

Documentary Standards 101

Connecting Metrology, Standards, and Conformity Assessment at NIST and Beyond

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Topics

- Some Definitions
- Example on How It All Relates
- USG Laws, Policy, and Strategic Objectives
- NIST Roles
- ANSI Roles
- State Department Roles
- National Body Processes
- Legal Issues
- Standards Development
- How to be Effective in Standards Development
- Some Current Issues in Standards Development
- Reference Information

Definition

- ***Information and Communications Technology (ICT)***
 - encompasses all technologies for the capture, storage, retrieval, processing, display, representation, organization, management, security, transfer, and interchange of data and information.
- Starting with this term because some of the following information will be based upon the ICT field.

Definition

- **Measurement Standard (etalon)** – realization of the definition of a given quantity, with stated value and measurement uncertainty, used as a reference.
 - NOTES
 - 1 The ‘realization of the definition of a given quantity’ can consist of a measuring system, a material measure, or a reference material.
 - 2 A measurement standard is frequently used as a reference to assign measurement results to other quantities of the same kind.
 - 3, 4, 5, 6, 7
 - SOURCE: International Vocabulary of Basic and General Terms in Metrology (the VIM)
- *The focus of the previous briefing.*

Definition

- ***Standard (norme)*** – document, established by consensus and approved by a recognized body that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.
 - Note: Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.
 - SOURCE: ISO/IEC Guide 2:2004
- *The focus of this briefing.*

Definition

- ***conformity assessment*** - demonstration that **specified requirements** relating to a product, process, system, person or body are fulfilled
 - SOURCE: ISO/IEC Guide 2:2004
- The **specified requirements** may be from a documentary standard.
- *The focus of the next briefing.*

Example on How It All Relates

- I started at NBS in 1974, developing industry requested NBS calibration services and NBS Standard Reference Materials (SRMs) for magnetic computer storage media.
 - ***measurement standards***
- I subsequently participated in the development of *voluntary consensus standards* (i.e., ANS, ECMA, and ISO) as a basis for data interchange, which cited the NBS measurement standards.
 - ***documentary standards***
- Vendors asserted their conformance to these standards.
 - ***first party testing; suppliers' declaration of conformity***
- The GSA tested products (at NBS) for conformance to their purchase specification (derived in part from the data interchange standards) and then approved products for USG purchase.
 - ***second party testing; certification***

USG Standards Mandate

- USG law and policy requires Federal agencies to use ***international, voluntary consensus standards*** in their procurement and regulatory activities, except where inconsistent with law or otherwise impractical.
 - Trade Agreements Act of 1979, as amended (TAA), July 26, 1979/December 8, 1994
 - The National Technology Transfer and Advancement Act (NTTAA), March 7, 1996
 - The Office of Management and Budget (OMB) Circular A-119 Revised: Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities, February 10, 1998
 - M-12-08, Principles for Federal Engagement in Standards Activities to Address National Priorities, January 17, 2012 (memo from three EOP offices: OSTP, OMB/OIRA and USTR)

USG Laws and Policy

Federal agencies, consistent with agency missions, need to coordinate their positions.

- OMB Circular A-119 [Section 15. b. (3)] emphasizes the need for interagency coordination and cooperation in voluntary standards development:

“Ensuring, when two or more agencies participate in a given voluntary consensus standards activity, that they coordinate their views on matters of paramount importance so as to present, whenever feasible, a single, unified position and, where not feasible, a mutual recognition of differences.”

Role of Standards

- Measurements, testing, and standards (and associated conformity assessment schemes) are the basis for developing and deploying technology.
- Consumers of technology are largely unaware of these activities.
- Many are oblivious to the importance of measurements, testing, standards and conformity assessment.
- For those who are aware, perceptions vary.

Standards Expert



What society thinks I do



What my mom thinks I do



What my colleagues think I do



What my friends think I do



What I think I do



What I actually do

NIST Mission

To promote U.S. innovation and industrial competitiveness by advancing measurement science, ***standards***, and technology in ways that enhance economic security and improve our quality of life.

