IDEESE Module 2.1
Variation in International Regulatory Processes

MJ Peterson
Version 1; August 2009

Learning Objectives

Students will be able to

1. Identify when international regulatory coordination or standardization is likely to be desired.
2. Describe the different ways of institutionalizing international policy coordination or standardization.
3. Understand the stages of policy or standards adoption and implementation.

Outline for In-class Discussion

I. When is international policy coordination or standardization desired?

Remind students that physical or social interconnections between people in different countries mean that activities in one country often have effects in others.

Remind students that each government's authority stops at its country's border.

A. Activity in one country produces unwanted effects for groups, persons, or firms in another country or countries.

B. Similar activity already underway in two or more countries would be even more beneficial if it were coordinated or standardized:

II. Where does Policy Coordination occur?

A. Ask students to define the term "international policy coordination?"

This module was created by the International Dimensions of Ethics Education in Science and Engineering (IDEESE) Project at the University of Massachusetts Amherst with support from the National Science Foundation under grant number 0734887. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. More information about the IDEESE can be found at http://www.umass.edu/sts/ethics.

This case should be cited as: M.J. Peterson. 2009. "Module 2.1: Variation in International Regulatory Processes." International Dimensions of Ethics Education in Science and Engineering. Available www.umass.edu/sts/ethics.

Students should be able to define it as both the process and the result of governments consciously seeking to make their regulations of a particular activity identical or at least more similar.

B. Ask how governments pursue policy coordination.

Students should be able to specify intergovernmental organizations and intergovernmental networks and discuss the major features of each.

C. Ask question: who participates in policy coordination?

D. Discussion: ask students who has the most influence over what policy ideas get adopted in an intergovernmental organization.

Note: there is no single correct answer. Policy entrepreneurs are most influential at the beginning of the process because they bring the ideas about how to coordinate. Brokers are like catalysts in chemical reactions; sometimes they succeed in getting disagreeing groups to find common ground. Controllers and vetoers have more influence during consideration of proposals since they can prevent adoption or effective action on a policy idea.

III. Where does Standardization Occur?

A. Ask students to define "international standardization"

They should be able to define it as the process of developing common specifications about a product, production process, scientific or technical classification, or professional conduct.

B. Ask students where standardization occurs.

They should be able to specify some intergovernmental organizations, private industry standards-setting bodies, and international professional associations.

C. Who participates in standardization done by private industry bodies or professional associations? Encourage students to think about whether scientists or engineers are likely to be involved in their early, mid, or late career years.

D. Discussion: Should governments allow private groups to set standards in their fields?

Notes for Instructor

Students who have not completed Module 1.1 would benefit from reading the section of the background reading for that module explaining why societies around the world are more interconnected today because much of the perceived need for policy coordination or standardization is inspired by a higher level of interaction between persons, groups, and organizations in different places.

This short discussion is intended to inform students about the main ways in which international policy coordination and standardization occur. It indicates the main features of collective decision-making among governments or among private actors in different countries. Module 2.2 covers the process of inter-governmental decision-making and implementation in greater detail.

After completing the module students should have a sense of the different organizational structures that can be used for policy coordination and standardization.

Suggested Case Studies

"Reporting Incidence of Severe Acute Respiratory Syndrome (SARS)." International Dimensions of Ethics Education in Science and Engineering. www.umass.edu/sts/ethics

Recommended Readings for Students

For assignment prior to class discussion

1) Roots of Interconnection: Communications, Transportation and Phases of the Industrial Revolution [included with Module 1.1 and available at www.umass.edu/sts/ethics]

2) Basic Features of International regulatory Processes [included in this module]

3) Diagram: IGO roles [included in this module]

4) Diagram: Factors Influencing IGO Outcomes [included in this module]

5) Case materials (as determined by choice of case)

For optional use as illustrative examples

1) Scientific standardization: Molecular Biology Nomenclatures [included in this module]

2) Engineering ethics: WFEO Code of Ethics [included in this module]

Recommended Readings for Instructors

1) Ann-Marie Slaughter. 2009. "America's edge: Power in the networked century" *Foreign Affairs* 88 (1): 94-107.

2) Jessica T. Matthews. 1997. "Power Shift," Foreign Affairs 76 (1): 51-55 (Jan-Feb).

3) Harold K. Jacobson. 1980. *Networks of Interdependence: International Organizations and the Global Political System*, chapter 6.

Resources Included with this Module

1) Peterson, MJ. (2009). Background Reading: Basic Features of International Regulatory Processes.

2) Peterson, MJ. (2009). Diagrams: Networks and Organizations

3) Peterson, MJ. (2009). Diagrams: Roles in IGO Policy Coordination Process

4) International Union of Biochemistry and Molecular Biology. "Molecular Biology Nomenclatures." [An Example of Standardization by International Scientific Associations]

5) World Federation of Engineering Organizations. "Code of Ethics." [An Example of Standardization by International Scientific Associations]

6) In-Class Evaluation

The Concepts of Social Inclusion and Social Equity

MJ Peterson
Version 1; June 2009

Organization of Policy Coordination or Standardization

The phrase "international policy coordination" refers to conscious efforts by governments to adopt identical or similar regulations governing a particular type of activity. The term "standardization" is broader, and can refer to any effort, whether by governments or by private individuals, companies, or organizations, to develop common rules or common definitions of the physical characteristics of products or parts, the performance of goods, the provision of services, or the organization of production or provision processes. In contemporary usage, "policy" is understood to designate mandatory rules for those whose behavior is addressed that are backed by government administrative and enforcement powers while "standard" is understood to designate rules that organizations, groups, or individuals choose to follow voluntarily.

Individuals, groups, and business firms carry out a considerable variety of activity within and across national borders. Most of the time, the participants are happy with the activity, and do not cause problems for third parties who are not involved. Sometimes, however, activities cause problems for others, either because they affect conditions in the area where they occur or because they can create hazards for others. When activity has significant effects on an area – such as producing loud noise or foul odors – or poses hazards – like increasing the danger of fire or increasing the potential for accidents – governments are likely to adopt regulations that specify how private individuals, groups, and business firms may act when engaged in that activity. Those individuals, groups, and firms quickly adapt to whatever regulations are adopted by their own government. However, when they start operating across national borders they are likely to discover that other governments' regulations about the activity are not the same. If the regulations are significantly different, the private individuals, companies, or organizations operating transnationally may have difficulty obeying them all simultaneously. They would face fewer difficulties if governments adopted similar regulations.

Government regulation usually deals with effects of activities on others. Yet, private firms and organizations often realize they would be able to pursue their activities better if they were all using the same equipment or following the same procedures. While government regulations could provide the needed uniformity, private firms and organizations often prefer to provide it themselves so they retain

This module was created by the International Dimensions of Ethics Education in Science and Engineering (IDEESE) Project at the University of Massachusetts Amherst with support from the National Science Foundation under grant number 0734887. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. More information about the IDEESE can be found at http://www.umass.edu/sts/ethics.

This case should be cited as: M.J. Peterson. 2009. "The Concepts of Social Inclusion and Social Equity." International Dimensions of Ethics Education in Science and Engineering. Available www.umass.edu/sts/ethics.

control over the content of the standards. Both business firms and professional associations have long traditions of developing national standards for their activity when they believe that using mutually compatible equipment, performing work in similar ways, or following common management routines will permit them to operate more effectively. The 20th century increase in transnational professional activity, international trade, and formation of transnational supply chains linking materials and parts suppliers, manufacturers or processors, and customers in different countries have required them to take their own standards-setting activities to the international level.

These 20th century increases in interconnection mean that the same conditions that promoted the growth of national regulations and standards now encourage development of international policy coordination and standardization. Both the increased scale of industrial activity and increased knowledge about how pollution, germs, and other hazards spread have made international regulatory coordination more important for protecting nonparticipants from harm caused by others' activity. In many instances avoiding hazards – such as cross-border spread of infectious diseases – or enhancing benefits -- such as facilitating international aviation – can be accomplished at lower cost under a common set of rules. Sometimes the common rules are meant to discourage slacking by specifying what all participants should do.

Governments can pursue international policy coordination through intergovernmental organizations (IGOs), also called "international organizations," or through transgovernmental networks of officials in the government agency in charge of regulating a particular activity. Private standard-setting also has two major patterns. In the first, a large number of interested private companies or organizations establish a separate standard-setting body, such as the International Organization for Standardization, comprised of national standards defining groups and product testing labs from around the world. In areas of professional conduct, international professional associations may develop standards for their members. This pattern is very common in science and engineering; international professional associations frequently establish standard nomenclatures and codes of professional conduct. Environmental protection has inspired formation of "hybrid" public-private networks involving government officials and members or employees of private organizations,[1] but in the final analysis their rule making and implementation resembles that of transgovernmental networks if governments stay in the lead or of private standards-setting if the private entities have the predominant role. Each of these processes has distinct features which scientists and engineers need to understand.

Policy Coordination Through Intergovernmental Organizations

Intergovernmental organizations (IGOs) are created by agreement among two or more states to promote attainment of some shared goal. While they differ in membership, extent of authority to make decisions creating binding commitments for member states, voting rules, extent of reliance on scientific or technical expertise, openness to input from nonstate actors, and effectiveness, all IGOs have these features:

1. A <u>defined mission</u>. This is typically defined in the international treaty by which the participating governments establish the intergovernmental organization. However, the typical mission statement is

[1] Thorsten Benner, Wolfgang H. Eeinike, and Jan Martin Wite. 2004. "Multisectoral networks in global governance: Towards a pluralistic system of accountability," *Government and Opposition* 39 (2): 191-210; Karin Bäckstrand, "Multi-stakeholder partnerships for sustainable development. *European Environment* 16 (5): 290-306.

very general. Details of what the organization will do and how it will do that are worked out in practice as the organization operates.

2. Some amount of decision-making authority as delegated by the member governments. Most often this is quite limited; governments remain nervous about giving up regulatory autonomy to an international-level body, even when that body consists of delegates that each member state sends. In some policy areas, however, governments are sufficiently agreed on the importance of common regulation and sufficiently confident that they see things in similar ways that they are prepared to give the intergovernmental organization more authority.

3. An intergovernmental decision forum exercising delegated authority according to agreed procedural rules.

4. A staff, often called the Secretariat, providing translation, document preparation, and meeting facilities for the intergovernmental forum and performing whatever tasks the forum assigns to it.

5. A headquarters where the intergovernmental decision forums have their meetings, and the organization's staff does its work. Some, particularly the large IGOs of the United Nations system, also have additional offices in places where organizational activity is particularly large.

Variation among IGOs

Membership. The international agreements establishing IGOs always refer to "member states." In international law, a state is an entity with a permanent population, a defined territory, a government, and independence from any other authority. Permanent population means a group of people living in the territory over a long term; individuals can move in and out without affecting the permanence of the population. "Defined territory" means possessing some core of territory that is not claimed by any other state; disputes about possession of some part of the territory (a disputed area along a border, one or more offshore islands) or exactly where a portion of boundary line should be drawn do not weaken the state's claim to have a territory. "A government" and "independence" denote the organizational basis necessary for functioning as a state; the population needs to have designated leaders in place and those leaders need to be legally autonomous – not subject to the orders of other leaders – for the entity to count as an independent state rather than as a colony or other type of nonself-governing territory. IGO activities thus involve the governments of member states, which appoint officials to represent them in the IGO. Effectively, then, the members of IGOs are the governments of member states.

