"Effectiveness of Federal Agency Participation In Standardization in Select Technology Sectors"

A public Request for Information on behalf of the Sub-Committee on Standards of the National Science and Technology Council

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COMMENTS ON NIST RFI
"Effectiveness of Federal Agency Participation
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This paper is in response to the National Institute of Standards and Technology (NIST) Request For Information (RFI) for "*Effectiveness of Federal Agency Participation In Standardization in Select Technology Sectors*."[i] These comments also address more broadly some additional standardization issues within the Information and Communications Technology (ICT)[ii] area[iii], first some broadly general issues followed by some specific examples.

NEED FOR A NEW APPROACH

Global leadership of ICT standards is an element of a nation's international competitiveness.

The importance of ICT standards leadership to our national interest is ever increasing due to many factors such as:

- Pervasive intrusion of the World-Wide-Web, Internet, and social networking technology into every area of public and private sector interface and interchange;
- Widespread move to networked systems and increasing need for interoperability and information sharing;
- Globalization – companies changing focus from US-only to a global focus;
- Serious cyber-security and identification protection needs;
- Growing international threat to reduce US global leadership in ICT and undermine the global competitiveness of the US;[iv]
- Rising costs and economic uncertainty.

To meet these new challenges, the US needs a new and better approach to information and communications technology (ICT) standardization and implementation – new structures and methods, expanded participation, as well as updated Federal policies and proactive support.

Some will argue that the current approach and attendant infrastructure serves our nation well. Others, as argued in this paper, disagree. Significant improvements are needed and must be supported by the US Government else the consequences will be detrimental to our economy. Needed changes can be made given the likely support of the current administration.

We have a different approach than most other nations. For example, the European Union underwrites participation in regional standards development organizations (SDOs)/standards setting organizations (SSOs) and incorporates standards into public policy and law. Many

regions are developing increasing levels of participation in the creation and use of standards. China is aggressively pursuing global standards involvement and leadership. Other nations promote and fund standards participation: their votes on standards and positions on standards issues in SDO/SSO reflect their coordinated national policy. The US needs to find ways to better represent national interests in global standards fora.

In the aerospace industry, the Aerospace Industries Association (AIA) has recognized the importance of global standards and is expanding its collaboration with Europe to set those standards.

In the Federal sector, it is imperative to change our focus from building government-unique and/or US national standards to collaborating on and facilitating global standards that reflect US interests (or at least are not harmful to US competitiveness). There is a strong need for broader Federal participation in external SDO/SSO (*de jure*, consortia, professional society, industry association, etc.) activities. There is a need for proactive and aggressive Federal direct involvement in and policy leadership of ICT standardization for the nation.

Effective Federal stakeholder participation in relevant private sector SDO/SSO is the critical breeding ground for addressing Federal requirements in tandem with global ICT standards development and implementation. This requires top level management support and adequate resources – two elements currently needing serious attention.

Public law proscribes Federal participation in private sector standardization[v]. Yet, the current Federal approach is pallid, piecemeal and uncoordinated[vi]. There is a need to establish means for increased and robust participation, better representation of Federal requirements into appropriate and relevant SDOs/SSOs, feedback from SDO/SSO activities back to Federal stakeholders, and coordination of Federal positions on cross-cutting standards issues.[vii] Kindly note that current Federal presence in a majority of ICT standards activities is nil – and where participation does occur, it is usually severely anemic.

At the national level, there is a need to be more realistic in assessment of what new standards projects to support (e.g., the cell phone – two competing standards exist: GSM and CDMA).[viii] We note that a majority of the world's cell phone subscribers – more than 80% – use the GSM technology standard. In this case, we found ourselves (the US) isolated from the rest of the world – we built and are using one standard and the rest of the globe built and implemented a different one. Changed attitudes and international coordination would have produced a better result: a single global specification (that US-based vendors could build to and supply the larger global market place).

There is a need to help change and improve the global ICT standardization process. Standards development activities need to be managed as a project – not as a 'hobby' by academics, altruistic enthusiasts nor as livelihood for consultants – with specific and measurable objectives, scoped boundaries, set deliverables, sufficient resources, and reasonable schedules: no more endless drifting of a standards activity schedule, no more 'standards-for-standards sake', no

more esoteric technology pursuits that lack practical or market utility. The US can pressure SDO and SSO to address these needs.