NIST Strategic Objectives

Participation in Documentary Standards Activities Order

[Directive Number O 805.01, Effective Date, October 11, 2012]

“NIST engagement in documentary standards activities is guided by five fundamental strategic objectives:

- *Ensure timely availability of effective standards and efficient conformity assessment schemes critical to addressing identified NIST priorities, including national priorities established in statute or Administration policy;*
- *Achieve cost-efficient, timely and effective solutions to legitimate regulatory, procurement and policy objectives;*
- *Promote standards and standardization systems that enable innovation and foster competition;*
- *Enhance U.S. competitiveness while ensuring national treatment[1]; and*
- *Facilitate international trade and avoid the creation of unnecessary obstacles to trade.”*

NIST Role in Standards

- The NIST Director co-chairs the NSTC Subcommittee on Standards (SoS) -- established in 2010.
- SoS coordinates:
 - federal agencies' standards needs for addressing national priorities;
 - the effectiveness of agencies' participation in private sector led standardization;
 - and current and future standardization related challenges.
- The March 23, 2010 testimony by the NIST Director before the House Committee on Science and Technology, Subcommittee on Technology and Innovation highlights and summarizes our role.

NIST Role in Standards Testimony

*“Last year over 400 technical experts from NIST participated in almost 1100 standards related activities, in more than 100 standards development organizations. **NIST brings to the table a breadth and depth of technical expertise, a reputation as an unbiased and neutral party, and a long history of working collaboratively with the private sector.** NIST values that collaborative relationship and looks to its continued success. This is one of our primary roles under the National Technology Transfer and Advancement Act or NTTAA (PL 104-113).”*

NIST Participation in SDOs

NIST approval is required to join an organization.

Participate in Standards Committees

- *NIST List of Approved Standards Organizations for memberships*
- *Request Memo template for approval of memberships in standards bodies*



NIST Standards Participation Policies

You need to know the big picture!

You represent NIST!

Participation in Documentary Standards Activities Order

Excerpt from Responsibilities, NIST Employees:

“Know and act in conformity with established policies and program objectives of NIST, the Department of Commerce, and the Administration, recognizing that for NIST employees who participate in activities related to the professional basis of their employment carry an inseparable identification with NIST.”

Awareness of the Policies and Objectives of NIST, DOC & the Administration

- NSTC Subcommittee on Standards Federal Engagement in Standards Activities to Address National Priorities Background and Proposed Policy Recommendations – October 2011
- NIST Participation in Documentary Standards Activities Policy [Directive Number P 805.01, Effective Date August 15, 2012]
- NIST Participation in Documentary Standards Activities Order [Directive Number O 805.01, Effective Date, October 11, 2012]

NIST Standards Participation Policies

NIST participation does not imply endorsement.

Participation in Documentary Standards Activities Order

“In accordance with OMB Circular A-119, participation in an organization or body does not necessarily connote NIST agreement with, or endorsement of, the decisions reached by the organization or body or the standards developed by voluntary standards bodies.”

NIST Standards Participation Policies

NIST promotes recognition of standards work.

Participation in Documentary Standards Activities Order

- *“NIST values participation in standards activities and provides mechanisms for recognition of effective activity.”*
- NIST annually presents the **Edward Bennett Rosa Award** to recognize outstanding achievement in or contributions to the development of meaningful and significant engineering, scientific, or documentary standards either within NIST or in cooperation with other Government agencies or private groups.
- *The award consists of an engraved plaque and a \$5,000 honorarium.*

NIST Participation in SDOs

- NIST Standards Services Group maintains the NIST Standards Committee Participation (SCP) Database
- NIST management is responsible for NIST staff maintaining their standards participation data in the SCP Database.
- *This database is now being redesigned to facilitate data entry by staff and to provide for ready extraction of data for use by management.*

American National Standards Institute (ANSI)

- Founded in 1918 by five engineering societies and three government agencies (including DOC).
- A 501(c)3 private, not-for-profit organization.
- Membership comprised of government, industry, academia, individual , etc. entities.
- Does not develop standards.
- Maintains the United States Standards Strategy, December 2, 2010.

American National Standards Institute

There is an MOU between NIST and ANSI.

“This MOU is intended to facilitate and strengthen the recognition of ANSI as the representative of U.S. interests at the international level by all participants; improve domestic communication and coordination among both private and public sector parties in the United States on voluntary standards issues; and increase the effectiveness of U.S. Government agency participation in the national and international voluntary standards-setting process.”

