

December 4, 2015

**Memorandum**

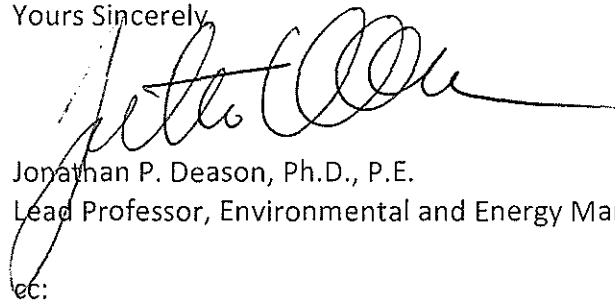
To: Erik Puskar, Federal Program Officer, NIST  
Husai Rahman, Grants Officer, NIST

From: Jonathan Deason, Principal Investigator

Subject: Grant Completion Technical Report, September 30, 2015 (amended report)

I am very pleased to forward the six attached documents that together comprise the final technical report for the period ending September 30, 2015 for NIST Grant Award #: 70NANB14H243. Professors Joe Cascio and Steve Crawford have developed the new course that has been designated -- *Global Connections: Standards for Technology, Business & Public Policy*, which will be offered this coming spring semester 2016. I also am happy to acknowledge the wonderful support and materials received by Joe and Steve from individuals at the American National Standards Institute who made significant contributions to the creation of this course. The enclosed documents are self-explanatory, but if you have any questions please feel free to give me a call at: (202) 994-4827, or e-mail at: [jdeason@gwu.edu](mailto:jdeason@gwu.edu).

Yours Sincerely,



Jonathan P. Deason, Ph.D., P.E.  
Lead Professor, Environmental and Energy Management Program

cc:

Joe Cascio, GWU  
Steve Crawford, GWU  
Lily Gebru, GWU  
Theresa Tran-Nguyen, GWU

Attachments:

- 1) Course Completion Summary
- 2) Course Outcomes
- 3) Course Syllabus
- 4) Course Case Study
- 5) Course Guest Lecturers
- 6) Course Reading List

**Course: Global Connections: Standards in Technology, Business & Public Policy**  
(Course Completion Summary)

**NIST Award Reference Information:**

- ☐☐ NIST Award #: 70NANB14H243
- ☐☐ Federal Program Officer: Mr. Erik Puskar
- ☐☐ Requisition #: 1460102
- ☐☐ Dun and Bradstreet #: 043990498
- ☐☐ Recipient ID: 1133067
- ☐☐ Requestor ID: 1133067
- ☐☐ NIST Grants Officer: Mr. Husai Rahman
- ☐☐ NIST Grants Specialist: Mr. Anthony Stephens

**Description of Work Covered by Grant:**

The recipient is expected to develop a graduate-level foundation course on:

- a) The role of standards and conformity assessment in promoting safety, interoperability, sustainability and prosperity in the modern world, and
- b) The structure and processes for creating and using documentary consensus standards.

Co-listed as a course in the School of Engineering and Applied Science (EMSE 6992-80) and the Trachtenberg School of Public Policy and Public Administration (PPPA 6085-80), this course could stand alone but is designed to serve as a common course in several course sequences in which the subsequent courses are more specialized ones taught in other GW schools.

**Course Name:**

The course has been assigned the name: *Global Connections: Standards for Technology, Business & Public Policy*. This title brings together the areas to be emphasized in the course and is meant to appeal to students in three fields of study: technology, business and public policy.

**Course completion:**

The course is complete as of September 30, 2015. Our approach was to extract teaching points from the references in the reading list and from other materials we have collected from our contacts at ANSI and other sources. We also collected information from other schools (e.g., Catholic University; University of Pittsburgh) that are currently teaching courses on standards and standardization.

Our objective was to collect as much information as we could for the lessons listed in the attached "Course Syllabus." We simply amassed relevant teaching points for each of the thirteen lessons. We then fashioned a set of slides for each lesson and wove in a case study into the thirteen lessons.

We also have invited guest lecturers and will slot them into those sessions where they feel most comfortable in contributing. We have compiled a preliminary list of guest lecturers (attached), all of whom have expressed a willingness to contribute, and this list is expected to grow.

The process of teaching each lesson will be tested against the General Course Outcomes (see attached). We designed the lessons to address one or more of those outcomes. As we created each lesson, we also extracted the detailed learning points for each. These will serve to guide us in delivering each lesson so that we are sure to cover the points we want to convey. Each lesson will also contain case study exercises to give students a “hands-on-experience” to absorb the points made in each lesson.

### **Goals for the Course:**

The course can be characterized as “Standards 101.” It is intended for graduate level students and professionals in engineering, business, public policy and international affairs who expect either to come into contact with standards, to integrate standards into their work or discipline, or to be involved in national or international standardization activities including conformity assessment. The expected course outcomes are as follows:

1. Knowledge of the prevalence and importance of standards for technological progress and commerce, and of their uses in public policy.
2. Knowledge about standards organizations (national and international), their scope, processes, and their roles in global standardization activities.
3. Knowledge of the U.S. national standards system.
4. Knowledge of the international standards system.
5. Knowledge of certain commercial, technological and management principles that have been championed in standards over the years.
6. Knowledge of the use of standards and a greater appreciation of how standardization influences corporate strategies, product design and management systems that have direct and indirect bearing on many fields including those which students are pursuing (i.e., relevance to their own careers and their own areas of interest).
7. Knowledge of the process of creating standards.
8. Knowledge of how conformity to standards is tested, who does the testing, the system for validating the testers, and the benefits and uses of conformity certification.
9. Knowledge of how standards contribute to public policy approaches aimed at Next Generation Self-Governance, including the achievement of cultural and operational change in organizations.
10. Capability and confidence to participate in national and international standards-making activities, including organizational considerations when selecting a representative to be its expert in a standard-making activity.
11. Capability to advise organizational Management on the general process for standards-making and what it would take to get involved in that process if the organization decides it wants to influence a particular outcome.