Most IGOs define their memberships on a geographical basis. The League of Nations (established 1920, dissolved1946) had and the United Nations (established 1945) has a global membership, with the UN now including 192. The 19th century "public international unions" promoting cooperation on technical matters like operation of telegraph and postal systems or cooperation against spread of disease also had global memberships; they continue today as Specialized Agencies of the United Nations. Other IGOs bring together states in a particular region; examples include the European Union (EU), the African Union (AU), the Organization of American States (OAS), and the Association of Southeast Asian Nations (ASEAN). Some draw members based on affinities: the North Atlantic Treaty Organization (NATO) initially covered the USA, Canada, and Western European states; the Organization of the Islamic Conference (OIC) consists of states with predominantly Moslem populations.

A few use activity-based criteria. The Organization for Security and Cooperation in Europe (OSCE) initially bridged the East-West Cold War divide, and still operates to foster good relations "from Vancouver to Vladivostok."[2] International Fisheries Commissions generally include states concerned with fishing in a particular area of ocean or for a particular species, either because they have coasts and Exclusive Economic Zones in the area or because their citizens are involved in the fishing.

The choice between having a global or a more limited membership may depend on the activity the IGO is meant to promote. Some activities, such as avoiding pandemics, or providing timely weather data, are perceived as "global public goods" most likely to be provided successfully when all states participate.[3] This usage does not quite conform to the economists' definition of a "public good" as one whose consumption is non-rival (one person's or group's use of the good does not reduce other's ability to use it) and whose distribution is non-excludable (the producer cannot subdivide the good into individually packaged quantities and provide them only to users who pay for them),[4] but does convey a similar desire for general cooperation. Other activities are more like what economists call "club goods" – things that are too large for any one entity to provide on its own but which can be fenced off so that only those contributing can enjoy them. Military alliances and free trade areas function more as club goods; giving each participating state more of what it wants than it could get by itself but allowing a group of states to keep the benefits to themselves. The memberships of IGOs dealing with scientific or technical matters usually depend on perceptions of the geographic extent of the problem being addressed. The Convention for the Protection of the Stratospheric Ozone Layer and the UN Framework Convention on Climate Change both established global bodies; the International Commission for the Danube deals with environmental and water use concerns in one river basin, so includes only states with territory along the Danube River.

Extent of Authority. When establishing an IGO, governments understand they will need to give it authority and resources to accomplish whatever tasks they set it for. Except in Europe, where members have given the EU considerable authority in many areas, governments remain very cautious about giving IGOs much authority over broad political, economic, and social questions. They are more willing to delegate authority when the tasks involve technical or administrative cooperation on a fairly specific matter. Member governments can delegate three sorts of functions to an IGO, 1) develop common rules for pursuing an activity, usually by delegating authority to the IGO's intergovernmental forum, 2) resolve disputes when governments are unable to do so themselves through direct negotiations, which may involve mediation by the IGO staff or establishment of a procedure in which the contending governments refer the matter to a third party, such as an arbitrator or an international court, for settlement, or 3) monitor member's compliance with agreements they have signed or with the IGO-made rules. Each delegation of authority to an IGO is independent of the others, meaning that an IGO may have little authority to make rules but a strong dispute settlement procedure or a significant role in monitoring compliance.

[2] The phrase Soviet President Mikhail Gorbachev used to describe the extent of the "common home" he hoped would replace the Cold War East-West divide. get cite to speech.

[3] Wolfgang Reinicke et al. Critical choices: The United Nations, networks, and the future of global governance. Ottawa, Canada: International Development Research Centre, 2000.

[4] Commonly-used examples are light houses and over-the-air broadcasts.

Governments are generally more willing to delegate dispute resolution and compliance monitoring than rule-making. Even in dispute resolution and monitoring, the extent of delegation to the IGO's staff or forums depends on the depth of policy coordination they perceive as necessary for success and the degree to which their interests converge or diverge on particular ways of pursuing coordination. The rational choice theory distinction between coordination and collaboration provides insight into the political dynamics involved. Actors in a coordination situation all want to reach the same goal and agree on the best means for reaching it.[5] Violations of agreed rules or other expectations about action stem from accident, inattention, or some uncontrollable intervening event rather than from intentions to cheat. Once the rules are set, there is little need for dispute resolution or compliance monitoring. Actors in a collaboration situation face a more complicated problem: they share the same goal, but disagree about means because different ways of reaching the goal have different benefit/cost ratios for each one. No matter which means are chosen, some actors will remain dissatisfied because they feel they are getting less than others from working together. The dissatisfied may reduce their efforts to secure a balance of benefits over costs more to their liking. The most difficult collaboration problems arise when reneging on promises while others live up to them, actually leaves that actor better off. In the stark situations summarized by the "prisoner's dilemma,"[6] actors have a double temptation to renege: one created by belief that it can share the gains of collaboration without contributing effort and the other by belief that if others are not contributing it is best to stop contributing oneself so that others cannot "free ride." If enough actors yield to the first temptation, others will feel obliged to yield to the second, creating a spiral of withdrawals that end in complete breakdown of the collaboration. Good compliance and dispute settlement systems can avert the spiral by identifying slackers and allowing others to punish them. Maintaining a low-tariff, low-barrier international trade system is widely regarded as posing a "prisoners' dilemma;" today the World Trade Organization (WTO) has a particularly elaborate dispute settlement/compliance monitoring system.

Voting rules. Governments' willingness to let an intergovernmental forum make rules for an activity can also depend on the voting procedures used in that forum. IGO decision-making procedures have two elements: an allocation of votes among the member states and a rule for determining how many members must support a proposal for it to become a rule. Votes can be allocated on the rule "one state-one vote," used widely in IGOs because it affirms the principle of sovereign equality of states; or by some formula of weighted voting that distributes varying numbers of votes to each member according to some objective (measurable) criteria regarded as relevant to the activity being coordinated. The EU's weighting formula stresses population size, which affirms the democratic norm of equality of persons. The International Monetary Fund (IMF)'s and the World Bank's weighting formula stress a combination of a country's share in world production and importance in international economic affairs. The support necessary to make a rule can be defined as unanimity (all members must agree), consensus (a very large majority agree and none has serious objections), simple majority rule (50% plus 1 of the votes are cast in favor), or qualified majority (some fraction of votes above 50% plus 1 is required).

[5] Introductions of the concept often use the example of two people coming to a city by different trains and converging spontaneously on meeting under the largest clock in the railway station.

[6] A name derived from the textbook example, efforts by a prosecutor who has enough evidence to get two criminals convicted of a minor crime but not of the major one they are suspected of having committed to elicit information by offering each an opportunity to become a witness for the prosecution against the other in return for going free. As long as they are kept apart, each suspect worries about whether the other will accept the offer.

IGO weighted voting systems using criteria other than population are particularly vulnerable to criticism as being incompatible with both democracy and the principle of sovereign equality of states. Many governments regard weighting by population as less attractive than one state-one vote because 5 Asian countries (China, India, Indonesia, Japan, and Pakistan) would hold about 44% of the votes under such a rule.[7] Yet, major powers are unwilling to accept one state-one vote and simple majority decision rules for anything but recommendations because that combination would allow the more numerous small and weak countries to make the decisions. An IGO given authority to make rules often uses qualified majorities in making decisions to maintain a reasonable balance among blocs of states.

Use of expert advice. IGOs addressing scientific or technical questions are more likely to develop formal procedures for establishing expert advisory bodies and using their suggestions. Two basic types of expert advisory bodies exist: longterm ("permanent") bodies that meet on a regular schedule and one-time ("ad hoc") bodies convened to produce a particular report and disbanded once the report is completed. Either sort of expert bodies may be composed of experts named by the IGO and serving as individuals, who operate in isolation from government instructions, or of experts named by a particular government or group of governments, usually from among experts employed in government agencies, who are expected to be sensitive to those governments' concerns as well as to apply their expert judgment. Though experts selected by the IGO staff to serve as individuals usually possess considerable credibility with the member governments, governments may prefer to select the experts themselves when the problem or issue on which their advice is being sought has significant political or economic implications. This happened fairly early in consideration of climate change, with creation of the Intergovernmental Panel on Climate Change in 1988.

Sometimes the forum or the head of an IGO convenes an expert body to explore some new concern or propose new ways of dealing with existing problems. The UN's consideration of environmental issues was strongly influenced by two major reports: *Only One Earth* (1972)[8] which helped define the agenda for the 1972 Stockholm Conference on the Human Development and *Our Common Future* (1987)[9] introducing the concept of "sustainable development" that became central to discussions at and after the 1992 Rio Conference on Environment and Development.

Expert bodies will have the greatest impact when governments have not yet paid much attention to an issue or problem or when they have paid some attention but agree that they cannot address it effectively without expert advice. A large number of scholars have studied government use of expert advice, and most agree that governments are most likely to follow expert advice when they agree on which set of experts possesses relevant knowledge, are developing broad approaches to new issues, are unsure about

[7] Based on *UN Demographic Yearbook 2006* data available online at http://unstats.un.org/unsd/demographic/products/dyb/dyb2006/Table01.pdf (world total) and http://unstats.un.org/unsd/demographic/products/dyb/dyb2006/Table05.pdf.(country totals).

[8] Barbara Ward and René Dubos, *Only One Earth: The Care and Maintenance of a Small Planet*. 1972.

[9]Commission on Global Governance (Bruntland Commision), *Our Common Future*. Oxford: Oxford University Press for the United Nations, 1987.

how to proceed because of uncertainty about causes of the problem or how to solve it, or expert advice helps break or paper over political impasses hindering action.[10]

Openness to nonstate actors. Nearly all IGOs limit formal participation in debates and decisions to the representatives of member states. Yet, nonstate actors of various sorts have managed to carve out roles as communicators of ideas and aspirations.[11] The anti-slavery, workers', women's, and peace movements already active in the 19th century quickly gravitated to the League of Nations after its first meetings in 1920. Professional societies, labor unions, and business associations developed ties with the staffs of the 19th century public international unions, and expanded their activities after the unions became UN Specialized Agencies. At the behest of several private associations, the US government proposed and other members accepted a system under which private associations could acquire "consultative status" with the UN Economic and Social Council allowing them to get copies of UN documents, send members to observe meetings of the ESC and its subsidiary bodies, and communicate ideas and comments to those bodies. Most of the Specialized Agencies established similar systems, though the degree of collaboration between them and associations in their field became much stronger. The International Civil Aviation Organization (ICAO) maintains very close working relations with both the International Air Traffic Association (the airlines' transnational industry group) and the International Federation of Air Line Pilots' Associations. The International Telecommunications Union allows employees of "recognized private operators" – the privately owned telecommunications providers and broadcasters allowed to operate in some countries – and of major equipment manufacturers to be full members of technical study groups preparing recommendations for intergovernmental meetings. Human rights, environmental, and development groups have been developing broader ties to UN agencies since the 1980s. The 1972 Stockholm Conference was the first UN-sponsored global conference to feature a "parallel forum" where members of nonstate groups could meet, talk to each other, and develop joint statements for presentation to the government representatives at the main conference but they quickly became standard procedure. By 1995, the practice of having a parallel forum meeting in the same city close to the main conference hall was so strong that the Government of China was widely criticized by other governments as well as women's groups for holding the parallel forum for the 1995 Beijing Conference on Women 40 miles away.[12]

Nonstate actors' ability to participate in IGO activities depends partly on the attitudes of governments towards nonstate actors in general, specific types of nonstate actor, or even particular nonstate actors. During the Cold War, Soviet bloc opposition served as a brake on nonstate actors' activities generally; particularly after 1972 the Soviets also sought to keep predominantly Jewish groups from securing "consultative status" as part of a broader effort to rally Arab opinion. Authoritarian governments tend to be less receptive to nonstate actors' participation. The governments of many developing states perceive the

[10]Including Ernst B. Haas, *When Knowledge is Power* (Berkeley: University of California Press,1990; Peter M. Haas, ed., *Knowledge, Power and International Policy Coordination* (special issue) *International Organization* 46 (1) (winter 1992);The Social Learning Group, *Learning to Manage Global Environmental Risks*, 2 vols. Cambridge, MA: MIT Press, 2000; Ronald B. Mitchell, ed. *Global Environmental Assessments: Information and Influence* Cambridge, Ma.: MIT Press, 2006.