American National Standards Institute

- Accredits the procedures of SDOs.
- About 200 SDOs are presently accredited.
 - > 600 SDOs in the United States
- Approves American National Standards (ANS) developed those SDOs.
 - Will hear appeals on procedural grounds only, not content.
- Accredits U.S. Technical Advisory Groups (TAGs) to ISO Technical Committees.
- Accredited product and personnel certification programs.

American National Standards Institute

Essential Requirements for Due Process

- Openness
- Lack of dominance
- Balance
- Coordination and harmonization
- Notification of standards development
- Consideration of views and objections
- Consensus vote
- Appeals
- Written procedures

American National Standards Institute

- Official U.S. representative to the International Organization for Standardization (ISO)
- Via the U.S. National Committee, official U.S. representative to the International Electrotechnical Commission (IEC).
- ISO/IEC only has National Body members and Liaison members.
- Liaison membership is only for organizations that are multinational.

ITL – ANSI Accredited SDO

<http://www.nist.gov/itl/ansi/index.cfm>

- NIST ITL accredited by ANSI in 1984:
"Standards and guidelines for information exchange relating to automatic data processing and related systems."
- ***We have retained our accreditation solely for the purpose of maintaining one standard:***
American National Standard, Data Format for the Interchange of Fingerprint, Facial, & Other Biometric Information
- Requires NIST ITL to be audited by ANSI every five years.

US Department of State

- The US Government is the US Member State for the International Telecommunication Union (ITU) and the International Civil Aviation Organization (ICAO).
- As specialized agencies of the UN, the ITU and ICAO are treaty-based standards developers.
- The US State Department conducts all of the US preparatory meetings for ITU and ICAO standards activities.
 - *There are no US State Department written procedures.*

US Department of State

- The US State Department represents the US in the ITU and ICAO.
- US State Department staff serve as the US HODs for ITU and ICAO meetings.
- In addition to Member States, ITU also has direct company members (non-voting).
- ICAO does not allow non-government members.

National Body Processes

- NIST, and other US organizations, participate in some SDOs via a National Body process.
- In a National Body process, there is one entity representing the US (e.g., ANSI, State Department).
- ***In such cases, all US NB contributions and all SDO documents go through the US National Body (e.g., ANSI, State Department).***

National Body Processes

NIST cannot directly participate in ISO/IEC or ITU and short circuit National Body processes.

- Exceptions:
 - NIST can directly participate in ITU Focus Groups but should make clear that such participation does not represent a US position.
 - The IEC has offered the NIST Smart Grid Program direct access to the IEC work on Smart Grid standards.
 - MPEG Working Group experts post expert contributions directly to the JTC 1/SC 29 WG 11 web site.

Legal Issues

- Antitrust Liability
- Sovereign Immunity
- Intellectual Property Rights (IPR)
- Legal Precedents – see Reference Information

Antitrust Liability

- In the United States, antitrust laws promote vigorous competition and protect consumers from anticompetitive mergers and business practices.
- In the United States, the *National Cooperative Research Act of 1984* opened a new era where organizations could collaborate to carry out joint research and development ventures and not be deemed illegal per se under Federal antitrust laws or similar State laws.

Antitrust Liability

- SDOs with written procedures that provide for consensus, due process, openness, and an appeals mechanism are less likely to be liable for antitrust actions ***if those procedures are followed.***
- NIST participants should always know the procedures and policies of the SDOs in which they participate.
- ***Whenever such procedures and policies are perceived to raise antitrust issues, this should be brought to the attention of the NIST Office of Chief Counsel.***

Antitrust Liability

- ***You should never discuss:***
 - Any company's prices or pricing policies;
 - Specific R&D, sales and marketing plans;
 - Any company's confidential product, product development or production strategies;
 - Whether certain suppliers or customers will be served;
 - Prices paid to input sources; or
 - Complaints about individual firms or other actions that might tend to hinder a competitor in any market.
- Source: <http://www.incits.org/inatrust.htm>

Sovereign Immunity

- The United States Government (USG) has sovereign immunity and may not be sued unless it has waived its immunity or consented to suit.
- When the USG is sued, the names of any individual USG employees are *usually* replaced with the USG.
- Individual USG employees acting within the scope of their duties will *usually* not be personally liable.
- NIST management and staff may face personnel actions for misconduct in voluntary standards development activities.