12. Capability to competently evaluate the use of voluntary, consensus standards to advance the strategic goals of an organization or the public policy agenda of national or international governmental authorities.

Since the course has not yet been taught, we have not had the opportunity to test for actual outcomes. The course is scheduled to be given during the spring semester of 2016 and we will have actual outcomes data by June of 2016. We intend to ask NIST for a spot on the fall workshop agenda for us to report on the course outcomes and course adjustments.

#### **Challenges in course development:**

The overarching challenge in developing this course was to create one that builds a memorable construct for the students given the sheer amount of information and considerations that were relevant to the subject; especially since we included in the syllabus the disparate fields of technology, business, and public policy. The course is by design a “standards 101” course. One strategy was to make the course one in a set of six courses that together are being offered in a graduate certificate program on environmental and energy management in the GW School of Engineering and Applied Science (SEAS). One of the six courses in that package is devoted to teaching how to apply the ISO 14000 and ISO 50000 series of standards to build environmental and energy management systems in organizations. By taking both courses, students will have been exposed not only to the generic, basic attributes of standards, standardization, and conformity assessment but also trained on the detailed and specific application of standards in the development and implementation of effective and conforming environmental and energy management systems in organizations. This course is thus anchored within a logical collection of courses where each one reinforces the key concepts taught in the others. Other schools at GW can also use this approach by integrating this course into other “packaged” offerings that develop students’ competence in the areas of business, public policy, and even law, for example.

The other strategy for overcoming the challenge of creating a coherent course that did not drown in a profusion of scattered detail, was to create a case study that would bind the course together, giving it cohesion and continuity as an integrated whole that would be meaningful to students and helpful for the retention of the material. Students retain concepts better if they can hang details onto a logical, memorable construct rather than trying to make sense of or remember a hodge-podge collection of facts without a binding narrative. The case study is woven into each of the fourteen lessons and builds up and is dependent on each lesson to advance to the next stage. It is based on the actual experience of developing the ISO 14000 series of environmental management standards.

Not only does the case study serve to bind the course details into a cohesive whole, it helps also to illustrate the disparate technological, business, and public policy issues which are fundamental to the goals of the course. Consequently, the instructors believe that we will be able to meet the challenge of creating a course that hangs together and therefore has strong staying power with students. We would emphasize, however, that this outcome still needs to be tested when we give the course. When that occurs, we will be sure to request feedback from the students on whether the course material and presentation succeeded in forming a mental

construct that is likely to remain with them even if the specific details imparted eventually recede in memory.

**Potential for adoption of course by others:**

This course will definitely be adoptable by other institutions of learning as long as the instructors have an appreciation for the standards development cycle. The course will still work if the case study is adapted to the development of some other standard as long as the development cycle format is retained. So, substituting ISO 9001 (*Quality Management*), or ISO 26000 (*Social Responsibility*) or some other standard will work fine as long as the same format is used and the instructor(s) have first-hand experience in developing the standard they are substituting. The experience of developing a standard in an international technical committee cannot easily be acquired academically from afar. If we want students to get a realistic sense of how that process works, then instructors must have experienced it themselves.

**Supplementary tasks currently underway:**

The following supplementary tasks currently are under way through the efforts of Professors J. Cascio and S. Crawford:

- 1) Receive departmental approval for the Environmental and Energy Management graduate certificate program that includes this course.
- 2) Advertise the course across campus.
- 3) Conduct the course in the spring semester, starting on January 14, 2016.

**Course: Global Connections: Standards in Technology,  
Business & Public Policy (EMSE 6992-80)**  
(Course Outcomes)

At the successful completion of this course, students will have acquired the following knowledge and capabilities:

13. Knowledge of the prevalence and importance of standards for technological progress and commerce, and of their uses in public policy.
14. Knowledge about standards organizations (national and international), their scope, processes, and their roles in global standardization activities.
15. Knowledge of the U.S. national standards system.
16. Knowledge of the international standards system.
17. Knowledge of certain commercial, technological and management principles that have been championed in standards over the years.
18. Knowledge of the use of standards and a greater appreciation of how standardization influences corporate strategies, product design and management systems that have direct and indirect bearing on many fields including those which students are pursuing (i.e., relevance to their own careers and their own areas of interest).
19. Knowledge of the process of creating standards.
20. Knowledge of how conformity to standards is tested, who does the testing, the system for validating the testers, and the benefits and uses of conformity certification.
21. Knowledge of how standards contribute to public policy approaches aimed at Next Generation Self-Governance, including the achievement of cultural and operational change in organizations.
22. Capability and confidence to participate in national and international standards-making activities, including organizational considerations when selecting a representative to be its expert in a standard-making activity.
23. Capability to advise organizational Management on the general process for standards-making and what it would take to get involved in that process if the organization decides it wants to influence a particular outcome.
24. Capability to competently evaluate the use of voluntary, consensus standards to advance the strategic goals of an organization or the public policy agenda of national or international governmental authorities.