[11] Such as Thomas G. Weiss and Leon Gordenker, eds. *NGOs, the UN and Global Governance* (Boulder, CO: Lynne Reinner, 1996); Michelle Betsill and Elizabeth Corell, eds. 2008. *NGO Diplomacy: The Influence of Nongovernmental Organizations in International Environmental Organizations*. Cambridge, MA: MIT Press.

[12] Carol Ann Traut, "Policy implementation in an international setting: A case study of China and the 1995 United Nations Conference on Women," *International Journal of Public Administration* 22 (2): 290-297 (1999).

nonstate realm as dominated by groups from "the North" (the major industrial countries) and therefore, unsympathetic with the situation of developing states. Others are receptive if the groups take positions supportive of their views in South-North contentions. IGO practices or the attitudes of the IGO's staff also make a difference. IGOs that are part of the UN system are generally expected to follow practices similar to those of the Economic and Social Council; the UN General Assembly even specified that the UN Commission on Sustainable development should consult with nine "major groups": 1) business and industry, 2) children and youth, 3) farmers, 4) indigenous peoples, 5) local authorities, 6) NGOs, 7) scientific and technological community, 8) women, and 9) workers and trade unions.[13] Other IGOs set their own practices, with regional IGOs showing the greatest variation because they reflect the views of governments in the region.

Organizational effectiveness. IGO effectiveness can be defined in two ways: by how well it uses resources and accomplishes tasks, and by how far task accomplishment contributes to attaining the goals expressed in the IGO's mission. The two are related because a poorly functioning IGO contributes less to goal attainment, but also distinct because goal attainment can fail because of conditions, events, or actions beyond an IGO's control.

Member states as a group set the basic terms of IGO effectiveness in task accomplishment by determining the size of the organization's budget and staff. Very few IGOs have sufficient resources to make a major impact on their own; typically IGO staffs coordinate national activity rather than to act directly. Even within those limits an IGO can perform well or poorly depending on the competence and energy of its staff. Staff competence varies considerably, as the various media reports of IGO staff incompetence and corruption indicate. Such problems are not confined to IGOs, but may be more difficult to address than in the better national civil services because lines of accountability are fuzzier. As in other organizations, much depends on the leadership. A lax or incompetent leader permits drift; a competent one can inspire the staff to high levels of accomplishment.

Efforts to assess IGO effectiveness are often hindered by the difficulty of relating IGO activity to moves towards or away from stated goals. Nearly all observers are dissatisfied with UN agencies' contributions to development. At the same time, Kapus, Lewis, and Webb's 1997 assessment of World Bank resources can be applied to all the UN's development efforts: the money available is "a drop in an ocean of need" for the largest developing countries and the equivalent of a 10-15% of annual imports for the smallest.[14] However, there is agreement that the modest resources could be used better. Identifying exactly how an IGO could increase its effectiveness often depends on ability to develop clear and widely acceptable measures of goal attainment. It is easier to assess degrees of success or failure at reducing environmental pollution, which can be tracked by standardized measurement of physical things, than at resolving conflicts, where serious failure, which is marked by resumption of fighting, can be observed more easily than improvement.

[13] UN General Assembly Resolution 47/191 (22 December 1992). The groups were first identified in *Agenda 21* issued by the Rio Conference in June 1992.

[14] Devish Kapur, John P. Lewis, and Richard Webb, eds. 1997. *The World Bank: Its First Half Century. Volume II: Perspectives*, p. 2. Washington DC: Brookings Institution Press.

IGOs sometimes operate in a competitive field. While the UN system has no competitors at the global level, regional organizations sometimes perform similar tasks for their members and provide alternate forums for particular clusters of the membership. Disagreements about goals or how to attain them can also lead to organizational duplication, as occurred during the Cold War when the Soviet bloc set up its own alternatives to the Western trade organizations. Strong rivalries can lead to establishment of parallel organizations by each side, as with NATO and the Warsaw Pact.

Within the UN system there is ample scope for competition among component IGOs because of overlapping missions. While the UN Development Programme has been able to enhance its role as central coordinator of the UN system's development aid programs,[15] each of the Specialized Agencies, the IMF, and the World Bank continue to pursue their own programs because they retain budget autonomy. The UN Environment Programme has not become the central coordinator of global environmental cooperation that its most ambitious promoter envisioned, partly because of scant resources and a relatively isolated headquarters location but partly because other agencies protected their own pieces of potentially overlapping missions.[16]

Establishing the Terms of Regulatory Coordination

Regulatory coordination through an IGO involves several types of actor, and features of the process give actors opportunities to acquire and play particular procedural roles.

The actors involved in any regulatory coordination process can be divided into three main groups: decision-makers, implementers, and stakeholders. Decision-makers are those actors who have formal right to vote on proposals, and therefore a direct role in determining whether and in what form regulatory coordination will occur. Implementers are the actors who must undertake the activity needed to make regulatory coordination in reality. The most direct implementers are typically the staff of the national regulatory agencies, since most intergovernmental organizations have very small staffs and are not able to exercise the sort of monitoring and supervision over private actors that national bureaucracies can provide. Sometimes, however, governments delegate implementation to private actors through such mechanisms as "contracting out" to private firms. Stakeholders are the most numerous since they include all the actors whose interests are affected by the existence, substantive content, and implementation of regulatory coordination. Stakeholders can be quite numerous and diverse, with more or less direct stake in the existence and form of regulatory coordination. ILO-sponsored international agreements on labor union rights and workplace conditions obviously affect employers and employees, but contemporary transnational advocacy coalitions seeking to reduce the inequities of market-organized economic exchange see the ILO process as important in broader efforts to secure social justice.

Most intergovernmental organizations limit formal voting rights to representatives of member states. However, they typically provide opportunities for stakeholders to communicate their concerns and try to persuade decision-makers to adopt or to avoid particular decisions. Thus, nongovernmental actors like

[15] Craig Murphy. 2006. *The United Nations Development Programme: A Better Way?* Cambridge: Cambridge University Press for the UNDP.

[16] David L. Downie and Marc A. Levy (2000). "The United Nations Environment Programme at a Turning Point." in Pat Chasek, ed., *The Global Environment in the Twenty-First Century*, 355-375. Tokyo, UNU Press; Maria Ivanova (2007). "Designing the United Nations Environment Programme." *International Environmental Agreements* 7: 337-361.

business firms, social movements, ethnic groups, public interest groups, or professional associations often get involved in IGO discussion of regulatory coordination.

Developing international regulatory coordination involves defining the substance of common rules and, in many instances, the procedures by which government agencies and other direct implementers will ensure application of those common rules. The decision-making process leading to adoption of common rules creates opportunities for actors to assume distinct roles in the process. Some of them can be filled only by decision-makers with formal voting rights but others are open to any actor with the interest, energy, and monetary resources needed to get involved by communicating with the intergovernmental organization or the government delegates. Six roles merit particular attention:

1. Policy entrepreneurs Policy entrepreneurs develop and propagate proposals for new common regulations, either in an area where there has been no regulatory harmonization, or in an area where there has but the current regulations are not fully satisfactory. Any actor involved in regulatory coordination can be a policy entrepreneur, though policy entrepreneurs who hold subordinate positions in an organizational hierarchy may have to present their ideas to their superiors and be able to circulate them outside their organization only with those superiors' permission.

2. Initiators Initiators are the actors who began the formal process of considering a proposal for regulatory coordination by introducing it in the relevant intergovernmental forum. Usually initiators are decision-makers, but some intergovernmental organizations allow the head of the organization's staff or an expert body to place items on the agenda or to prepare draft proposals for decision-makers' consideration. In the European Union, the parliament and the council adopt the major decisions known as "Directives" but only the commission can propose them. The difficulty of initiating a proposal depends very much on its relation to the existing activities of the IGO. Initiators suggesting policy coordination in an area where none exists have to identify the right IGO; anything other participants thinks is outside the IGO's mission is unlikely to be taken up. Even when they have identified the right IGO, initiators seeking policy coordination in a new area may have to persuade others not only that the proposed coordination would provide good regulations but that there is a need for policy coordination. This is a separate consideration, and governments will be more or less receptive depending on whether they believe that region-wide or global coordination is needed. For some activities having the regulatory agencies in a few leading countries triggers tacit global coordination if private actors operating transnationally want to run their operations the same way everywhere want to operate in or sell to customers in those leading countries.

3. Controllers Controllers are actors whose support is necessary for successful adoption or implementation of regulatory coordination. A government or other actor might be a controller because it has sufficient influence with decision-makers that its support ensures, or opposition prevents, formation of a sufficient majority for adopting a proposal. It also might be a controller because it has sufficient resources (geographic location, money, military capability, technologies, labor force, etc) that its action is crucial to effective implementation or its inaction ensures that implementation will fail.

4. Vetoers Vetoers are individual decision-makers able to prevent adoption of proposals under the decision-making rules of the particular IGO. The difference between a controller and a vetoer is that a controller has to use influence over others to block a proposal, whereas a vetoer can invoke the rules and block a proposal by itself. Thus, the possibility of acquiring a vetoer role depends on the decision-

making rules of the IGO. Individual country vetoes are now uncommon; even the vetoes held by the five Permanent Members of the UN Security Council are being challenged in some proposals for UN reform.[17] IGOs operating with systems of qualified majority voting in which more than 50% plus 1 of the votes are needed to adopt decisions do not have individual vetoers; but the closer the special majorities required comes to 100% of the members, the smaller the group needed to form a blocking coalition that can act as a controller.