Intellectual Property Rights (IPR)

- A big issue for ICT companies is if the standard requires IPR to implement and if the SDO requires:
 - Royalty Free (RF);
 - Reasonable and Non-Discriminatory (RAND);
 - Reasonable Non-discriminatory and Zero-cost (RAND-Z);
 - Ex Ante (disclosure of licensing terms by IPR owners)
- ***An even bigger issue for ICT companies is whether the SDO requires early notification of IPR issues while a standards project is under development or if IPR notification is voluntary.***

Standards Developing Organization (SDO)

- An SDO is any organization that develops and approves standards using various methods to establish consensus among its participants.
- Such organizations may be:
 - accredited (e.g., ANSI-accredited IEEE or INCITS or NIST ITL)
 - international treaty-based (e.g., ITU-T or ICAO)
 - international private-sector based (e.g., ISO/IEC)
 - an international consortium (e.g., OASIS or IETF or W3C)
 - a government agency (e.g., DoD or DHS or NIST)

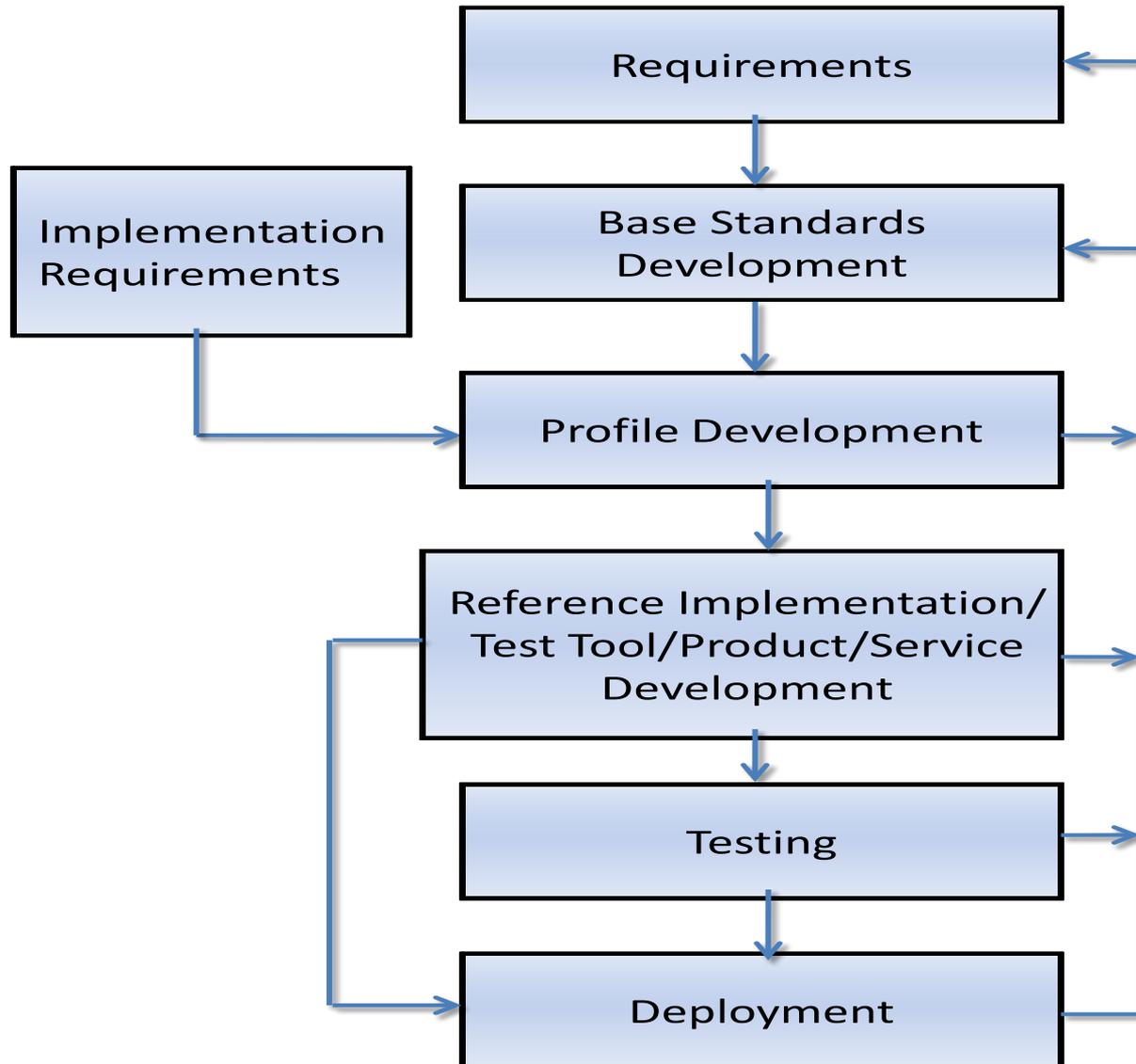
Standards Developing Organizations

- Many SDOs operate through a consensus process that is characterized by openness, transparency, balance, and due process or mechanisms for ensuring adherence to organizational procedures, including provision for appeals.
- The *US National Cooperative Research Act of 1984* opened a new era where organizations could collaborate to carry out joint research and development ventures and not be deemed illegal per se under Federal antitrust laws or similar State laws.
- Consortia may not open and may restrict membership to specific business allies.
- ***This would be an issue for NIST participation.***

ICT Standards Landscape

- As a consequence of the *National Cooperative Research Act of 1984*, where there was once about 25 SDOs involved in ICT standardization, there are now over 200 SDOs worldwide developing ICT standards.
 - CEN Survey of ICT Standards Fora and Consortia; July 12, 2010

ICT Standards Life Cycle