**Course: Global Connections: Standards in Technology,  
Business & Public Policy (EMSE 6992-80)**  
**(Syllabus)**

**COURSE DESCRIPTION**

What are standards and why care about them? Standards are agreed-upon ways of doing something – of making a product, managing a process, delivering a service or supplying materials.<sup>1</sup> In our technologically advancing and connected world, they increasingly shape the competitiveness of firms and economies, the health of individuals and complex systems (energy, trading, financial reporting), and the fate of the planet. Yet, few business managers, government officials or those who advise them know much about the standardization process for voluntary, consensus standards and who creates them, much less how to get involved in order to shape them and take full advantage of their existence. This inter-disciplinary, graduate-level course addresses that gap by teaching the knowledge and skills needed to operate effectively and provide leadership in the standards arena. It gives special attention to the exciting potential for voluntary consensus standards to promote prosperity and safety at a time when governments find it difficult to act.

**LEARNING GOALS and OBJECTIVES**

The overarching learning goal of this course is to introduce you to the mildly esoteric but exciting world of standards, standards organizations and standards development in a way that leaves you knowledgeable about their key factors, prepared to apply that knowledge in professional settings including those for creating standards, and motivated and well-equipped to continue learning on your own. The learning objectives below represent more specific dimensions of that goal, organized around basic questions about standards.

**LEARNING OBJECTIVES**

What are standards and what do they do? Technology standards control access to markets, and thus play a critical role in the fortunes of firms and countries. By the end of this course, you will be able to explain standards, the wide range of subjects they cover, and the different types that exist for different purposes, with special attention to voluntary, consensus standards.

Why do we need standards? There are many answers, from making sure spare parts fit, to ensuring that transmitters and receivers work together, to protecting children from toxins in toys. By the end of this course you will be able to explain how standards promote consumer and worker safety, economic development and environmental sustainability, and why they are sometimes controversial.

Where do standards come from and how are they enforced or revised? By the course's end, you will be able to explain the existing industrial, national and international institutions for developing standards and for assessing and enforcing conformity with them. You will have opportunities to

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<sup>1</sup> To be more precise, standards are published documents that spell out the specifications and procedures that ensure the safety and reliability of the materials, products, methods, and/or services people use every day.



meet with senior executives at the American National Standards Institute (ANSI), the National Institutes for Standards and Technology (NIST), and other leading standards bodies.

How can I use such knowledge in my career? By the course's end, you will be able to identify and explain the need for a new standard or risks posed by a proposed one, support the development and consensus negotiation of an appropriate standard, and assist with its implementation and/or enforcement in your professional setting. You will be able to assess and show how standardization does or would affect corporate strategy, product design, and management systems. For those in public policy, you will be able to evaluate the need for and implications of new standards and the challenges of attaining agreement on them.

How else might I use such knowledge? You will also gain deeper insight into the challenges of ensuring prosperity, safety and sustainability in an increasingly complex world. And you may come to care about the potential of private, consensus-based processes for making needed rules about emissions, trade, financial reporting, product and worker safety and much more in a world where governments are often unable to do so. Such insight and caring may affect your personal decisions about career choice and volunteer activities.

### **PEDAGOGICAL APPROACH**

This course is premised on the belief – one backed by much evidence -- that learning is most effective when it is active. Therefore, lectures will be few and brief, discussion and group projects will be serious endeavors, and the professors will act more as guides by your side than sages on a stage. You will have an opportunity to shape the course as it unfolds, but should expect in turn to take some responsibility for its success.

Your professors bring much relevant experience to your community of learners. An engineer and lawyer by training, Joe Cascio is an experienced consultant on management systems based on ISO standards and a Visiting Scholar at GWU's School of Engineering and Applied Science. He worked for 26 years at IBM, chaired the U.S. Technical Advisory Group (TAG) on the ISO-14000 series of environmental management standards from 1991 to 2003, and served as the Federal Environmental Executive with the Council on Environmental Quality in the Executive Office of the President in 2008-09. He has published widely on the role of process standards and conformity assessment of environmental management systems.

Steve Crawford is a Research Professor in GWU's Institute of Public Policy. Previously he worked as a senior manager at Brookings, the National Governors Association, and in Maryland State government, as well as a college professor. Currently he directs a major project on developing and operationalizing standards for defining labor-market credentials. He is a member of the board of the American National Standards Institute, and awaiting Senate confirmation of his nomination by President Obama to serve on the U.S. Postal Service's Board of Governors.

The students in this class bring a wealth of professional and personal experience of their own. By working collegially and collaboratively, just as in professional settings, we will be able to achieve the learning objectives set out above for this course.