5. Brokers. Brokers are actors seeking to bridge disagreements among decision-makers so that a decision can be adopted. While stakeholders can operate as brokers, decision-makers usually make the best brokers because they can talk to other decision-makers as peers. Brokers agree that regulatory coordination is needed, but are willing to compromise on the substance of the coordination so that sufficient support can be attained for some proposal. Typically the brokers are neither the strongest supporters nor the strongest opponents of any of the proposals before the intergovernmental forum; they occupy a middle position within the group of decision-makers which allows them to talk to both supporters and opponents in efforts to formulate a proposal that will win majority support. Whether brokers succeed depends very much on the depth of disagreement among the decision-makers. When disagreements are relatively narrow, and refer mainly to technical details, it will not be hard for brokers to come up with a generally acceptable compromise. When, however, disagreements to rest on questions of principle or strongly divergent interpretations of how a commonly-accepted principle should be carried out in practice, brokers will have a much more difficult time coming up with a generally acceptable compromise. When disagreement is severe, brokers may have to choose between diluting the substance so much that the regulatory coordination means very little and giving up on coordination altogether. Sometimes brokering functions very much like mediation, a process of dispute-settlement in which a mediator having no stake in the dispute other than getting the disputing parties to resolve their problem offers possible solutions. More often it is part of a process of political deal-making, in which leaders of factions work out compromise proposal that their respective followers will support, secure support for one proposal by trading votes on another, or provide benefits to coalition members in return for supporting the proposal.

6. Blocs. Blocs are groups of decision-makers who have similar enough positions on substantive questions that they usually vote the same way on proposals. The bloc may rest on ideological agreement, as did the Western and Soviet blocs during the Cold War; it may rest on shared interests, as does the Group of 77. Whatever the foundation, a bloc will usually have more influence than an individual decision-maker because it has more votes and is therefore in more of a position to help or hinder adoption of a proposal. Only when the rules allow for vetoers will certain individual decision-makers have more weight than blocs. Blocs vary in their solidity: in some members agree on almost all issues and voting differently is rare; in others members agree on some issues but disagree on others, so vote together only some of the time. While a cohesive bloc will be influential on a range of issues, even a fractious bloc can be important on those issues where its members are in strong agreement with each other.

[17] More of the discussion focuses on number seats and rules for allocating them among various groups of members. See Thomas G. Weiss, "The Illusion of Security Council Reform," The Washington Quarterly 26 (4) (2003); Edward C. Luck, "Rediscovering the Security Council: The High Level Panel and beyond," in Ernesto Zedillo, eds., *Reforming the United Nations for Peace and Security* (New Haven: Yale Center for the Study of Globalization, 2005); Philip H. Gordon, "Scenarios for reforming the United Nations," *Le Monde* 9 August 2005.

Implementation of Regulatory Coordination

The typical IGO does not have sufficient staff, money, and other resources to implement or enforce the terms of regulatory coordination itself. Generally, implementing and enforcing functions are confided to the national bureaucracies of the member states. Some agreements on regulatory coordination include systems for implementation review[18] in which national governments report to an intergovernmental committee on their implementation efforts and the committee provides recommendations for improvement and may even have authority to identify a particular state as failing to comply sufficiently with its obligations. Whether a system for implementation review exists or not, IGO staffs generally have sufficient resources to promote implementation through provision of administrative training to national officials, operation of websites where national regulators can post information and queries, or compilation and dissemination of global data governments need to assess the overall effectiveness of the regulatory coordination effort.

Within individual countries both the political leadership and the bureaucracy are relevant to implementation. The political leadership sets the tone, first by agreeing to the regulatory coordination and then by indicating to the national bureaucracy that the coordination should be taken seriously. The national legislature will need to be involved if some aspect of regulatory coordination requires a revision of previously existing national law or new budget allocations to government agencies. Most of the action required for implementation falls to the national bureaucracy, which invokes its nationally based authority for action, uses the routines it uses for its domestic tasks.

Some intergovernmental policy coordination requires only that government agencies act in similar ways because governments can produce or take care of situations on their own. Successful implementation of the Convention against Torture requires only that governments make sure their own officials do not engage in torture because it includes no rules relating to severe physical harm caused by private actors targeting each other. This question remains within the domain of national law. Yet, in more and more areas of life today, securing the desired end result requires making sure that private actors follow certain rules. Thus, the Montreal Protocol to the Convention on Protection of the Ozone Layer, like most international environmental agreements, includes several provisions defining how government should make sure private actors manufacturing and using ozone-depleting substances use only the permitted ones.

Whenever the actions of private actors are central to producing the desired result, success or failure of intergovernmental regulatory coordination depends on their reactions. Even in authoritarian countries anticipation of their support or opposition feeds back into the decision-making phase as governments pay attention to the amount of private opposition likely to be elicited by any particular proposal. Just as in national politics, decision-makers in intergovernmental forums often face divided publics, with some private actors supporting a particular proposal and others rejecting it. If the supporters are less numerous or less important to the outcome than the opponents, governments are likely to be cautious. When private opposition is strong, decision-makers opposed to some proposal will be strengthened in the debates preceding decision-making because they will be able to argue that private opposition will impede implementation. When private support is strong, decision-makers supporting some proposal will be strengthened in debates because they will be able to argue that private support means implementation will not require extensive and expensive efforts to enforce rules against reluctant private actors.

[18] David G. Victor, Kal Rustiala and Eugene B. Skolnikoff, "Introduction" in Victor, Rustiala and Skolnikoff eds. *The Implementation and Effectiveness of International Environmental Agreements,* pp. 16-20. Cambridge: MIT Press, 1998.

Whenever the success of international regulatory coordination depends on cooperation by private individuals and entities, it involves a "two-level politics" with concurrent domestic and international dimensions. In these conditions, national political leaders and administrative agencies must pay simultaneous attention to the likely reactions of private individuals and entities in their own country and the likely reactions of other national governments when considering any particular proposal for regulatory coordination.[19]

Policy Coordination Through Transgovernmental Networks

Governments often pursue coordinated implementation of their international agreements through transgovernmental networks. These networks consist of administrative officials in charge of regulating some area of activity from each country concerned who use the network to establish close working relations counterparts in other countries. However, these networks can branch out into determining the terms of policy coordination if governments are not inclined to set up an IGO to address the matter. Transgovernmental networks foster regulatory coordination in four ways:

1. Providing timely flows of information needed to regulate cross-border activity effectively.

2. Facilitating joint action among subsets of network members as needed for particular purposes.

3. Promoting awareness of best administrative practices or newly available technologies among participants.

4. Encouraging development of shared standard operating procedures.

Networks are organized very differently than bureaucratic organizations. The typical bureaucratic organization is a vertical array of officials in a multi-level hierarchy from head of the agency through one or more tiers of intermediate officials, to the "street level" officials in direct contact with individuals or entities subject to the regulations (see Figure 1). Each official reports to a single superior, who similarly reports to a single higher level official, until the reporting lines converge at the top. Networks, in contrast, are horizontal arrays in which participants operate as peers (see Figure 2). Intergovernmental networks often involve officials at the same level in their respective national bureaucracies as a way of bridging between the international regulatory coordination and the national-level enforcement of the agreed common rules.

Variation in Transgovernmental Networks

Size. Networks vary considerably in size, though the limited number of independent states in the world means the variation in size of transgovernmental networks is less than the variation in size of networks among other kinds of social actor. A global transgovernmental network including one official from each participating state would have about 200 members today. The Paris Memorandum of Understanding on Port State Control is an arrangement among the maritime authorities of 27 states, but the associated

[19] This concept was given its current definition in Robert D. Putnam, "Diplomacy and domestic politics: The logic of two-level games," *International Organization* 42 (3): 427-460 (summer 1988).

network of port state control officers who exchange date on ship inspections and ships found deficient through a central inspections database maintained in Paris is larger.[20]

Network size varies because of the number of governments concerned about a problem, political affinities or rivalries that make individual governments more or less willing to have officials participate in a network with officials from particular other governments, or the number of governments whose cooperation is regarded as important to success of the regulatory coordination effort. Sometimes a transgovernmental network starts relatively small, and grows as other governments seek to join or are recruited by initial participants; the US-led Proliferation Security Initiative began with 9 members and currently has 95.[21] Size may also reflect differing levels of concern. The FAO/UNEP system of prior informed consent to imports of hazardous chemicals[22] is managed by a network consisting of a central clearinghouse run by the FAO and UNEP that manages information exchange among the Designated National Authorities (DNAs) who have authority to allow or forbid a proposed import into their country. Because many governments regulate pesticide use and chemical use through different ministries or agencies, they have the option of naming one DNA responsible for both pesticides and chemicals or separate ones for each. In 1997, 59 of the 143 participating governments had chosen to name separate DNAs. 33 of those 59 were developing countries that had only named their DNA for pesticides.[23] Though leaving the network a bit ragged, this choice was reasonable for governments of primarily agricultural states having small bureaucracies.

Leadership core. Even at 20-25 members, transgovernmental networks are likely to have a core – a subset of members who provide leadership by activating the network more often, providing more information, or making more suggestions about network activity. Social network analysts who study networks among private individuals or groups often define "core members" by determining who in the group has the largest number of direct connections to other members of the network.[24] In regulatory coordination direct contacts are less important than expertise, skill in getting others to work together, or access to resources that will facilitate network activity.

Access to needed resources suggests that officials from the larger participating states (or the participating states having the largest and most capable bureaucracies addressing the problem) will always be in the core, but that is not necessarily the case. The core is often filled by officials from the governments most

---

[20] Port officers of the 27 maritime authorities performed 22,888 ship inspections in 2007. See the Paris MOU website at http://www.parismou.org/ParisMOU/home/xp/menu.4389/default.aspx (accessed 19 June 2009). Data on inspections from the 2007 Annual Report, p. 29 available at http://www.parismou.org/upload/anrep/PSC_annual_report_20071.pdf (accessed 19 June 2009).

[21] List dated 29 May 2009 available at http://www.state.gov/t/isn/c27732.htm (accessed 24 June 2009).

[22] Begun as a voluntary process implementing the 1985 FAO Code of Conduct on the Distbn and and Use of Pesticides and the 1987 London Guidelines for the Exchange of Information on Chemicals in Intl Trade; converted into a mandatory process by the 1998 Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

[23] David G. Victor, "'Learning by doing' in the chemicals and pesticides trade regime" in David Victor, Kal Rustiala and Eugene Skolnikoff eds. *The Implementation and Effectiveness of International Environmental Agreements,* p. 251. Cambridge: MIT Press, 1998.

[24] See Stanley Wasserman and Katherine Faust, *Social Network Analysis: Methods and Applications*. Cambridge: Cambridge University Press, 1994.

concerned about, and hence applying the most thought to, the issue or problem. They have the strongest motivation to identify areas where cooperation from other governments is needed and to develop policy suggestions. Alternatively, the impetus for concern may come from particular government agencies whose ability to fulfill other mandated tasks is hobbled by the problem, and members of the agencies feeling the most constraint will be particularly active in the network.

Many transgovernmental networks have a communications hub: an entity that maintains the central data repository and facilitates communication among the rest. Often an IGO secretariat performs this function, as with the FAO/UNEP network of Designated National Authorities on Pesticides and Industrial Chemicals. On other occasions one of the participating governments performs it. In the Missile Technology Control Regime, a multi-government effort to standardize export controls on items useful in making ballistic missiles, the central 'Point of Contact' is an office of the French Ministry of Foreign Affairs.[25] Being the communications hub may or may not lead to influence within the network: many hubs are clerks buried under routine tasks.