Standards Maturity Model

NIST Special Publication 500-291

No Standard	SDOs have not initiated any standard development projects.
Under Development	SDOs have initiated standard development projects. Open source projects initiated.
Approved Standard	SDO approved standard is available to public. Some SDOs require multiple implementations before final designation as a “standard”.
Reference Implementation	Reference implementation available.
Testing	Test tools are available. Testing and test reports are available.
Products/Services	Standards-based products/services are available.
Market Acceptance	Widespread use by many groups. De facto or de jure market acceptance of standards-based products/services.
Sunset	Newer standards (revisions or replacements) are under development.

Standards Development

Typically an Iterative Process

- Project editor prepares a ***proposed disposition of the comments*** that are received on a draft standard by the assigned target date.
- The ***approved disposition of comments*** is determined by the meeting participants.
- Based upon the approved disposition of comments, the project editor prepares the next version of the standard by the assigned target date.

Standards Development

Project Editor

- The project editor often has tight target dates.
- The project editor is the catalyst.
- The project editor is not the author.
- The project editor is an officer of the SDO.
- The project editor should not advocate for his/her company or country while in the officer role.

Accelerating Standards Development

Timely standardization is dependent upon:

- level of effort by the participants;
- frequency of meetings;
- technical difficulty;
- market politics;
- use of best practices to establish consensus;
- fast track processing, where appropriate; and
- competency of leadership.

How to Effectively Engage in SDOs

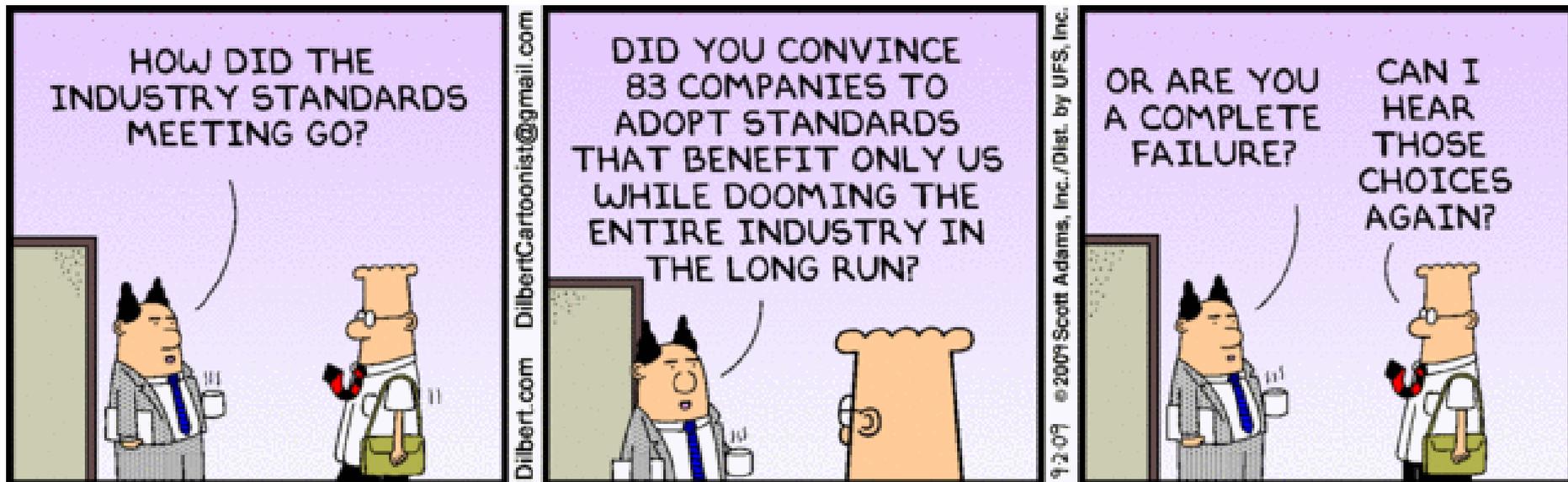
“If people knew how laws or sausages were made, they would have little stomach for either.”