## COURSE TOPICS

This course envisions thirteen learning sessions in a three credit academic offering. Most sessions will be enriched by a guest lecturer who has exceptional experience in the topic being covered. The course sessions include:

1. Historical perspective and value of standards:
  - a. Illustrate with a sampling of standards from antiquity through industrialization, World War II, the post-war decades and the last few decades' revolution in information and communications technology
  - b. Discuss the influence of military specifications to other standards
  - c. Discuss the genesis and advantages of standards for the industrial era
  - d. Present anecdotes on the contributions of Deming, Juran and other leaders in standardization
  - e. Discuss how quality standards led to a proliferation of *management system standards* (MSS), many of which treat areas that are "normally" in the province of public authorities
  - f. Introduce the case study: *International Standards for Environmental Management*
  
2. Types of standards, principles and value to society:
  - a. Technical standards (mechanical, electrical, Metrical, IT)
  - b. Quality processes (scientific management)
  - c. Product characteristics (medical devices, labeling, LCA, Design, Buildings)
  - d. Management subsystems (Environmental, OSH, Social Responsibility)
  - e. Exemplify with: ISO 9000, 14000, 26000, 50001, 45001, others
  - f. Case study exercise
  
3. The U.S. national standards system (I): Private sector
  - a. Players, structure, process, checks and balance
  - b. ANSI Federation, SDOs, Consortia Groups
  - c. Case study chapter
  
4. The U.S. national standards system (II): Governmental role
  - a. NIST, USTR and other Federal agencies
  - b. The National Technology Transfer and Advancement Act (NTTAA)
  - c. The Standards Development Organizations Advancement Act (SDOAA)
  - d. NIST report to the National Science & Technology Council (2011)
  - e. Case study chapter
  
5. The International standards system (I)
  - a. Players, structure, process (ISO, IEC, CEN/CENELEC, ITU, Country Member Bodies)
  - b. The ISO Technical Management Board
  - c. The ISO Central Secretariat
  - d. Case study chapter

6. The International standards system (II)
  - a. The Vienna Agreement
  - b. Relationships with other international bodies (e.g., WTO, ILO, OECD, UN, Member Bodies and Governments, etc.)
  - c. Representation of interest groups on committees
  - d. Case study chapter
  
7. The mechanics of standardization (I)
  - a. ISO technical committees, subcommittees, work groups (formation, scope of work)
  - b. National member bodies (e.g., ANSI) and national mirror groups (e.g., USTAGs)
  - c. Strategic Advisory Groups to ISO (e.g., Strategic Advisory Group on the Environment)
  - d. Case study chapter
  
8. The mechanics of standardization (II)
  - a. New work item proposals (NWIPs)
  - b. National delegations (delegates, experts, operation and rules)
  - c. Consensus (Definition, how it is achieved in practice)
  - d. Participation in standardization (materially interested parties)
  - e. Case study chapter
  
9. The use of standards (I):
  - a. By industry and commercial entities (voluntarily)
  - b. For national governmental purposes (DoD, USEPA, FDA, etc.)
  - c. Case study chapter
  
10. The use of standards (II):
  - a. For international governance, arrangements, agreements, protocols
  - b. Federal policy of incorporation by reference into regulations
  - c. Ramifications of incorporation by reference (ramifications for regulation)
  - d. Legal uses and issues (copyright, etc.)
  - e. Case study chapter
  
11. Conformity Assessment (I)
  - a. How conformity assessment works separately from standardization
  - b. Accreditation, Certification, Registration
  - c. Structure and entities involved
  - d. Oversight and control nationally and internationally
  - e. Case study chapter
  
12. Conformity Assessment (II)
  - a. Auditing standards (e.g., ISO 19011)
  - b. Legitimacy and credibility in conformity assessments
  - c. Qualification and competence of auditors and course providers
  - d. CASCO guides for accreditation, certification and auditor competence
  - e. Case study chapter

### 13. Next Generation Self-Governance

- a. What is it?
- b. Enablers (technology, voluntary standards, public awareness and involvement)
- c. Achieving cultural and operational change in organizations
- d. Case study chapter

### 14. Review and reinforce concepts and principles from previous lessons

#### **ASSESSMENTS, LOGISTICS and INTEGRITY**

In a course about standards, there should be clear criteria and standards for assessing student learning. At the same time, the assessments should encourage deep and enduring learning, and not only about the course material but about your own interests, abilities and best ways of learning. With that in mind, this course offers some choice about what you do to demonstrate progress towards competency in standards and how much the various activities count. Please review the following menu and choose according to the directions. The result will be a contract.

- (1) Case Study: The case study will be presented as chapters in a rolling scenario over the thirteen sessions. It will explore the issues and options for the creation of international environmental management standards. We will discuss in class the underpinnings of the types of issues and options available for the creation of such standards in each chapter of the scenario. Students will be divided into small groups and will receive a set of questions at the end of each session. Answers to the questions will reflect their analysis and recommendations to be submitted in written form before the next course session. We will devote the first 30 minutes of each session to reviewing the submissions and discussing their merits.

Issues and options to be considered in the case study chapters may include ones such as:

- What evidence would you expect to be presented as justification for creating separate, unique standards?
- What goals might the advocates for new standards have in mind?
- What expertise would you expect from those that would create such standards?
- Which interest groups would you expect to come forward to participate in creating such standards?