Task. The shape and intensity of a transgovernmental network's activity depends on the tasks it is given. The Designated National Authorities in the FAO/UNEP pesticides and chemicals network are charged with informing the clearinghouse of any national regulations about chemicals or pesticides their country adopts and approving or rejecting imports of pesticides and chemicals listed in clearinghouse information designated as specially hazardous by the FAO/UNEP Joint Meeting of Experts on Prior Informed Consent. Similarly, the collaboration on ship inspection among European ship inspectors varies depending on the number of ships found deficient in an earlier inspection, or selected for more intense scrutiny because of age, type (oil tanker, bulk cargo carrier, containership), or reputation of the flag state's shipping regulators.

In these examples, the common policy has already been decided by governments, and the network connects implementers who are expected to work out the details of how to implement. However, actual efforts to implement often kick up questions that require the officials to secure additional policy guidance. This may lead them to propose expanding the network to include higher-level officials so they can secure that guidance. Thus, participants in the Fifth Meeting of the Proliferation Security Initiative noted that "the attainment of the PSI goals requires continued efforts within the operational experts group to work through operational legal issues" and that "to further build the PSI as an activity, political vision and strategic guidance remain necessary. Further consideration shall be given to the suggestion of establishing a network of contact points at policy level among participants."[26]

Some networks are used to secure relevant information about physical phenomena or human activities that extends across national boundaries. This was the major task in European countries concerned about pollutants reaching high enough into the atmosphere to be carried hundreds of miles before settling back to Earth. By the mid 1960s, there were 100 stations routinely monitoring the chemical composition precipitation. In 1968 a Swedish scientist used results from stations in Scandinavia to confirm suspicions that precipitation had become more acidic; his hypothesis that the increase was the result of higher sulfur

[25] Missile Technology Control Regime (MTCR) Questions and Answers http://2001-2009.state.gov/t/isn/rls/fs/101470.htm (accessed 19 June 2008).

[26] Proliferation Security Initiative: Chairman's Statement at the Fifth Meeting March 5, 2004 (Lisbon) http://www.state.gov/t/isn/115306.htm (accessed 19 June 2009).

emissions in other countries was more controversial.[27] As European governments moved to address the problem, they found their national systems of data gathering and reporting were not compatible. Collaboration among national monitors in the Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (known by the acronym EMEP) and adoption of the EU's CORINAIR air pollution reporting scheme overcame most of the incompatibility problems.[28]

Standard-Setting By Private Bodies

A few national governments began decreeing standard units of weight and physical measurement in the 18th century, and the practice spread after the French Revolution. Industrialization facilitated and encouraged the growth of wider markets and more complex relationships between parts suppliers, final assemblers, and repair shops, leading firms to perceive the advantages of having common standards for the physical characteristics of manufactured goods (like size and threading of screws, dimensions of wheels, or diameters of pipes), and of electric power (the voltage, the cycle rate if alternating). Common standards allow multiple firms to supply goods that will be used together or connected to the electric power grid. When industry standards-setting began in the late 19th century, the committees responsible for defining standards were sponsored by national industry associations, whose members were the major firms making a particular type of product and lent technical personnel to the standards-setting committee. The first transnational industry standards-setting body, the International Electrotechnical Commission (IEC), was formed in 1906. Today it consists of 49 national committees which develop and publish standards allowing companies to make electrical components that buyers anywhere in the world can incorporate into their own products without worry about design incompatibilities.[29] The strength of cooperation in the electrical and electronics industry is indicated in the fact that the IEC is the only product standards body that has not been absorbed into the International Organization for Standardization (abbreviated name, ISO).[30]

Though originating in industry, standards-setting later became a government function in many countries. Today some national standards-setting bodies are government agencies while in others they remain industry associations operating with government encouragement and permission. Local building codes frequently incorporate industry-developed standards, and certain privately-supported independent testing groups (such as the Underwriters' Laboratory (UL) in the USA) provide quality assurance marks accepted as seals of safe manufacturing practice. While competition (anti-trust) agencies in the USA and the EU punish companies for participation in cartels or oligopolies engaged in collusion on price-setting or sharing out of markets, they allow joint participation in development of industry-wide standards. Intergovernmental organizations provide institutional homes for standards-setting in some industries, usually because the industry was a state monopoly in many states when the IGO was founded. The

[27] S. Odén, "The acidification of air and precipitation and its consequences in the natural environment," *Ecology Committee Bulletin* No 1 (Stockholm: Swedish National Research Council, 1968) (in Swedish).

[28] Juan Carlos di Primio, "Data quality and compliance control in the European Air Pollution Regime," in David Victor, Kal Rustiala and Eugene Skolnikoff eds. *The Implementation and Effectiveness of International Environmental Agreements,* pp. 288-295. Cambridge: MIT Press, 1998.

[29] It maintains a website at www.iec.ch (accessed 9 August 2009).

[30] See the ISO's website at www.iso.org (accessed 6 August 2009).

International Telegraph Union, formed in 1865 to promote standardization of telegraph equipment, telegram delivery, and telegram charges, initially included only European countries where telegraphs were run by a government agency.[31] State monopoly was the norm for telephones and radio broadcasting as the Telegraph Union was merged with the International Radiotelegraph Union in 1932 to become the International Telecommunications Union (ITU). Though most countries turned telecommunications over to regulated private companies after 1990, the ITU remains responsible for standards-setting for "wired" (traditional copper or new fiberoptic cables) and "wireless" (radiofrequency-based) telecommunications and broadcasting systems. In these areas, ITU functions very much like a private standards-setting body in that the members of the technical committees drafting the standards are drawn from equipment manufacturers and private or government agency system operators.

Standardization expanded into areas of industrial process and methods of managing production during the 1990s. ISO pioneered this development with the ISO 9000 standard, which codified a set of "best practices" in quality control and documentation of quality control processes. ISO 9000 does not require use of any particular quality control system; rather, it requires that a company select and use one consistently and document in transparent fashion what system it uses and the steps it takes in using it. The origins and diffusion of ISO 9000 reveal the on going public-private cooperation involved in standards-setting. The initial version of ISO 9000 was derived from standards developed in the UK and then adopted in other countries; [32] the diffusion of ISO 9000 accelerated after the EU Commission began promoting it as part of the effort to develop a "single internal market" among the EU countries. Today many governments require companies interested in bidding on government contracts to be certified as meeting ISO 9000 series standards before they can submit a bid.

Standards can also develop spontaneously if one company's products come to dominate the market. This happened in computer operating systems in the late 1980s when Microsoft's Windows operating system (OS) was being run on about 90% of all computers sold. Software developers who wanted to sell their application programs knew that the applications would have to run on Windows if they were to sell widely.

The Microsoft example illustrates both the advantages and the dangers of situations where a proprietary standard (one owned by a single company and covered by a patent or copyright) becomes a de facto standard. While having computers running on the same OS was convenient for individual and organizational computer users, Microsoft ran afoul of government regulators in both the USA and the EU by "bundling" application programs with the OS and selling them only as a complete set, a practice they regarded as an illegal method of excluding competitors from the applications market. A US Federal Trade Commission investigation of Microsoft's practices ended inconclusively in 1993, but the US Department of Justice took up the problem later in 1993. It sued and Microsoft agreed to an out-of-court settlement under which it promised to end bundled sales. Yet, when Microsoft developed Internet Explorer to compete with Netscape Navigator, first successful internet browser, it bundled IE with Windows. It sought to evade the settlement by claiming IE was a built-in component of Windows rather than a separate program. Netscape quickly lost most of its sales. The Department of Justice, joined by 20 of the 50 state governments in the

[31] Mark W. Zacher with Brent A Sutton, *Governing Global Networks: International Regimes for Transportation and Communications*, Cambridge UK: Cambridge University Press, 1996, chapter 5 summaries the shift from government to private provision.

[32] R.W. Peach, *The ISO 9000 Handbook.* New York: Irwin Professional Publishing, 1997.

USA, sued again. The initial ruling in *United States v. Microsoft* would have required Microsoft to split into 2 companies: an OS producer and an applications producer. The ruling was thrown out on appeal and the case remanded to another district court judge, but before the new case could proceed, the Bush administration dropped the lawsuit and allowed Microsoft to remain a single company and keep most of its OS code secret in return for releasing enough code to permit other companies to write compatible applications and ending its efforts to retaliate against computer manufacturers who installed rival operating systems in their products. 9 of the state governments, joined by the city of Washington DC, pressed the original suit and won a ruling that included enough findings that Microsoft has violated anti-trust laws and/or infringed on others' patents for the State of California, AOL-Time-Warner (which had bought Netscape) Sun Microsystems, InterTrust, Real Networks, and IBM to win settlements totaling more than $2.5 billion. The EU Commission fined Microsoft Euro 497 million (about $600 million at the time) for infringements of European competition law and required it to stop bundling Windows Media Player with the OS, and to release more source code.[33]

The Microsoft litigation had two effects. First, it gave considerable impetus to the "free software"/"open source" movement of programmers who believe that operating systems and user applications should be made part of the public domain and freely available to all, and have developed their own mechanism for shared development and continues dissemination of software through successive versions of the General Public License.[34] Second, it provided vivid confirmation of the proposition that standards-setting should be separated from the operations of any individual company by having a separate industry association-sponsored or other body develop the standards. Even when most of the participants in standards-setting committees are employees of particular companies because they have most of the knowledge relevant for defining standards, setting the standards in a separate entity creates a public good accessible to all companies. This keeps proprietary control of the standard from becoming part of a dominant firm's marketing strategy. It also tempers, though does not eliminate, competition among firms seeing to have their products or methods become the standard so they will have fewer adjustment costs. The separation also allows companies to develop their own particular way of meeting the standard and treating that method as proprietary information to be kept in house or licensed as the company chooses.

Whether national, or as is increasingly the case, transnational, private standards-setting organizations share the following characteristics:

1. Members of the committees developing draft standards for the body's approval are experts in the technical disciplines relevant to designing and manufacturing or delivering the product with credentials credible to the private firms or others whose activities are being standardized.