Otto von Bismarck, first Chancellor of the modern German State

How to Effectively Engage in SDOs

Stakeholders have disparate interests.

Self interest drives the consensus.



How to Effectively Engage in SDOs

Read the following guidance documents.

- NISTIR 7854, Guidelines for NIST Staff Participating in Documentary Standards Developing Organizations' Activities
- DOD Guidance on Participating in the Development and Use of Non-Government Standards
 - *Table 1. Participants' Responsibilities*
- ANSI Guide for U.S. Delegates to Meetings of the IEC and ISO

How to Effectively Engage in SDOs

Know the procedures and policies of the SDO.

- Effective negotiation in consensus standards development requires not just technical expertise, but a thorough knowledge of the SDO's standards development processes and policies.
- Many US - based SDOs use ***Robert's Rules of Order*** to effectively conduct meetings.
- You should become familiar with these common practices to be effective.

How to Effectively Engage in SDOs

Know the market, the participants and when to negotiate.

- Awareness of the relevant market and associated market politics, which drive the motivations of the other participants, is essential.
- For international fora, understanding of the cultures of the participants is also important.
- It is important to understand and take advantage of the fact that negotiations occur before, after, during and in between the formal meeting sessions.

How to Effectively Engage in SDOs

Effective leadership

- Effective leadership in SDOs promotes timely development of technically sound standards.
- Leaders need the following attributes:
 - technically knowledgeable;
 - know the market;
 - thoroughly familiar with the SDO's development processes and policies; and
 - talent for listening and summarizing the issues.

How to Effectively Engage in SDOs

Effective leadership

- Key SDO leadership positions include:
 - chairing or convening the consensus group;
 - providing the administrative/secretariat functions for a group;
 - serving as the project editor for a specific standards development project; and
 - serving as a liaison from one group to another group so that two or more standards are consistent.

How to Draft a Good Standard

Support innovation & unambiguous requirements.

NISTIR 7854, Guidelines for NIST Staff Participating in Documentary Standards Developing Organizations' Activities

- Whenever appropriate, you should encourage the development and use of performance standards.
- Performance criteria in standards generally do not stand in the way of innovation, whereas prescriptive specifications tend to do so.
- However, prescriptive standards may sometimes be more appropriate, particularly for describing test methods or procedures.

How to Draft a Good Standard

Use available drafting guides.

- ISO/IEC Directives, Part 2: Rules for the structure and drafting of International Standards
 - *Does not include a requirement for a mandatory or optional conformance clause.*
- World Wide Web Consortium (W3C) specification developers, Quality Assurance Framework – Specification Guidelines
 - *2.1.1 A conformance clause is essential. ... Requirement 1: Include a conformance clause.*

How to Draft a Good Standard

Include a conformance clause.

***Excerpts from the W3C Quality Assurance Framework –
Specification Guidelines***

- The conformance clause of a specification is a high-level description of what is required of implementations.
- The conformance clause provides the answers to the important questions: what may conform and how?