The group submissions will be graded for quality and for the degree of understanding of the international standardization process. Members of each group will all receive the same grade on the case study portion of the course grade (50%)

- (2) 3 Quizzes on readings and class instruction, worth 5 points each (15%)

- (3) Class Participation/contributions to discussion (learning through discussion) (20%)

- (4) Write a 5-page policy brief arguing for or against the adoption of a new standard of your choice (to be approved by instructor) and advising a client (firm, industry association, government agency) on the best strategy to pursue and why (15%)

## **CLASS LOGISTICS**

Course credits: Three credit hours

Time is 2.5 hours/session, one session/week, 6:10 – 8:40 PM, 15 weeks

Location: Lehman Auditorium, Science and Engineering Hall, 800 22<sup>nd</sup> St. NW

Submit work electronically to Professors Cascio and Crawford by email.

Office Hours: Cascio – Tuesday: 4-8 pm (Tompkins Hall, Suite 103). [cascio@gwu.edu](mailto:cascio@gwu.edu); 994-3005

Crawford – Thursday: 4-6 pm (Media & Public Affairs Building, Suite 625).

[Crawford@gwu.edu](mailto:Crawford@gwu.edu); (202) 994-5365

## **HOUSEKEEPING**

Students should check the GW Campus Advisories web site at:

<http://www.campusadvisories.gwu.edu/index.cfm> for current information related to campus conditions, closures, safety information and any other information concerning events that may disrupt normal operations. You may find it convenient to register in the GW Banner system to receive emergency alerts, notifications and updates sent to the GW email addresses. If individuals elect to receive these alerts on a mobile device, they may log on to GWeb Information Web Site at <https://banweb.gwu.edu> and update their contact information to include mobile devices.

If we fail to arrive for the class at the designated starting time and have not notified the class of a late starting time or cancellation, students should wait in the classroom for at least 15 minutes before departing. One member of the class should be selected to notify the EMSE Department of the instructors' absence by calling the EMSE Department at 202-994-7541 on the next business day. All students should familiarize themselves with the emergency evacuation routes from our classroom. In the event of an emergency evacuation of the class building, students are to assemble at the northwest corner of 23<sup>rd</sup> and H Streets, N.W.

## **ACADEMIC INTEGRITY**

Academic integrity is central to the learning and teaching process. Students are expected to conduct themselves in a manner that will contribute to the maintenance of academic integrity by making all reasonable efforts to prevent the occurrence of academic dishonesty. Academic dishonesty includes, but is not limited to, obtaining or giving aid on an examination, having unauthorized prior knowledge of an examination, and plagiarism of all types. Ignorance is no excuse. Nevertheless, collaboration is a good thing, just acknowledge it.

**Course: Global Connections: Standards in Technology,  
Business & Public Policy (EMSE 6992-80)**  
**(Case Study)**

**Case Study: International Standards for Environmental Management**

**Case study structure and operation**

This case study is structured and presented through thirteen exercises (corresponding to the thirteen course learning sessions) to give students a hands-on experience on the mechanics and logical concepts of standards creation and utilization to help cement the learning points in each session. The class will be sub-divided into small groups so that students can interact and learn from each other as well as reach collective answers that are of higher quality than might otherwise be the case for students working individually. Students are encouraged to remain an additional 30 minutes at the end of each session to work within their groups to answer the questions in the case study exercises. They also have the option to come to consensus by e-mail or any other method convenient for their group. Each group will record its answers to the exercise questions and submit them electronically to the professors by end of day Tuesday before the next scheduled session. The first thirty minutes of each session will be devoted to a class discussion of the answers, except when the scheduling of guest lecturers requires later coverage during the session. Student submissions will be graded and the grades will account for 50% of the total course grades given.

Every member of each group will receive the same grade for the case study portion of the total course grade, including an extra grade point for each week in which his or her group earns the highest grade. Answers will be graded on the following criteria (25% allotted to each criterion):

1. How close does the answer agree with the aspect of standardization that was discussed in the corresponding class session?
2. How much depth of understanding of the nuances, considerations and consequences does the answer reflect?
3. How many valid or useful options, considerations and consequences does the answer contain? (Invalid, improbable or impractical options, considerations and consequences in the answer will not count against the grade for the answer.)
4. The degree to which the answer is concise, logically structured, and well communicated.

**1. Case study introduction**

We have been informed that the International Organization for Standardization (ISO) is looking into the *possibility* and *desirability* of creating international standards for environmental management that will achieve the same level of popularity and usefulness as the ISO 9000 series of standards for quality management in organizations. ISO has notified its member bodies and will soon convene the first meeting of its newly appointed Strategic Advisory Group on Environment (SAGE) in Geneva, Switzerland, to begin looking at these questions. ISO itself will be the convener of the meeting and will provide the secretarial support. It has also named a chairman to run the meetings. The chairman of SAGE is an executive in one of the organizations that approached ISO to conduct this

inquiry. That organization is an industrial enterprise in Switzerland, headed by the wealthiest Swiss citizen according to widespread belief. The vice-chairman of SAGE is an American executive from a small manufacturing company in New Jersey, but this nascent activity had not yet been communicated to other ANSI members until now. The American National Standards Institute (ANSI) has now called a meeting of “volunteers” from among its members to discuss the formation of a U.S. delegation to the SAGE meeting and to prepare consensus positions for participation in that meeting. You have been volunteered by your company to participate in the ANSI meeting and perhaps to be a part of the delegation to the upcoming Geneva meeting.

1. Exercise: In preparation for the ANSI meeting, you ask yourself: Do we want international environmental management standards, and why do we?