2. The typical standards-setting process involves highly specialized expert committees drafting proposed standards for a particular product, circulating the draft among interested firms and

[33] Because compliance remains under monitoring, the case is listed as "active" by the US Department of Justice, and major documents can be read at http://www.usdoj.gov/atr/cases/ms_index.htm (accessed 12 August 2009). Origins of the case and court proceedings through 2002 are analyzed in Ken Auletta, *World War 3.0: Microsoft v. the U.S. Government and the Battle to Rule the Digital World* (New York: Broadway, 2002)

[34] Current terms are described at http://www.gnu.org/licenses/gpl.html (accessed 12 August 2009). The GPL was developed by the Free Software Foundation in Boston, MA. Open Source Initiative maintains a list with descriptions of other open source licenses at http://www.opensource.org/licenses/alphabetical (accessed 12 August 2009).

others for comment, refining the draft in light of comments, and submitting the revised version to the general approval body of the standards-setting organization. That body may approve or return the draft for revision. Only when approved does the standard become an official statement of the standards-setting organization. [35]

3. Private standards-setting bodies have no implementation agency or enforcement power. Therefore, they cannot compel anyone to use the standards they produce. Manufacturers' acceptance of and compliance with a product standard stems from perceptions that they will benefit significantly from working to the standard. Benefits can include greater sales possibilities because of interoperability with a wider range of other producers' products, network effects of increasing consumer demand that often develop as more users adopt a standard product, or provision of goods or infrastructure that fit with customers' routines. Working to standards also enhances customer trust in the quality of the product, which can be very helpful to new firms whose brands or trademarks are not widely known. In the newer areas of process certification, such as the ISO 9000 (quality control) and 14000 (environmental management systems) series,[36] the Forest Stewardship Council's lumber scheme, the various "fair trade' initiatives on Third World agricultural goods, or organic farming, a system of third-party compliance certification has developed because customers cannot tell from inspecting the final good whether the process standards have been followed. In these schemes, a standards-setting body defines the standards and a separate accreditation body lists and monitors the competence of the organizations serving as third-party certifiers.[37] However, decisions to follow the standards still depend on companies' perception of whether doing so is consistent with the corporate self-definition or will enhance profitability.

Private standards-setting processes vary considerably in their detail. Some bodies include only persons employed in the industry. Others include participants from the independent rating bodies or testing laboratories that have developed in several countries, such as the (insurance) Underwriters' Laboratory (UL) in the USA. The ISO maintains two processes for developing standards – the more formalized process of drafting and circulation through its standing committees and a less formal process of developing "International Workshop Agreements." These can be initiated by request of "any interested party" and participation is open to "market players and other stakeholders." Though one of the ISO standard organizations will be put in charge of coordinating workshop meetings, participants do not have to be members of national delegations to ISO. The resulting IWA can address "any subject" on which there is

[35]The ISO process is outlined at http://www.iso.org/iso/standards_development/processes_and_procedures/how_are_standards_developed.htm (accessed 12 August 2009). Kristina Tamm Hallström, "Organizing the Process of Standardization," in Nils Brunsson, Bengt Jacobsson and Associates, *A World of Standards*, chapter 6 Oxford: Oxford University Press, 2000 focuses on ISO's Technical Committee 176 which develops the 9000 series standards;

[36] See John T. Rabbit and Peter A. Bergh, *The ISO 9000 Book: A Global Competitor's Guide to Compliance and Certification*. White Plains, NY: Quality Resources, 1994 and A.J. Edwards, *ISO 14000 Environmental Certification Step by Step*, rev. ed. (Butterworth-Heinemann, 2004). Also see the ISO website pages on the 9000 and 14000 standards at http://www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000/iso_9000_essentials.htm and http://www.iso.org/iso/iso_14000_essentials (accessed 24 June 2009)

[37] Descriptions of such schemes and their rules for use of the relevant logo on products are available on the Forest Stewardship Council's website www.fsc.org; and TransFair USA's website at www.transfairusa.org.

market or policy-driven need for harmonization of practice, and can be either a standalone document or a precursor to a fully-developed ISO standard.[38] Because fair trade schemes were developed by transnational advocacy coalitions, their members include environmental organizations, community groups, and indigenous peoples, as well as professional resource managers, companies or cooperatives producing the product(s) covered, and companies engaged in wholesale or retail selling of the product(s). The International Federation of Organic Agriculture Movements is composed mainly of national and local organic farmers' groups, but also includes firms producing cosmetics and other products from organically-grown plants and organic certifying organizations.[39]

Some private initiatives have been spurred by public scandal following major production accidents or revelations of long-term pollution. The 1976 Seveso and 1984 Bhopal Disasters spurred development of a voluntary code of conduct among chemical companies that became the Responsible Care Initiative. The coordinating industry organization has members in 52 countries. These are typically seen by members of environmental, human rights, and development NGOs as efforts to "whitewash" (or, for environmental matters "greenwash") private activity and hide lack of real change in industry practices.[40]

International Scientific or Engineering Associations

Within their respective disciplines, international scientific and engineering associations develop transnational standards for the conduct of professional activity and serve as forums for discussion of broader ethical concerns. These associations share 3 basic features:

1. Membership requires possession of the professional qualifications defined by the professional community in the discipline; for individuals this means formal admission into the field and for associations it means the individuals in the association are qualified to work in the discipline.

2. The association upholds the transnational nature and traditions of science or engineering.

3. The association also devotes considerable attention to maintaining professional autonomy, vis-à-vis government, business, and other entities.

Other aspects of the organizations vary. Some of the transnational associations are membership organizations consisting of individual scientists or engineers. Others are federations of national-level organizations. Some work at the frontiers of basic science; others are more involved in applying basic scientific knowledge to particular areas of human activity. While the transnational association is independent of any government, the national-level components vary from entirely autonomous to receiving some government support to being arms of government.

---

[38] Details on the process are available at http://www.iso.org/iso/standards_development/processes_and_procedures/deliverables/iso_iwa_deliverable.htm (accessed 12 August 2009).

[39] See IFOAM membership list at http://www.ifoam.org/organic_world/directory/index.html (accessed 12 August 2009).

[40] E.g., Jennifer Clapp,"The privitization of global environmental governance: ISO 14000 and the developing world," *Global Governance* 4 (3): 295-316 (1998).

Some have gone further than others in developing explicit codes of ethics for members; however, most scientific and engineering codes of ethics are still developed and applied by national-level associations. A few sponsor development of global safety regulations meant to reduce risks posed by new types of research. The International Council for Science (ICSU) Committee on Space Research (COSPAR) has been the primary forum for discussion of rules for minimizing the likelihood of contamination of outer space by Earth organisms or of Earth by organisms originating in outer space or natural bodies in space. The discussions of safety rules for Recombinant DNA research begun at the 1975 Asilomar Conference has continued since 1979 in the ICSU Scientific Committee on Genetic Experimentation (COGENE).

International scientific associations occasionally comment on controversies that directly affect their members' work. The International Astronomical Union (IAU) was persuaded to criticize the US government's 1958 plan to test the radiocommunications potential of sets of metal rods put in orbit around Earth by members, including many prominent US astronomers, worried that the experiment would interfere with radioastronomy and needlessly clutter near-earth space.[41] They also prepare statements indicating how their members' expertise can contribute to assessing and addressing real world problems.[42]

International scientific associations are more active in facilitating research by organizing joint projects and establishing standard terminology. International collaboration marked development of values for comparative atomic masses ("atomic weights") since the 19th century. In the 1960s the International Union of Pure and Applied Chemistry (IUPAC) and the International Physics Union (IPU) collaborated in developing a globally uniform table to replace the somewhat different tables that had been used by physicists and chemists since 1929.[43] The IUPAC also maintains a *Manual of Physico-Chemical Symbols and Terminology* disseminating standard names for and diagrammatic representations of natural and man-made chemicals and chemical compounds. The lack of a single standard name for the metal known as "aluminium" in most of the world but "aluminum" in the USA after 1925,[44] has not caused confusion. However, the pace with which newly-synthesized chemicals, including new medicines, emerge today means that lack of standard usage can cause severe confusion inhibiting effective research and regulation.

The number and size of transnational scientific bodies have increased in recent decades.[45] The increase has been promoted actively by the UN Educational, Scientific, and Cultural Organization (UNESCO) since

---

[41] C. Wilfred Jenks. 1965. *Space Law*, pp. 35-36. New York: Oceana Publishers.

[42] For instance, the July 2002 statement on Water Systems including Water Quality by the International Union of Geodesy and Geophysics (IUGG)'s International Association of Hydrological Sciences (IAHS) section and ICSU's"s Scientific Committee on Water Research (SCOWAR) available at http://www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/211_DD_FILE_statem-water_July_02.pdf (accessed 14 August 2009).

[43] See Norman E. Holden, "Atomic Weights and the International Committee – A Historical review," *Chemistry International* 26 (1) (Jan-Feb 2004. Full text available through http://www.iupac.org/publications/ci/2004/2601/1_holden.html (accessed 12 August 2009)

[44]Sir Humphry Davy proposed calling the metal "aluminum" in the1820s but others preferred "aluminum" because it matched the "ium" form at the end of most element names at the time. In 1925 the American Chemical Society voted to use "aluminum" instead. See http://chemistry.about.com/od/elementfacts/a/aluminum.htm (accessed 12 August 2009).

[45]Frank Greenaway, *Science International: A History of the International Council of Scientific Unions.* Cambridge: Cambridge University Press, 1996.

its establishment in 1946. UNESCO staff worked hard to promote development of science academies and science policy offices in countries, mainly in the developing world, where they did not exist.[46] It also encouraged formation of scientific associations in disciplines where they did not exist, and in drawing scientists from around the world into global research projects such as the (Third) International Geophysical Year in 1957-58, the International Year of the Quiet Sun in 1964-65, the Ocean Drilling Program in 1985-2003, and the Man and the Biosphere Project since 1972.

<end>

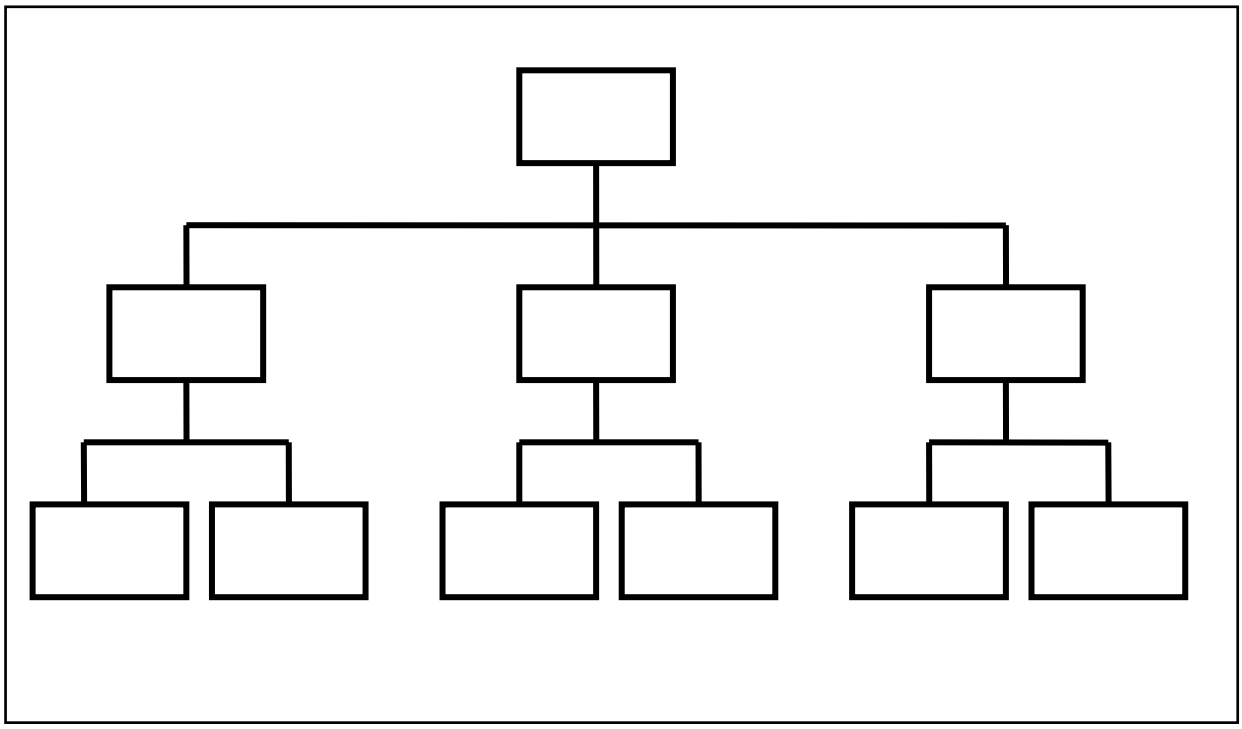
[46]Martha Finnemore, "International organizations as teachers of norms: UNESCO and science policy," *International Organization* 47 (4): 565-593 (1993).