Conformance Clause -- ANSI/NIST-ITL 1-2011, Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information

- **2.1 Verbal forms for the expression of provisions**
 - Shall/shall not, should/should not, may/may not
- **2.2 Syntactical conformance**
 - form and structure of the internal content and verifies data structures exist and have allowable values
- **2.3 Morphological conformance**
 - relationships between fields, subfields, or information items
- **2.4 Semantic conformance**
 - faithful representation of the parent biometric data

Ongoing Issues in Standards Development

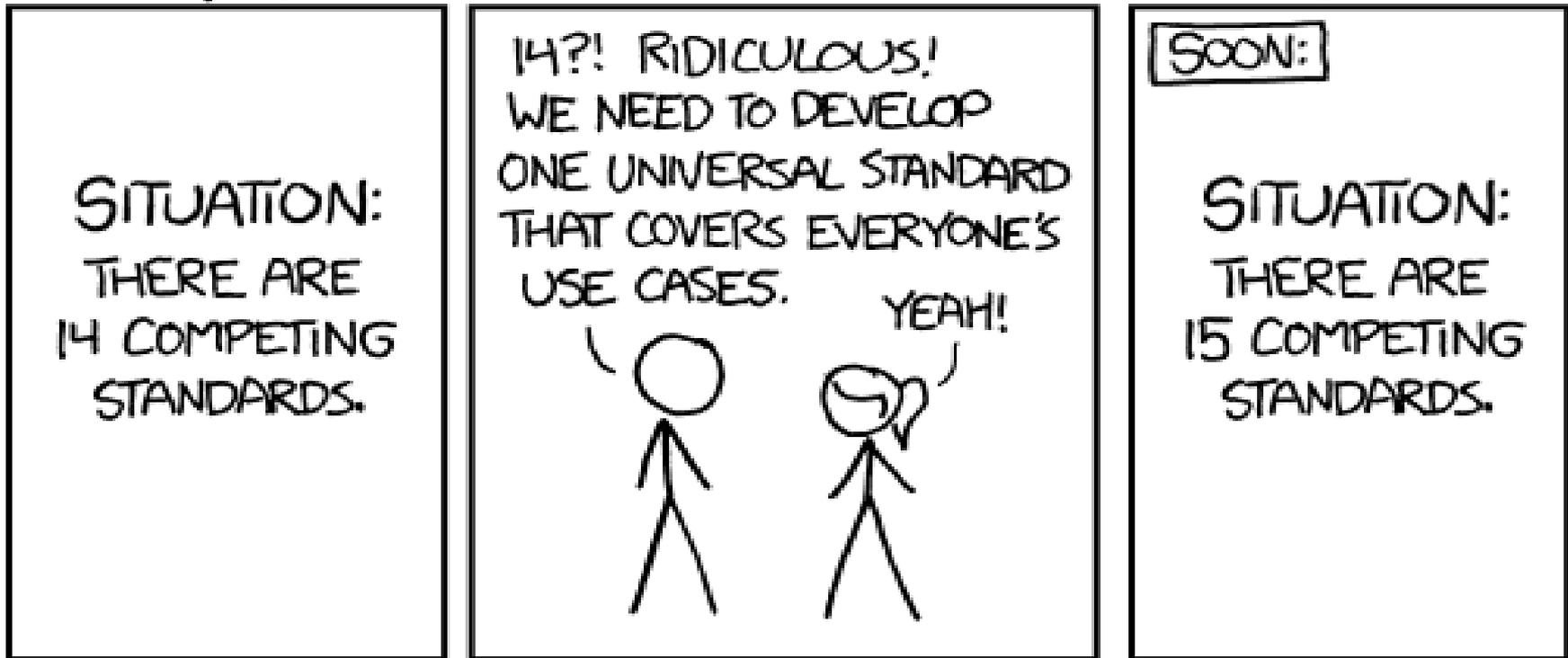
- Standards and Public Policy
 - USG and US private sector oppose SDO attempts at drafting public policy through the creation of technical standards
- Open Standards
 - process, membership, standard available, *IPR*
- Differences between the US and other National or Regional standards systems
- Freely available standards
 - DOT, by reference, cites ~ 600 standards ≈ \$200,000.00.

Ongoing Issues in Standards Development

- SDOs competing for new areas of standardization
 - Turf fights, duplication, conflicting standards, waste of resources
- Turf fights within SDOs
- Duplicative standards versus competitive standards
 - No means test has been established!

Standards Proliferation

HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)



Source: xkcd.com

See: <http://xkcd.com/927/>

NIST

National Institute of
Standards and Technology
U.S. Department of Commerce

Ongoing Issues in ICT Standards Development

NIST Prestige in Measurements, Testing, and Standards

- On occasion, someone seeks to validate the importance of their work by soliciting NIST participation.