Instead there needs to be standards project management reviews, controlled milestone events, and capabilities to work electronically with minimal face-to-face meetings (emulate ISO TC184/SC4 and OASIS examples for teleconferences, open source tools such as SourceForge, wikis, electronic voting, videoconferencing, collaboration, information sharing, newly available tools and techniques, etc.). There is a need to better educate and encourage standards project participants and their sponsors of these urgent requirements and the need for them to insist upon requisite policy and process changes within the SDO/SSO to make it happen. Federal level participation in relevant SDO/SSO could help initiate such needed changes.

SDO/SSO participants must insist upon producing deliverables that are actually used – that are incorporated into conforming commercial-off-the-shelf (COTS) products, i.e., vendors build COTS products that employ open standards. With the Federal government being one of the largest user communities in the market[ix], it could (like the European Union does), certainly pressure SDOs/SSOs to adhere to this principle.

The Federal government can help standards project participants to insist upon 'good' processes whereby a SDO/SSO quickly and efficiently produces a quality technical specification (standard) that reflects a user/business case via an engineering and management process that considers relevant user and business/industry input. The process ought to be requirements driven. It must use a proven engineering methodology, be managed as a project with coordinated expectations, correctly applied expertise, specific deliverables, adequate resources, realistic schedules and associated accountability. Again, the Federal government is well positioned to influence this through effective participation and involvement in relevant SDO/SSO (e.g., as public law proscribes, Federal participants should seek leadership positions within the SDO and SSO).

There also is a need to find ways for ICT standards development and implementation to better keep pace with technology evolution. We need to be better able to discern when best to introduce new standards. There is a natural tension between technology evolution and standards setting. Timing is critical. Our experience shows that finding the right timing balance is complex – introducing a new standard too soon often kills innovation and creativity (the root of technology evolution and competitiveness), but introducing new standards too late begets significant economic and social costs, e.g., the old home video standards format war: Beta (Sony Betamax) vs. VHS (Video Home System). Again, the Federal sector can help influence this.

Our observation is that there seems to be a relationship between hot new technology and the level of consortia activities[x]. This 'metric' can provide us with some clues about the relevance of a new technology for Federal government transformation via new technology[xi]. The key here is to encourage the new consortia and other SDOs/SSOs to collaborate with each other to produce better technologically current standards that vendors use in COTS products. The end

goal being widespread recognition, acceptance, and use of ICT standardization process deliverables.

It is important for the US to exert influence to encourage SDOs/SSOs to find and employ ways to better collaborate across all standards builders – *de jure*, consortia, professional society and industry associations – and involve all stakeholders, public and private, in a faster, more efficient and robust process that emphasizes openness, is financially holistic and secure, synergistic, transparent and accountable. Re-vitalizing the US standards infrastructure and attendant policies and procedures would help enable this. The Federal government could directly encourage this within the US (e.g., offer tax incentives to off-set costs of standards participation)[xii].

There is a strong need to find ways for inclusion of all stakeholders, especially the small-to-medium-size business enterprises which are conspicuously absent from the current system.

There is a need to continue to support the 'bottom-up' voluntary system and have the private sector lead. While consensus, open participation, and due process are negative draws on process speed during open standards creation, they are vitally important elements whose continuance needs to be supported.

But we also need more public-private collaboration and partnering to produce needed market/user supported open standards. And at the same time, we need to promote coordination and collaboration across business, industry, academia, and Federal sectors.

There is an overwhelming need to foster information sharing and collaboration across the entire ICT global standards community. There is currently too much wasted effort that could more efficiently be put to better and more productive use.

One of the problems is self-imposed. Experience shows that in the US we have been using a short-sighted approach of corralling standards building into industry sectors whereby the various participants in these sectors operate only within their "swim lanes". This limited approach is what is prescribed in the "*US National Standards Strategy*"[xiii] and it might work well in some industry sectors – but it is actually counter-productive and exacerbates the inherent 'rice bowl' issues within the area of ICT technology. It ill serves our nation in addressing business and social changes and global competitiveness challenges of evolving new ICT technology (e.g., cyber-security, etc.), user needs (information sharing, interoperability, networking, mobility, etc.), and the semantic web. Instead, it results in fragmentation and duplication of effort, re-enforces turf struggles, and ignores cross-sector needs and issues. It does not encourage cross-sector information exchange and collaboration.