## **2. Type of standards**

Assuming we have decided to create international environmental management standards, and considering our in-class discussion of the variety of standards, we now need to decide the type of standards we want to create for environmental management. Should they be technical engineering specifications, measurement protocols, process standards, standards for product characteristics, or guidelines for carrying out analytical investigations? You have been informed that the SAGE group has decided to create standards in four main categories: (1) environmental management system for organizations, (2) product labeling, (3) life-cycle analysis, and (4) green-house-gas measurement and reporting. Considering these four categories, what type of standards should we create for each category?

2. Exercise: You have been selected to go to Geneva as part of the U.S. delegation to SAGE. The consensus in the ANSI meeting was that we do want such standards. There was also consensus on the type of international standards that should be created for the four categories selected for environmental management by SAGE. What might those types of standards be and why?

## **3. Selecting the U.S. SDO Administrator**

As we discussed in this session, the U. S. standards system is decentralized, with ANSI serving a coordination function for over 400 active standards development organizations (SDOs). Importantly, in the environmental field we also need to consider that environmental protection is a major subject for governmental controls and regulations that are principally executed through the U.S. Environmental Protection Agency (USEPA) but also involving the Department of the Interior, the Bureau of Land Management, the National Oceanic and Atmospheric Administration, the Fish and Wildlife Service, the Department of Agriculture and the myriad state and local agencies dedicated to protecting the environment. Additionally, there are many non-governmental organizations devoted to environmental protection such as the Sierra Club, the Audubon Society, the National Wildlife Federation, Greenpeace, the Environmental Defense Fund, the Natural Resources Defense Council, and dozens of others at both the national and local levels. Given this broad diffusion of responsibilities among governmental and non-governmental organizations and the fact that there is a serious public concern for environmental protection, the decision on which organization organizes and administers the U.S. sub-group to the international standard-creation effort (the US “mirror group”) needs to be weighed and allocated carefully by ANSI.

3. Exercise: As the U.S. member body to ISO and head of the federation of SDOs, ANSI can keep to itself or allocate responsibility to organize and administer the U.S. mirror group to correspond directly to the structure of the international technical committee. What factors should ANSI weigh to select the appropriate SDO that can form the mirror group and gain broad acceptance from all the U.S. "materially interested parties" on this subject, and why?

#### **4. U.S. government role**

In exercise #3 we took note of the fact that in the U.S. many governmental and non-governmental organizations share responsibility for environmental protection and for promoting environmental performance improvements. Having chosen one of the existing private-sector SDOs to organize and administer the U.S. mirror group, what role should the governmental and non-governmental organizations play within this mirror group to ensure that public policy issues are appropriately safeguarded, competently represented, and appropriately included in U.S. positions?

4. Exercise: What role in the U.S. mirror group should the governmental and non-governmental organizations play for the creation of international standards for environmental management, and what is the primary vehicle for playing such a role?

#### **5. The appropriate international secretariat**

In this lesson, you have had an introduction to the international bodies that create international standards. As you have heard, they tend to specialize within certain sectors and generally respect and stay out of each other's turf. They sometimes formalize their relationships and boundaries with a memorandum of understanding (MOU) or even more formally with "treaties" such as the Vienna Agreement between ISO and the European Union (EU). Even though ISO initiated this current process of evaluation, considering the characteristics of the international bodies that we have discussed in class, is one such body more appropriate than the others to establish a technical committee on environmental management standards? The selected international standards body would then delegate to one of its member countries the authority to convene an international technical committee to create the international standards for environmental management.

5. Exercise: Which international body and which of its member countries would you select to convene the technical committee for the creation of international standards for environmental management, and why? Include reasons on why the other candidates are less suitable.

#### **6. Coordination among national mirror groups**

The international technical committee (TC) has now been formed and the U.S. has also formed its mirror group, typically named the Technical Advisory Group (TAG), which will be administered by the selected SDO. The initial stages of work to prepare the *scope of work* and *new work item proposals* (NWIPs) are very important since these blueprints will largely determine what the committee will work on and hence produce as standards, at least during the first five to eight years of the committee's life. Consequently, there are strong temptations to reach out to the other national mirror groups to form alliances that can more effectively influence the process of deciding



on the scope of work of the committee and on the initial work items to be addressed under that scope of work. Importantly, there are also factions within each national mirror group that may have stronger common interests with similarly interested factions (e.g., NGOs) in other national mirror groups and they would welcome the opportunity to collude or at least to coordinate their strategies for getting what they jointly want to achieve from the process.

6. Exercise: To what extent should the U.S. mirror group or factions within the group be allowed to coordinate and/or collude with their counterparts in other member bodies in the creation of international standards for environmental management, and why?

### **7. Scope of work**

As discussed in exercise #2, the areas of standardization selected by SAGE and passed on to the TC include: (1) environmental management system for organizations, (2) product labeling, (3) life-cycle analysis, and (4) green-house-gas measurement and reporting. In exercise #2 we also decided on the type of standards appropriate to each of these four categories. The question that must now be decided is the depth, the detail, and the level of prescription that standards in these four categories can attain or should attain. Factors that weigh on those decisions have to do with what is the appropriate level of prescription for this topic that can be promulgated by an international standards body; what is the actual level of need in the user community that should be addressed; what is the level of technical expertise that can be brought to bear for the creation of these international standards; what level of detail is politically acceptable to the member bodies; what potential economic effects are acceptable to the member bodies; and what is agreeable to the other international standards bodies who are jealously protecting their turf?