IDEESE Module 2.1 Resources

Diagrams: Networks and Organizations

MJ Peterson
Version 2; August 2009

Figure 1. Typical Bureaucratic Organization



This module was created by the International Dimensions of Ethics Education in Science and Engineering (IDEESE) Project at the University of Massachusetts Amherst with support from the National Science Foundation under grant number 0734887. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. More information about the IDEESE can be found at http://www.umass.edu/sts/ethics.

This case should be cited as: M.J. Peterson. 2009. "Diagrams: Networks and Organizations." International Dimensions of Ethics Education in Science and Engineering. Available www.umass.edu/sts/ethics.

Figure 2. Typical Network

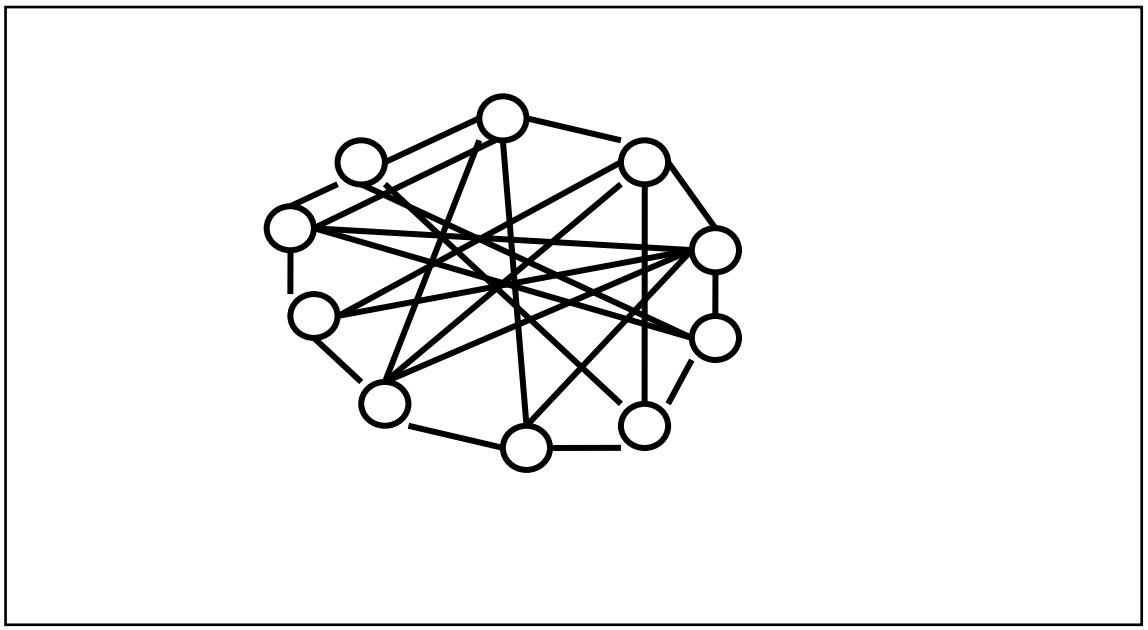
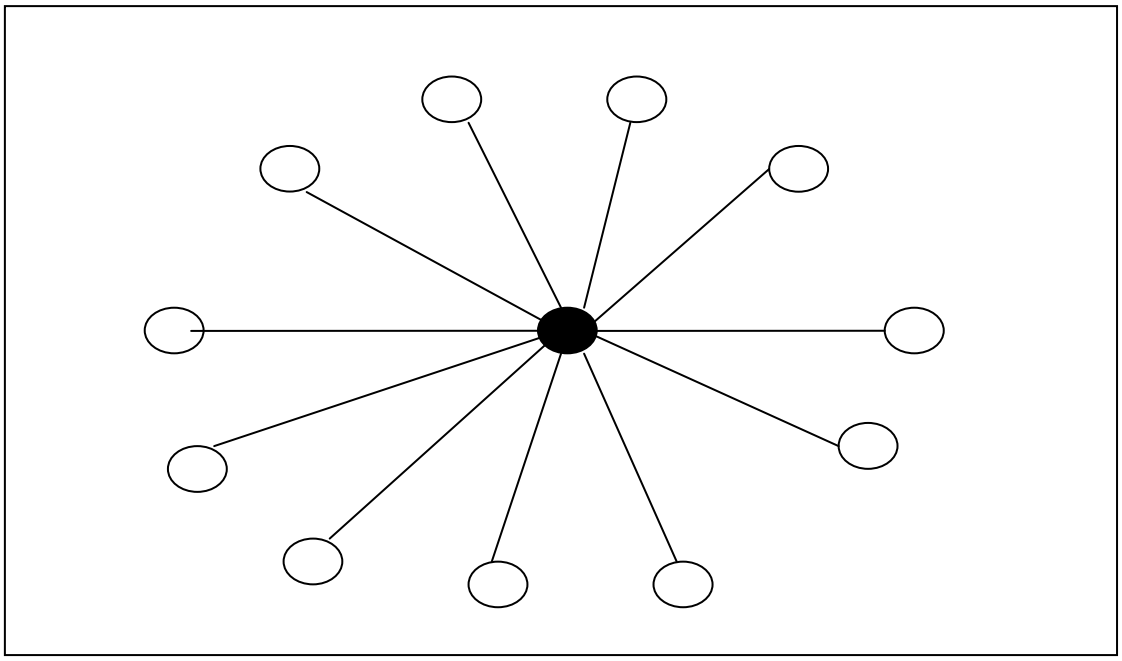


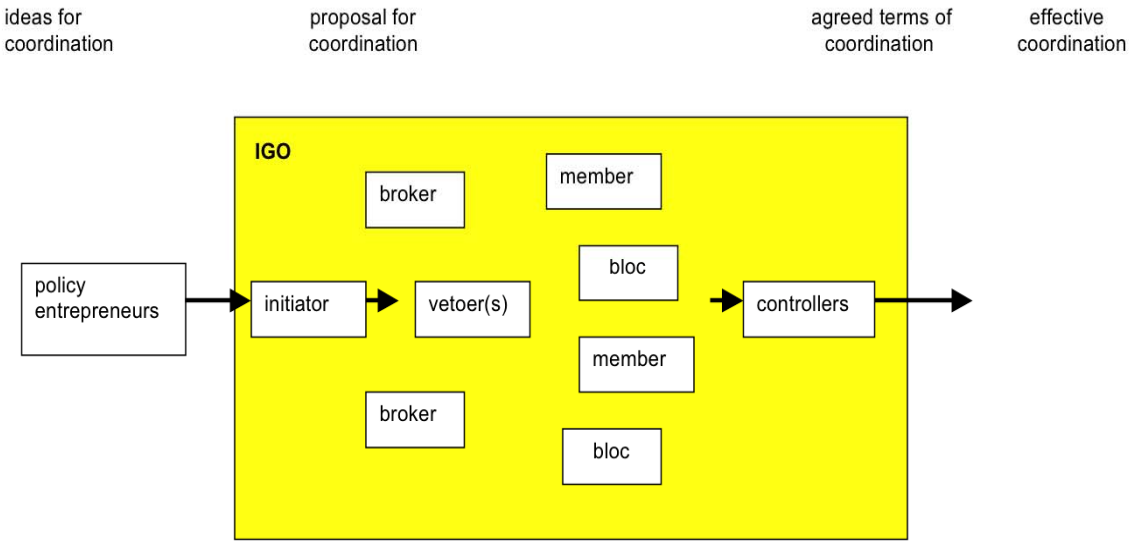
Figure 3. Network with a communications hub