The convergence of computer and communications technology highlighted the shortcomings of this non-synergistic approach and exacerbated the standards community turf issues and the duplication and fragmentation of efforts that is unnecessary and so costly [e.g., IEC TC100[xiv] and the Digital Audio Visual Council - DAVIC]. Yet we continued the same approach when the

American National Institute for Standards - ANSI published the revised *US National Standards Strategy*[xv].

We are finding this issue to be even more perplexing as we pursue the current administration's ambitious goals for cloud computing, smart grid, health information exchange, education, clean energy, better security, etc. [xvi] Today's global economic competitiveness and the pervasiveness and pace of new technology evolution require new approaches to this specific problem.[xvii]

The challenges we now face require new and better standards and profiles to be developed, tested and implemented quickly across very complex business and industry sectors and domain interfaces. They beg for widespread and comprehensive coordination and collaboration when creating and implementing new standards and profiles. They require a more efficient and effective approach. As a nation, we simply cannot afford to continue encouraging the narrow "swim-lane" approach to ICT standardization.

The author has been working with the ICT global standards community for a very long time and one observation is the frequent fragmentation and duplication of effort that occurs – usually rooted in rice bowls and egos. This drains and dilutes the precious few resources that can be devoted to important new standards development activities.

This problem is exacerbated by the fact that there is little incentive for individual SDO/SSO to voluntarily reach out and collaborate with other SDOs/SSOs to address comprehensive and complex cross-sector standards issues (e.g., smart grid, cyber-security, semantic web, etc.). This is an area where the Federal government could help provide a solution, for example, provide incentives such as seed funding certain initiatives, sponsoring public technology workshops and summits that address specific standardization needs, initiating public-private partnerships such as highly successful new standards and technology project examples like CALS, PLCS, NCOIC, Smart Grid (NIST-SGIP)[xviii], etc.

Collaboration, cooperation and information sharing among standards-setting organizations (SSOs) working in the same area is a good thing. It can happen through government incentives, procedural mechanisms at ANSI (for US accredited SDO), regular communications between SDOs and SSOs, and direct open communications among their overlapping members/ participants (who have strong business and economic incentives to minimize unnecessary or undesirable conflict or duplication of efforts).

Across the Federal sector, NIST could serve as the focal point for Federal level information sharing and collaboration on ICT standards relevant to government transformation.[xix] Indeed, NIST is beginning to take this approach with Cloud Computing.

NIST could also provide training to the Federal level representatives participating in various SDOs/SSOs to teach them how to formulate, coordinate and promulgate US interests in their SDO/SSO processes and substantive deliverables. For example, Federal participants in the

SDOs/SSOs could insist upon efficient and effective SDO/SSO processes and procedures be employed that exhibit characteristics such as:

- Performance vs. process[xx]
- Marketplace support
- Technology relevance
- Managed as a project
- Published quickly[xxi]

PROJECT EXAMPLES

Following are twelve standards projects that the author either initiated, or participated in, that provide excellent examples of various aspects of public-private 'partnerships' and/or novel approaches for standards creation and which are offered as examples to be emulated.

eForms – An internal Department of Defense (DoD) project to automate business forms used in the government. Began with all interested parties – government sponsors, government users, independent testers, vendors, standards 'techies', etc. starting with a 'blank sheet of paper'. The joint team simultaneously developed requirements and conformance test specifications in parallel. Thus, Vendors were provided up front with test harnesses which enabled them to reduce project risk, eliminate the ambiguity of requirements common to other projects, expedite their development schedule, and perform quality checks to ensure compliance. By collaborating and jointly working together a complete new specification was ready for publication within only 11 months. The completed draft specification was then input to a major private sector SDO for adoption and publication (did not want to publish a government-unique standard). However, the project was hi-jacked at that point by a single individual. There was a serious flaw in that particular SDO's process requiring all members to unanimously agree before publication – which enabled a lone disgruntled 'techie' who was as a member of the SDO (but outside the project team) to object and thus wrongly veto the entire process. The specification never was published as a standard but the vendors went ahead and marketed their implementations separately. Thus each unique implementation soon migrated to the point that interoperability among implementations was lost (i.e., subsequent versions deviated from the draft specification that had been agreed upon but not published). Several important lessons were learned by all including the SDO which subsequently changed their voting rules and publishing process.