7. Exercise: What should be the scope of work for the four categories of environmental management that will be standardized by the international committee, i.e., how deep should they go, and why not deeper?

### **8. Mirror group makeup**

In exercise #6, we alluded to the fact that there are factions within the mirror groups. These are made up of separate parties that have close common interests and have coalesced to work together within the mirror group as an interest category (e.g., NGOs; Industry; Consumers; Labor; Government, etc.). Considering the total population of interest categories in the U.S., there are many possibilities as to which of them should join or be invited to join the mirror group. Parties often need to be invited even though any party that can show a material interest in the proposed standardization has a right to join and participate in the mirror group.

8. Exercise: In the U.S., which materially interested parties should join or be invited on to the mirror group for creating international standards for environmental management? From which of these groups should representatives be selected to speak for the U.S. in the TC, and why?

### **9. Use of standards (I)**

In exercise #1, we learned that the consensus decision in the first ANSI meeting on this subject

was that the U.S. would support the creation of international standards for environmental management. Presumably, the parties that made that decision saw value in the use of those standards. In lesson #9, we were given some examples of how such standards have been used in the U.S. by some organizations in the private and public sectors.

9. Exercise: List other possibilities for using international standards for environmental management for different levels of technology, business and government, and provide a reasonable rationale for such uses.

#### **10. Use of standards (II)**

In this lesson, we were given examples of other uses of these standards. One of these uses is their inclusion by reference in government regulations. Many commentators have criticized such use and the attendant limitations on access to the referenced standards. To them, this appears to contravene the universal assumption that in a democracy access to laws should be unencumbered and free.

10. Exercise: What issues might arise if USEPA were to incorporate international standards for environmental management into U.S. regulations by reference?

#### **11. Conformity assessment decision**

Conformity assessment provides a neutral, unbiased, independent verification that an organization, product, or process has met all the requirements and specifications of a standard and is therefore in conformity with the standard. An organization is said to comply with regulations, but conform to voluntary standards. This nuance reflects the top down, command nature of mandatory compliance edicts, and the bottom up, aspirational effort to conform to a higher standard. Organizations spend money and costly effort to achieve conformity to the requirements of voluntary standards and to acquire third party certification of conformity (or registration) of their systems or products.

11. Exercise: What are some reasons for U.S. companies to seek registration of their environmental management systems if they are already in compliance with USEPA and local regulations? How might the USEPA use the option that companies have to register their environmental management systems to advance public policy goals for environmental improvements?

#### **12. Conformity assessment integrity**

Many countries have established conformity assessment institutions to provide conformity assessment services to organizations within their borders. Some of these institutions have achieved recognition and credibility in other countries and have established themselves as international providers of such services. These international players are based predominantly in developed countries. The other national institutions that hail from developing countries have not in general achieved a high enough level of international acceptance of their programs. Unavoidably, there are different levels of rigor in the conformity assessment programs of different countries. For some countries, there are serious questions about the integrity of their

programs despite international safeguards in place and consequently there is a level of international skepticism about the credibility of their certifications.

12. Exercise: Should U.S. companies rely on certifications in other countries as being honest and accurately reflective of actual conformity to specifications? What steps would USEPA need to take in the U.S. to ensure that certifications of environmental management systems are honest and valid reflections of truly effective systems?

### **13. Standards in the achievement of next generation self-governance**

A recent trend is the use of global management standards that create voluntary “rules of the road” for global supply chains. Certification of organizational management systems to the ISO 9001 standard for quality management or the ISO 14001 standard for environmental management allows businesses to establish their bona fides in the global marketplace. More recently developed standards such as the ISO 45001 for worker safety and the ISO 37001 for anti-bribery will help bring needed oversight and sunlight to the far ends of global supply chains where laws are few, often ineffective, and mostly unenforced.

Voluntary consensus standards establish technologically, financially, and socially desirable benchmarks that individuals and organizations can adopt, voluntarily implement, and conform to without the coercive force of authority. More importantly, over time such voluntary adoptions have the beneficial effect of transforming the internal culture of organizations and the personal attitudes and behavior patterns of individuals. When those transformations occur, the reliability of their implementation is much stronger and society has achieved a valuable, lasting benefit. While such ends are desirable, there are factors that promote or inhibit the adoption of self-governing measures, practices, and standards. Organizations must first decide that the benefits of voluntary practices outweigh the costs, at least over the long term. Individuals must also recognize that conformity is to their own personal interest. Standards are seen by public policy experts as having a crucial role in next generation self-governance.

13. Exercise: What might be the factors that promote or inhibit the adoption by organizations of voluntary self-governance standards for next generation environmental protection and improvement? Detail the positive or negative effects of the factors you select.