Questions?

- Or, time permitting, some illustrative digressions:
 - Unintended consequences of the *US National Cooperative Research Act of 1984*
 - Five Technical Committees with Four Chairs
 - Ample precedent – Dara Hekimi
 - Coffee break – Dara Hekimi
 - Sovereign immunity exceptions

Reference Information

Legal Precedents

- **US Supreme Court Hydrolevel Decision -- 1982**
- **Description:** Hydrolevel went out of business because of the interpretation that their product was not in conformance with an American Society of Mechanical Engineering (ASME) standard.
- **Issue:** No management controls by the SDO (ASME) on interpretations of its standards.

Legal Precedents

- **US Supreme Court Hydrolevel Decision -- 1982**
- **Results:** Technical development group officer issuing interpretation and his employer settled out of court. Amount of damages paid is unknown.

Supreme Court awarded treble damages by ASME to Hydrolevel of \$4.75 million.

ANSI required accredited standards developers to institute due process management controls for the interpretation of standards into their procedures.

Legal Precedents

- **U S Supreme Court Allied Tubing Decision – 1988**
- **Description:** NFPA final draft standard (NEC) excluded poly vinyl chloride (PVC) conduit for electrical wiring.
- **Issue:** A member of NFPA standards activity, Allied Tubing (a manufacturer of steel conduit), led an effort to have many “new” members join NFPA in time for the final ballot on this standard. NFPA membership rules for voting on its draft standards allowed this “stacking” for voting.

Legal Precedents

- **U S Supreme Court Allied Tubing Decision – 1988**
- **Results:** Allied Tubing and NFPA (SDO) were sued by Indian Head Corporation (a leading manufacturer of PVC tubing).

NFPA asked Indian Head Corporation to please drop them from litigation and they agreed.

Supreme Court awarded treble damages of \$11.4 million by Allied Tubing to Indian Head Corporation.

ANSI asked SDOs to review their procedures to guard against possible abusive situations.

Legal Precedents

- **Federal Trade Commission (FTC) – Dell -- 1996**
- **Description:** Dell Computer Corporation attempted to require license on a standard in which it participated and in which it did not disclose its IPR to the Video Electronics Standards Association (VESA).
- **Issue:** “Snake in the Grass” Scenario
- **Results:** Dell entered into a consent agreement with the FTC that prohibits Dell from enforcing its United States patent number 5,036,481 against any company for such company's use of the VESA VL-bus standard.

Legal Precedents

- **Federal Trade Commission – Rambus -- 2009**
- **Description:** In May 2002, FTC filed charges against Rambus for antitrust violations. The complaint asserted that Rambus pursued a strategy of expanding the scope of its patent claims to encompass the emerging JEDEC SDRAM standard.
- **Issue:** “Snake in the Grass” Scenario
- **Results:** On February 23, 2009, the US Supreme Court rejected the bids by the FTC to impose royalty sanctions on Rambus via anti-trust penalties.

NIST Standards Resources

- NIST Participate in Standards Committees
 - NISTIR 7854, Guidelines for NIST Staff Participating in Documentary Standards Developing Organizations' Activities
 - Beaucoup more information
- The U.S. Standards System and Intellectual Property Rights (IPR)
 - Henry Wixon, Chief Counsel

NIST Standards Resources

Global Standards Information

- standards and conformity assessment information
- latest global standards news, events, resources, key contacts
- subscribe for customized updates
- many useful publications
 - The ABC's of Standards Activities
 - ABC's of the U.S. Conformity Assessment System

Other Standards Resources

ANSI Search Engine for Standards -- NSSN

ISO/IEC Information Technology Task Force (ITTF)

- www.iso.org/ittf
- Policies and procedures
- Freely available standards
- ISO templates for drafting standards
- more

SDO Standards Resources

W3C QA Working Group (QAWG) Home Page

- <http://www.w3.org/QA/WG/>
- QA Framework Primer and Usage Scenarios
- QA Specification Guidelines
- Test FAQ
- more

SDO Standards Resources

OASIS Technical Committee Process Policy

- <http://www.oasis-open.org/policies-guidelines/tc-process>
- (8) Conformance Clauses
- more

OASIS Guidelines to Writing Conformance Clauses

- <http://docs.oasis-open.org/templates/TCHandbook/ConformanceGuidelines.html>