PLCS[xxii] – Born in the NATO data model experience, collaborated with British Ministry of Defense (MOD), supported by US DoD and other resources, a consortium was established as a government-private sector partnership to build a new standard in ISO and then create a corresponding detailed set of data exchange standards for tailored implementation. The PLCS consortium worked closely with US and other National Standards Bodies, Government agencies (US, UK, Norway, Finland and Sweden) and global business and industry entities. The result was published as an ISO standard [ISO 10303 AP 239]. Subsequently, the joint team took the additional follow-on work to another SDO – the OASIS consortium – to develop and publish detailed data exchange set standards that are used in the implementation of PLCS in various user sectors (e.g., logistics, electronic commerce, etc.). This is an excellent example of governments, the private sector, *de jure* SSO and consortia SDO working together to quickly and efficiently build a new major standard and corresponding detailed implementing standards.

SC4 Harvesting[xxiii] – the ISO TC184/SC4 Committee for Industrial Data established a mechanism whereby specifications created outside the *de jure* standards setting arena (e.g., government specifications, consortia documents, etc.) can very quickly be "harvested" by bringing them into the international *de jure* standards community and adopted as an accredited international standard. This approach offers the US government a significant opportunity to "harvest" relevant internal specifications to become internationally accredited standards. This concept needs to be expanded throughout the ICT standards global arena. The US standards community could exert influence and insist upon this happening.

CALS[xxiv] standards – Two Federal agencies formed a public-private partnership for creation and maintenance of the CALS series of standards with government and industry co-chairing the standards committee[xxv]. Extensive collaboration between the government (numerous agencies/organizations throughout the logistics and electronic commerce communities) and the private sector (multi-national companies, vendors, system integrators, consultants) and academia was the result. The deliverable results were published as a series of new standards (MIL-PRF- 28000 series) and subsequently transformed into succeeding projects to incorporate these requirements into accredited international standards published by private sector SDOs/SSOs.

CALS test network – An example of public-private sector shared resources in operating the CALS test network that was formed to test vendor produced CALS standards implementations.

VRML/Web 3d – government 'seed funding' example to accelerate standards project schedule. As Federal agency representatives participated in a project to develop a new global standard, it was discovered that slow progress on creation of the standard was beginning to lag behind the pace of technology evolution and market place needs. So the government agency provided a minimal level of "seed funding" to accelerate the project schedule (by paying for the cost of the editing process, thereby collapsing the schedule). This particular project and resulting international standard [Virtual Reality Modeling Language (VRML)][xxvi] then evolved to the global Internet's widespread acceptance and implementation.

OOXML[xxvii] – Three Federal agencies were participating in the *de jure* standards process for creating a new global *de jure* standard for office automation. The project became very controversial with competing sides attempting to divide the government into opposite factions. Thus, the Federal participants agreed to caucus and thereby present a unified Federal government input/position on this controversial major new standard.

DOCUMENT INTERCHANGE SYMPOSIUM – A Federal agency sponsored/hosted an invitation-only symposium of internationally known technology experts to address how emerging new technology can help the government with efficient document interchange and interoperability management (specifically, consensus resolution of ODA, ODIF, PCL, PostScript, SGML, etc. standards[xxviii] issues). The government invited certain global experts to participate off-site and covered all symposium expenses including a stipend for the expert's time. The symposium results were shared with various SDO/SSO and had an impact on the subsequent private sector development of interoperable document format specifications and standards.

SGIP (Smart Grid). An example of a new approach to standards creation that includes public-private partnerships, new processes, extensive collaboration, and seed funding. The Smart Grid Interoperability Panel (SGIP) is a consensus-based group of public and private organizations, created by NIST to support the agency in its role to coordinate the development of Smart Grid standards. While the SGIP has more than 630 member organizations with almost 1,800 individual representatives engaged, it seems that the ICT community is under-represented.