**Course: Global Connections: Standards in Technology,**  
**Business & Public Policy (EMSE 6992-80)**  
(Candidate Guest Lecturers)

- **Gordon Gillerman:** Chief, Standards Services Division, NIST; formerly, Head of Government Affairs, Underwriters Laboratories. (contacted)
- **Mary Saunders:** Associate Director for Management Resources, NIST; formerly, Director of NIST's Standards Coordination Office. (contacted)
- **Mary McKiel:** President and CEO, The McKiel Group, Member of the American National Standards Institute (ANSI) Board of Directors; formerly, Standards Executive, U.S. Environmental Protection Agency. (contacted)
- **Gary W. Kushnier:** Consultant and lecturer on standards, formerly Senior Vice President, American National Standards Institute (ANSI). (contacted)
- **Chris Pyke:** Chief Operating Officer, USGBC; Adjunct Professor, GWU; formerly, co-chaired the U.S. Climate Change Science Program's Interagency Working Group on Human Contributions and Responses to Climate Change.
- **Dorothy Bowers:** Environmental Policy Consultant; Chair, ASQ Standards Group Council; formerly, Vice President, Environmental Policy, Merck & Co., Chair, EPA National Advisory Council on Environmental Policy and Technology (NACEPT).
- **Frederick W. Allen:** Counselor, Office of Strategic Environmental Management, Office of Policy, U.S. Environmental Protection Agency.
- **Alan D. Hecht:** Director for Sustainable Development, Office of Research and Development, U.S. Environmental Protection Agency.
- **Daniele Gerundino:** Strategic Adviser to the Secretary-General, ISO
- **Roy Swift:** Executive Director, Workcred (an affiliate of ANSI). (contacted)
- **Scott Cooper:** VP, Govt. Relations & Public Policy, ANSI; Adjunct Professor, GW Business School. (contacted)
- **Mike Schmidt:** Principal Consultant, Strategic Device Compliance Services
- **Brian Kahin:** Fellow, MIT Sloan School Center for Digital Business; Senior Fellow, CCIA
- **Robert Sheets:** Research Professor, GW Institute of Public Policy, George Washington U.
- **Ken Krechmer:** Senior Member, IEEE; Instructor, U. of Colorado
- **Dorothy Garcia:** Faculty Member, Georgetown U, Dept. of Communication, Culture & Tech.

**Course: Global Connections: Standards in Technology,  
Business & Public Policy (EMSE 6992-80)**  
(Reading List)

1. *Standards, Conformity Assessment, and Trade into the 21<sup>st</sup> Century*.  
National Research Council, National Academy Press (1995), ISBN 0-309-05236-X,
2. *Governing through Standards, Origins, Drivers, and Limitations*.  
Edited by Stefano Ponte, Peter Gibbon and Jakob Vestergaard. Palgrave Macmillan, (2011),  
ISBN 978-0-230-29540-7  
Chapters:
  - I. *Governing through Standards: An Introduction*, Stefano Ponte, Peter Gibbon and Jakob Vestergaard
  - VII. *ISO 26000, Alternative Standards, and the Social Movement of Engineers' Involved with Standards Setting*, Craig N. Murphy and Jo Anne Yates
  - X. *Competition, Best Practices and Exclusion in the Market for Social and Environmental Standards*, Stefano Ponte and Lone Rilsgaard
  - XII. *Conclusion: The Current Status, Limits and Future of Governing through Standards*: Stefano Ponte, Peter Gibbon and Jakob Vestergaard
3. *Global Institutions: The International Organization for Standardization (ISO), Global Governance through Voluntary Consensus*, Craig N. Murphy and Jo Anne Yates, Routledge (2009), ISBN 978-0-415-77428-4  
Chapters:
  - IV. *From Quality Management to Social Regulation*
  - V. *Standards Wars and the Future of ISO*
4. *The New Global Rulers: The Privatization of Regulation in the World Economy*, by Tim Buthe and Walter Mattli (Princeton University Press, 2011).
5. *Effective Participation in the Development of Globally Relevant IEC Standards*: ANSI National Committee of the IEC
6. *Global Standards, Building Blocks for the Future, TCT-512*, U.S. Congress, Office of Technology Assessment, (1992)
7. Federal Engagement in Standards Activities to Address National Priorities, Background and Proposed Policy Recommendations, NIST Subcommittee on Standards, October 2009, [www.NIST.gov/standardsgov/](http://www.NIST.gov/standardsgov/)
8. *The Strategic Value of Standards Education*, A Global Survey conducted by The Center for Global Standards Analysis, August 2008, Edited by Donald E. Purcell, Chair
9. *Improving Worker Safety in Global Supply Chain, A Case for a Global Safety & Health Management Standard*, Scott Cooper, October 2014
10. *Testimony by Joe Cascio to The U.S. House of Representatives, Committee on Science, Subcommittee on Technology*, June 4, 1996
11. ANSI Public Document Library:
  - (1) ANSI International Delegates' Guide (2013)
  - (2) ANSI Standards Action
  - (3) ANSI Accredited Standards Developers

- (4) ANS Guidance Documents
- (5) ANSI Procedures for U.S. Participation in the International Standards Activities of ISO, January 2015

12. ISO/IEC Directives & Policies:

- (1) ISO/IEC Directives Part 1 and Consolidated ISO Supplement
- (2) ISO/IEC Directives Part 2
- (3) The Agreement on Technical Cooperation Between ISO and CEN (Vienna Agreement)
- (4) Using and Referencing ISO and IEC Standards to Support Public Policy
- (5) Supporting Public Policy Initiatives
- (6) ISO and IEC International Standards – for Policy Makers
- (7) ISO and ISO/IEC Guides: what they are and what they can help you achieve (PDF)