine content and approval.
Democracy	All interested parties are welcome in drafting and approval.

The United States uses the democracy system, where all stakeholders can participate in an open, balanced system. The legislation that has language about requirements for standards lends itself to more of a mix of bureaucracy and democracy, as there is no longer an even interest from each stakeholder. For this reason, it is important to explore the standard developing processes of other country. Valuable insight can be gained from learning by example, and the processes of other countries can be seen as possible alternatives to our current system.

3.2.1 Europe

The countries that made up the European Council (the earlier version of the European Union) recognized the need for a centralized group of standards that could be used to make trade simpler between them. This group of

directives originally adopted in 1985 was called the New Approach. The purpose of the New Approach was to clearly define the roles of the government, industry, and standard developing organizations in Europe. Also, the New Approach was a major influence in creating a 'harmonized' standardization system, meaning to centralize and organize all of the different standards that are approved. The main objectives are:

- Legislative harmonization is limited to the 'essential requirements', these being obligatory and formulated in general terms;
- Writing of the detailed technical specifications is entrusted to the European, voluntary standards organizations;
- Standards are not mandatory, but products manufactured according to such 'harmonized' standards gives a 'presumption of conformity' to the essential legal requirements in the directives;
- Compliance results in the right of the product to bear the CE marking of conformity and market release throughout Europe.

On October 18th 2004, the European Union commission highlighted its standardization policy and formulated recommendations aiming to improve the European standardization system.⁷ Since then, the EU has continually been improving their New Approach strategy, making it a priority in the Enterprise and Industry sector. The EU Council believes that a harmonized and continually updated strategy on standards will lead to increased competitiveness and a stronger free trade between countries.

3.2.2 China

⁷ (European Commission - Enterprise & Industry Directorate)

Standards in china begin with the Standardization Administration of China (SAC). The SAC is the governmental agency that coordinates, or provides unified administration for, standardization.⁸ About 260 technical committees and 300 subcommittees serve SAC in standards writing. The chairs of these committees are those who work for the state Council in the department in which the standard would fall under. These standards are developed, accept public comment, and then are later approved by the government. Each standard developed by SAC and approved by the government becomes law. In the case of international standards, such as ASME International, the SAC would adopt these standards and sign them into law.

⁸ (Ping)

4.0 Recommendations

As with any problem, it is essential to make recommendations for a solution. In the case of requirements for standards in legislation, three major recommendations can be made:

Eliminate requirements for standards development in legislation: The language in the legislation to include requirements for standards is most likely a large misunderstanding. It doesn't seem that it was the policy-makers intent to infringe upon the current standard developing process. The more plausible explanation for the origination of this legislation is that by establishing these set targets, it would make it easier for industry to understand and therefore follow the standard. However, standards are not meant to be rules that keep the bar set high; they are to be the set guidelines for a particular science or technology. By eliminating the requirements for standards development in legislation, the standards development process is preserved, and current government documentation that encourages the use of voluntary standards still stands.

Redefine 'standard' and reeducate stakeholders: Many SDO loosely defines a standard as the most logical rules for a particular technology. This definition is not translated to all of the stakeholders and further, to the rest of America. It is also unclear that standards are voluntary until they are mentioned in legislation. It is important that each of the stakeholders recognize the difference between a voluntary standard and a code. This would lead to a greater understanding of the purpose of standard. It is up to the SDOs to take action on this recommendation to avoid further confusion.

Increase funding for Research and Development: SDOs are not responsible and should not be held accountable for the development of new technology. The focus should be shifted to the Research and Development sector, where the new findings can then be easily implemented into standards. Standards cannot be updated until new technology is readily available for the entire industry to use and furthermore, the technology needs

to be widely accepted such that each of the stakeholders would agree that a change in a standard to reflect the new technology is necessary.

Looking to the future, America may decide that a centralized standard developing process would be more suitable for our needs. There are several countries around the world already doing this that serve as valuable examples.

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