A significant factor in the success of this new approach is the seed funding provided via Congressional direction. While the SGIP does not develop or write these standards directly, it works with existing standards organizations (*de jure*, consortia, industry associations and professional societies) to coordinate and accelerate the development of standards considered critical to achieving a nationwide Smart Grid. A significant new

approach to standards building includes the use of "Priority Action Plans (PAPs)". PAPs arise from the analysis of the applicability of Standards to the Use Cases of the Smart Grid. PAPs include identified experts in relevant SDOs, known as the PAP Working Group Management Team. A PAP addresses either:

> A gap where a standard or standard extension is needed: i.e., The need for meter image-download requirements is an example of a non-existing standard needed to fill an identified gap.
>
> An overlap where two complementary standards address some information that is common but different for the same scope of an Application: i.e., Metering information where CIM, 61850, ANSI C12.19, SEP 1&2 all have non-equivalent methods of representing revenue meter readings.

PAPs are created when the SGIP determines there is a need for interoperability coordination on some urgent issue. The PAPs themselves are executed within the scope of the SDOs and Users Groups that sign up for tasks that implement the plans. The SGIP facilitates this process, ensures that all PAP materials are publicly available in real time on a TWiki, and provides guidance when the participants in the PAP are at odds or unsure of its goals.

NCOIC – Established a CRADA[xxix] to jointly (government and industry) work on net centric issues. Three tasks were formulated and resulted in individual working groups for each task. Significant contributions to the technology resulted (e.g., "patterns" approach to requirements and standards analysis[xxx]).

> NCOIC TASK1 - [netcentricity task]. Established a working group to jointly (government and industry) work on definitions and meaning of netcentricity and its significance to the Federal government as well as the public and private sectors.
>
> NCOOIC TASK 2– [Standards task]. Established a working group to jointly (government and industry) work on identifying standards needed for net centric operations implementation. Produced a standards framework and useful taxonomy.
>
> NCOOIC TASK 3 – [Cloud Computing task]. Established a working group to jointly (government and industry) work on means for establishing a geospatial cloud computing application.

Country Codes Tiger Team – An ad hoc team created by an agency to establish a new profile and implementing guidelines for replacing an obsolete Federal standard (FIPS 10-

4). The team is collaborating with Federal government-wide agency representatives and with private sector SDO and SSO to build a new profile of ISO 3166 and FIPS 10-4.

ISO 8000 – A Government agency provided seed funding for the development of ISO 8000, the international standard for data quality and ISO 22745, the international standard for the exchange of quality data, as a means of encouraging industry to provide faster, better and lower cost access to the data required to describe items of supply[xxxi].

SUMMARY

It is strongly in the best interest of the US to properly invest in the ICT global standardization infrastructure and processes. Such investments have great dividends: in cost savings and in enhancing national security and global competitiveness.

The private sector led voluntary 'bottom up' consensus aspects of the US ICT standards approach are good but the overall standards making system faces serious problems and is in need of significant improvement – issues such as:

- viscosity of embedded procedures,
- dwindling participation,
- absence of small to medium size businesses,
- anemic Federal participation,
- lack of Federal-wide information sharing and collaboration, and the
- counter-productive 'swim-lane' (sectorial) approach.

These issues place the US at a disadvantage with respect to other nations in the ICT-standards-aspect of global competitiveness. It is suggested that these complex problems and issues will increase – not diminish – in the future if ignored.

More government collaboration and coordination of standards creation and adoption is needed (internal and external). The Federal government now has an opportunity to significantly affect US ICT standardization infrastructure and processes. The Federal sector is able (if willing) to exert significant influence on private sector standards development and implementation.

To improve the US ICT standards infrastructure and processes, lessons learned from past projects of public-private partnerships, such as depicted in Table 1 below, should be incorporated in Federal initiatives designed to change the current approach. There are many opportunities available through government incentives ("seed funding", other financial incentives, etc.), procedural mechanisms at ANSI (for US accredited SDO), regular

communications between SDOs and SSOs, and facilitating direct open communications (teleconferencing, web-conferencing, wikis, etc.).

We must also address how to best engage government agencies on standards policy issues, articulate a US model of public-private cooperation in standard setting to domestic and international audiences, and develop increased awareness within the Federal government of best practices in addressing-standards policy and procedural issues.

Across the Federal sector, NIST could serve as the focal point for Federal level information sharing and collaboration on ICT standards relevant to government transformation.[xxxii] It is in the best interests of the nation to sufficiently empower and resource NIST to lead the Federal sector in ICT standardization.

NIST could also provide training to the Federal level representatives participating in various SDOs/SSOs to teach them how to formulate, coordinate and promulgate US interests in SDO/SSO processes and substantive deliverables. Trained Federal participants in SDOs/SSOs could then insist upon efficient and effective processes and procedures to be employed.

We do believe very strongly that it is critically important to support creativity and innovation in technology and standards evolution! Indeed, the marketplace shall ultimately decide the winners when there are multiple versions and new technology thrusts – as opposed to some standards committee determining the outcome of such issues. Finally, what is most important is not a particular standard in itself but rather what is done with that standard – its implementation and use is vital. Robust Federal engagement in the US national and the global ICT standardization community can help ensure adherence to these important principles.

Project	Public-private partnership	Federal level collaboration	Information Sharing	SDO Collaboration	Resource Sharing Seed Funding
eForms	√		√		√
PLCS	√		√	√	√
SC4 Harvesting	√		√	√	
CALS standards	√	√	√		√
CALS test network	√	√	√		√
NCOIC standards	√		√		
NCOIC netcentricity definition	√		√		
NCOIC cloud computing	√		√		
PREMO	√				
OOXML		√			
Country Codes		√	√		
VRML	√				√
Document Interchange Symposium		√			√
Smart Grid	√	√	√	√	√
ISO 8000	√	√	√	√	√

Table 1
PROJECT EXAMPLES

END NOTES:

[i] Federal Register /Vol. 75, No. 235 /Wednesday, December 8, 2010 /Notices 76397. DEPARTMENT OF COMMERCE, National Institute of Standards and Technology, [Docket No. 0909100442–0563–02], Effectiveness of Federal Agency Participation in Standardization in Select Technology Sectors for National Science and Technology Council's Sub-Committee on Standardization, AGENCY: National Institute of Standards and Technology (NIST), Department of Commerce. ACTION: Request for Information.

[ii] ICT is the generic name used by the author to include the information technology (IT) and the communications (including telecommunications) technology areas. Many currently simply use "IT" to include both.

[iii] Perceptions based upon the author's extensive and longstanding direct involvement in myriad consortia, professional society, industry association, and national and international and, *de jure* Standards Development Organizations/ Standards Setting Organizations (SDO/SSO). This experience includes current and/or past involvement as a standards committee chair, vice-chair, co-chair, rapporteur, convenor, editor, secretary, and national body head of delegation, as well as service on standards management committees and consortia executive boards.

[iv] In late 1990 European standards organizations (such as CEN, et al) began increasingly introducing new standards that many observed directly undermine U.S. competitiveness in the global marketplace. SEE: American National Standards Institute (ANSI) – "*ANSI On The World Stage*".

[v] SEE: National Technology Transfer and Advancement Act of 1995, Public Law 104–113, 110 Stat. 775— 784 (1996). OMB Circular A–119 Revised, Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities (rev. Feb. 10, 1998).

[vi] This is the author's observation in at least the ICT area.

[vii] e.g., the OOXML office document format standards debacle – Federal level consensus on engagement was needed. In the OOXML case, three Federal agencies were involved – Department of Homeland Security (DHS), NIST and the Department of Defense (DoD) – and the author proposed a Federal caucus with NIST in the lead: a good example for replication of Federal involvement in ICT SDO/SSO and standards activity information sharing and collaboration across the Federal sector.

[viii] GSM is Global System for Mobile Communications developed and published by the European Telecommunications Standards Institute (ETSI). CDMA is Code Division Multiple Access adopted by the US Telecommunications Industry Association (TIA). CDMA is a Qualcomm-created mobile technology that originated in the U.S as a second-generation digital mobile telephone standard which took a different approach to a competing standard: GSM. It is the author's perception that, in this case, ego and rice-bowl concerns overruled the necessary global collaboration and coordination.

[ix] The United States Government is the world's largest consumer of information technology, spending over $76 billion annually.

[x] Kindly note the current proliferation of Cloud Computing activities.

[xi] "*Use technology and lessons learned from the private sector to improve efficiency across every level of government* …" President Obama.

[xii] E.g., enable participation in accredited SDO/SSO standards activity actual costs (membership fees, travel, and labor) to be accepted as allowable deductible expenses.

[xiii] The *National Standards Strategy for the United States* (NSS), published by the American National Standards Institute (ANSI) was approved in August 2000. This first NSS reaffirmed that the U.S. is committed to a sector-based approach to voluntary standardization activities, both domestically and globally. It established a standardization framework that was built upon the traditional strengths of the U.S. system — such as consensus, openness, and transparency — while giving additional emphasis to speed, relevance, and meeting the needs of public-interest constituencies. Strategic and tactical initiatives contained within this framework were developed so that they could then be used by diverse interests to meet their own national and individual organizational objectives.

[xiv] International Electrotechnical Commission Technical Committee 100: Audio, Video and Multimedia systems and equipment

[xv] The revision of the NSS is now known as the *United States Standards Strategy* (USSS), was published by ANSI in 2005. The name change recognizes globalization and the need for standards designed to meet stakeholder needs regardless of national borders. The name also reflects a standardization environment that incorporates new types of standards development activities, more flexible approaches, and new structures. However, the basic approach is still a sectorial approach to standards building.

[xvi] " … *harness technology to confront the biggest challenges that America* faces …" President Obama

[xvii] *"The current standards development infrastructure was never designed to create the closely integrated standards needed to solve the complex problems embedded … in the technology and innovation agenda* …" Andy Updegrove

[xviii] The acronyms are:

CALS – Computer Aided Logistics Support
PLCS – Product Life Cycle Support
NCOIC – Net Centric Operations Industry Consortium
Smart Grid (NIST-SGIP) – Smart Grid Interoperabiity Panel

[xix] "*Unleash creativity … Drive transparency … Ensure accountability* … " President Obama

[xx] Standardize on desired performance instead of process – specify interfaces rather than components; i.e. data formats and protocols rather than software modules. *" …any place we can get a critical mass of the marketplace to get together and do the hard work of testing, internationalization, accessibility in a reasonably timely, fair and accountable way is a place … to do more good than harm."* Dan Connolly

[xxi] It is critical that new standard development projects establish and publish deliverables quickly (apply the Pareto Principle – the "80-20 rule" to their work and schedule) then make improvements to be published in subsequent editions. The PREMO standards projects is a good example how schedule slippage can torpedo a good standard. The Presentation Environment for Multimedia Objects (PREMO) project began well with widespread participation and technical contributions from many experts and vendors. The project quickly built a good specification but the academic project editors held the document back for an additional 18 months to "perfect it". Consequently, when it was finally voted on and published, all of the vendors had lost interest in building conforming implementations. Thus, the published standard is technically excellent [See: ISO/IEC 14478-Information technology – Computer graphics and image processing – Presentation Environment for Multimedia Objects (PREMO)] but it has zero implementations!

[xxii] Product Life Cycle Support (PLCS) is an ISO STEP standard (ISO 10303-239) that enables the creation and management through time of an Assured set of Product and Support Information which can be used to specify and control required support activities throughout a complex product's life. ISO 10303-239 provides an application-specific, but flexible, information model as part of the ISO STEP series of standards. The information model can be tailored by industry and organizations through the use of Reference Data Libraries (RDL). The role of RDL is to complete the semantics of the PLCS model necessary for deployment in industry. The benefit of ISO 10303-239 (PLCS) is its integrated view. However this means that it has a large and generic information model that is larger in scope than most business processes require or most IT applications can manage. This problem is addressed by defining sets of "Data Exchange Specification (DEX)". A DEX is a way of dividing up the ISO 10303-239 (PLCS) information model into sections suited for a particular business process. A DEX provides a subset of the PLCS information model and usage guidance. A DEX can be used to contract against or for setting conformance but AP239 implementations do not have to use DEXs. ISO 10303-239 (PLCS) has been published as an ISO standard. The DEXs are initially being standardized by publishing the subset of ISO 10303-239 (PLCS) and associated usage guidance material as OASIS standards. Once they have been used extensively, they will be included as conformance classes of ISO 10303-239

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[xxiii] The concept of “harvesting” was first introduced by Dr. Steve Carson when he was chairman of the ISO/IEC JTC1 SC24 international standards committee.

[xxiv] CALS (Continuous Acquisition and Life-cycle Support) was a Federal initiative for electronically capturing documentation and linking related information. The initiative has developed a number of standard specifications (protocols) for the exchange of electronic data with commercial suppliers (MIL-PERF 28000 series). CALS includes standards for electronic data interchange, electronic technical documentation, and guidelines for process improvement which have been adopted by several other allied nations. Also, The CALS initiative has endorsed the internationally accredited IGES and STEP standards as formats for digital data. The CALS Table Model is a DTD standard for representing tables in SGML/XML. (see also DocBook). The CALS Raster file format was developed to standardize on graphics data interchange for electronic publishing for the federal government.

[xxv] The CALS initiative has endorsed the internationally accredited IGES and STEP standards as formats for digital data. IGES is *Digital Representation for Communication of Product Definition Data*, first published by the U.S. National Bureau of Standards (now NIST) as NBSIR 80-1978 is an ANSI (US national) standard (also referred to it as ASME Y14.26M) The IGES project was initiated by a group of CAD users and vendors, including Boeing, General Electric, Xerox, Computervision and Applicon, with the support of NIST and the U.S. Department of Defense (DoD).

STEP (ISO 10303) is an ISO standard for the computer-interpretable representation and exchange of product manufacturing information. Its official title is: *Automation systems and integration — Product data representation and exchange*. It is known informally as "STEP", which stands for "Standard for the Exchange of Product model data". The International standard's objective is to provide a mechanism that is capable of describing product data throughout the life cycle of a product, independent from any particular system. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and archiving. Typically STEP can be used to exchange data between CAD, Computer-aided manufacturing, Computer-aided engineering, Product Data Management/EDM and other CAx systems. STEP is addressing product data from mechanical and electrical design, Geometric dimensioning and tolerancing, analysis and manufacturing, with additional information specific to various industries such as automotive, aerospace, building construction, ship, oil and gas, process plants and others. STEP is developed and maintained by the ISO technical committee TC 184, Automation systems and integration, sub-committee SC 4, Industrial data.

[xxvi] VRML (Virtual Reality Modeling Language is a standard file format for representing 3-dimensional (3D) interactive vector graphics, designed particularly with the World Wide Web in mind, and developed by

ISO/IEC JTC1 SC24. The Web3D Consortium was formed to further the collective development of the format. VRML (and its successor, X3D), have been accepted as international standards by the International Organization for Standardization (ISO). The first version of VRML was specified from, and very closely resembled, the API and file format of the Open Inventor software component, originally developed by SGI. The current and functionally complete version is VRML97 (ISO/IEC 14772-1:1997). VRML has now been superseded by X3D (ISO/IEC 19775-1).

[xxvii] Office Open XML (also informally known as OOXML or OpenXML) is a zipped, XML-based file format developed by Microsoft for representing spreadsheets, charts, presentations and word processing documents. The Office Open XML specification was initially standardized by ECMA (as ECMA-376) and later by ISO and IEC (as ISO/IEC 29500).

[xxviii] These acronyms are:

ODA – ISO Standard 8613 "Office Document Architecture (ODA) and Interchange Format"
ODIF – Open Document Interchange Format
PCL – Printer Control Language
SGML – Standard Generalized Mark up Language

[xxix] CRADA - Cooperative Research and Development Agreement

[xxx] Patterns can provide incremental architecture guidance to enable specific networking collaborative capabilities through a recommended structure of related architectural functions and standards. These patterns promise to have a positive impact on reducing the complexity, risk, and costs for development of architectures within the context of multi-enterprise, multi-system environments.

[xxxi] This is a good example of the effectiveness of Federal agencies' participation in standards-setting efforts led by the private sector. ISO 8000 and ISO 22745 are the result of a minimal investment by a Federal agency to seed fund the editing work of standards creation and collaborative efforts by private sector SDOs – the ECCMA and ISO TC184/SC4. The result is effectively driving transparency in the international data supply chain by implementing a standard method across industry sectors for identifying and describing individuals, organizations, locations, assets, goods, services, processes, rules and regulations in a multilingual environment.

[xxxii] "*Use technology and lessons learned from the private sector to improve efficiency across every level of government* …" President Obama.

Comments prepared by Jerry Smith for Intellegere Foundation®

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