IDEESE Module 2.1 Resources

Diagrams: Roles in IGO Policy Coordination Process

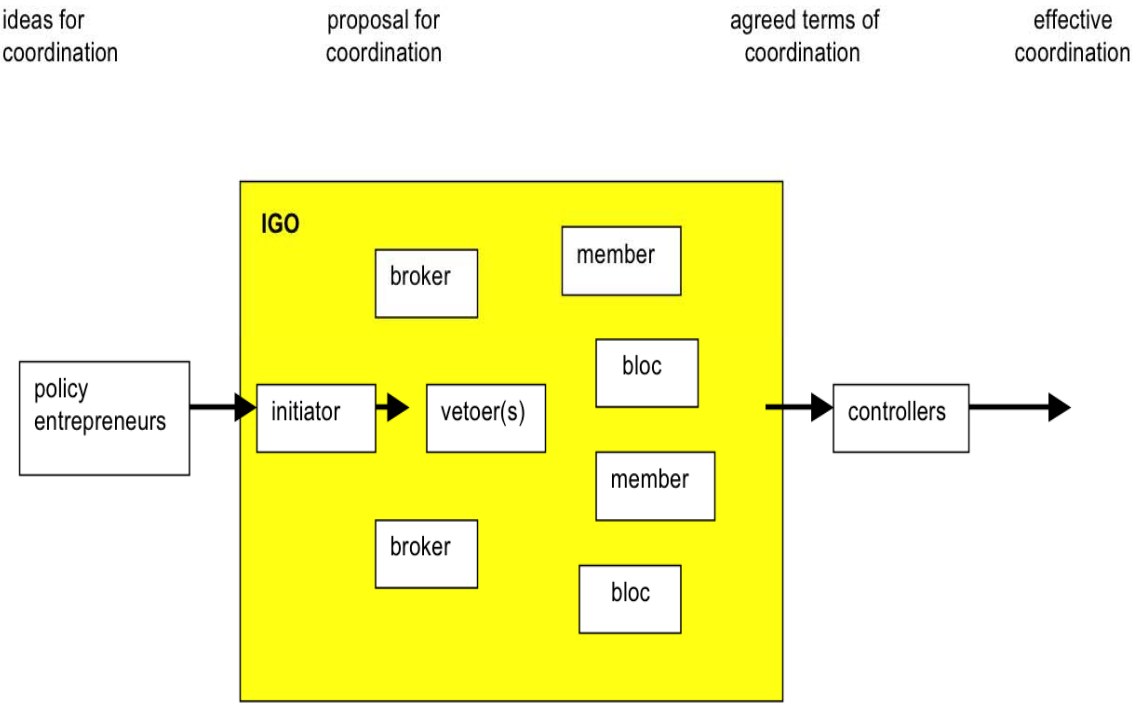
MJ Peterson
Version 1; June 2009



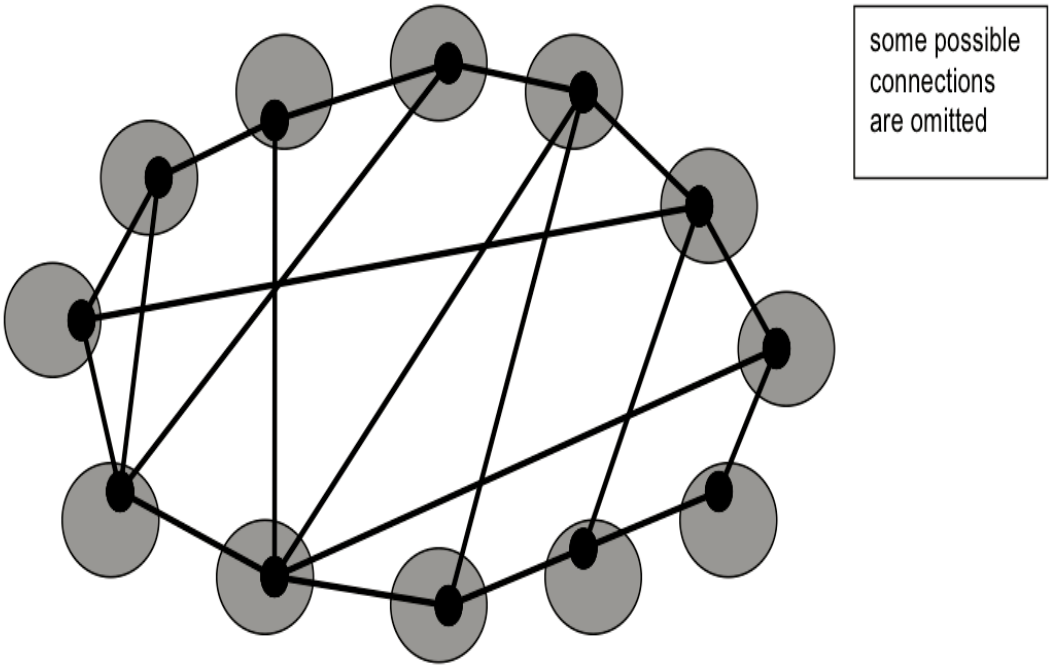
This module was created by the International Dimensions of Ethics Education in Science and Engineering (IDEESE) Project at the University of Massachusetts Amherst with support from the National Science Foundation under grant number 0734887. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. More information about the IDEESE can be found at http://www.umass.edu/sts/ethics.

This case should be cited as: M.J. Peterson. 2009. "Diagrams: Roles in IGO Policy Coordination Process." International Dimensions of Ethics Education in Science and Engineering. Available www.umass.edu/sts/ethics.

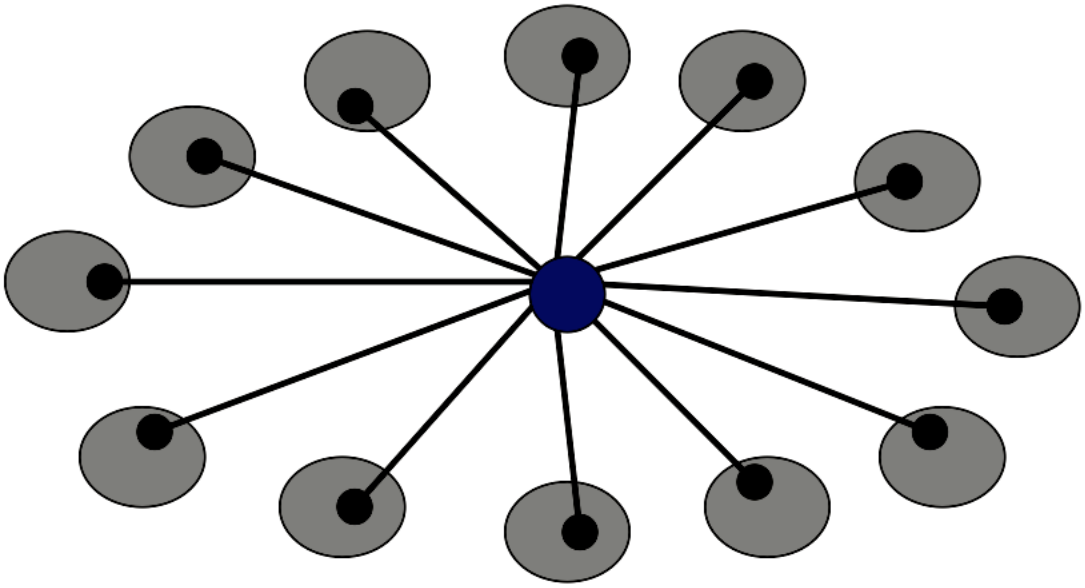
Variation: Controllers are not members of the IGO



Intergovernmental Network



Intergovernmental Network with central information node



<end>

An Example of Standardization by International Scientific Associations: Molecular Biology Nomenclatures

MJ Peterson
Version 1; June 2009

[Excerpt from International Union of Biochemistry and Molecular Biology website, www.iubmb.unibe.ch Accessed April 2008]

The International Union of Pure and Applied Chemistry (IUPAC) and the International Union of Biochemistry and Molecular Biology (IUBMB) have established the IUPAC-IUBMB Joint Commission on Biochemical Nomenclature (JCBN) and the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology (NC-IUBMB). A short outline on the purpose and aim of these Committees is outlined in the paragraphs below.

More detailed information and the recommendations for biochemical nomenclature including enzyme nomenclature can be found on the nomenclature website.

Purpose of the committees

The purpose of the committees is to facilitate communication of biochemical information by encouraging scientists to use generally understood terminology.

They make recommendations with this aim. The committees seek advice from experts in the diverse fields of biochemistry about matters where communication is difficult because of inconsistent practices. This is the starting point of most of the initiatives of the committees. The experts consulted include journal editors and database managers. For example, the recommendations for a Nomenclature for Incompletely Specified Bases in Nucleic Acid Sequences (1984) arose out of an attempt by an international group of experts to resolve the confusion that previously resulted from the existence of many different systems to represent combinations such as "G or C", which had been written in at least five different ways.

Origins

The present nomenclature committees were created by the International Union of Biochemistry (IUB; now the International Union of Biochemistry and Molecular Biology, IUBMB) and the International Union of Pure

This module was created by the International Dimensions of Ethics Education in Science and Engineering (IDEESE) Project at the University of Massachusetts Amherst with support from the National Science Foundation under grant number 0734887. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. More information about the IDEESE can be found at http://www.umass.edu/sts/ethics.

This case should be cited as: "Molecular Biology Nomenclatures." As cited in M.J. Peterson. 2009 "Module 2.1: Variation in International Regulatory Processes." International Dimensions of Ethics Education in Science and Engineering. Available www.umass.edu/sts/ethics.

and Applied Chemistry (IUPAC) to replace the IUPAC-IUB Commission on Biochemical Nomenclature (CBN), which was discontinued in 1977. Formally there are two committees:

* JCBN, the IUPAC-IUBMB Joint Commission on Biochemical Nomenclature
* NC-IUBMB, the Nomenclature Committee of IUBMB

with somewhat different terms of reference. JCBN is jointly responsible to both International Unions, and deals with matters of biochemical nomenclature that have importance in both biochemistry and chemistry. NC-IUBMB is responsible only to IUBMB and deals with matters of biochemical nomenclature that are more remote from the interests of chemists.

In practice there is considerable overlap in the tasks of the two committees and they always work and meet as a single body, with a common Chairman and a common Secretary. The present members are listed on the web. Unless otherwise indicated, therefore, the term "nomenclature committees" in this page refers equally to JCBN and to NC-IUBMB.

Procedures for establishing new recommendations

The initial recommendations for any topic are always prepared by experts in the subject area, but are subsequently studied by the nomenclature committees in an effort to harmonize them with recommendations in related areas of biochemistry, or indeed in chemistry and other disciplines. Although this step often appears unnecessary to experts in a restricted area of the subject, its importance emerges when one attempts to present information on a broader scale or to a broader audience. As an example, some years ago the nomenclature committees were asked to advise on some draft recommendations in which “I” (in ordinary roman type and without any qualifiers) was proposed as a standard symbol that could be used without definition for a particular immunoglobulin; they had to point out that this could only be acceptable in a very narrow context, as it would be confusing whenever the chemical symbol for iodine might be needed, or if the one-letter code for isoleucine and the symbol for ionic strength were also used (quite apart from confusion with the personal pronoun, as, for example, in "I mixed I with 131I-labelled thyroxine in a solution of I = 0.5 mol/l containing 5mM"). Further review is required after the nomenclature committees are satisfied with any recommendations, as the International Unions, which have ultimate responsibility for any publication, need to be satisfied that they represent the views of a broad range of experts. The actual review procedures of the two Unions differ somewhat, but their aims are the same, and they also have the additional consequence that preparing any document is inevitably slow. Even the most rapidly produced documents, such as the Nomenclature for Incompletely Specified Bases in Nucleic Acid Sequences noted above, which encountered no serious obstacles on the way to approval, typically take at least two years.

Connections with other bodies

There is inevitably some overlap between the work of the biochemical nomenclature committees and similar bodies in other disciplines, especially through IUPAC Division VIII, Chemical Nomenclature and Structure Representation. Many IUPAC nomenclature recommendations are available through the web. To avoid arriving at conflicting recommendations the nomenclature committees maintain close relations with such bodies (and during the existence of the present committees they have always included present or former members of CNOC among their members). Input from other committees concerned with

biochemical nomenclature is always welcomed, and any such body interested in sending an Observer to meetings of JCBN and NC-IUBMB is invited to contact the Secretary, Dr. S Boyce.

Publication of recommendations

Apart from Enzyme Nomenclature, discussed below, recommendations of the nomenclature committees are published in the primary research literature. All JCBN recommendations are published in Pure and Applied Chemistry, and all JCBN and NC-IUBMB recommendations are currently published in the European Journal of Biochemistry, by courtesy of FEBS. Many documents appear also in other journals, and any journal wishing to republish a document can normally obtain reproduction-quality proofs from the European Journal of Biochemistry, to avoid the need for re-setting. However, it is not obligatory to use these proofs, and journals that prefer to set the type themselves may do so without any copyright complications. From time to time these documents are published together as a Compendium, Biochemical Nomenclature and Related Documents; the most recent edition was published by Portland Press for IUBMB in 1992 (ISBN 1 85578 005 4).

A list of JCBN and NC-IUBMB publications is available through the web, and the full texts of the following are also there. Others will be added as time permits.

[From separate Nomenclatures page]

Apart from Enzyme Nomenclature, discussed below, recommendations of the nomenclature committees are published in the primary research literature. All JCBN recommendations are published in Pure and Applied Chemistry, and all JCBN and NC-IUBMB recommendations are currently published in the European Journal of Biochemistry, by courtesy of FEBS. Many documents appear also in other journals, and any journal wishing to republish a document can normally obtain reproduction-quality proofs from the European Journal of Biochemistry, to avoid the need for re-setting. However, it is not obligatory to use these proofs, and journals that prefer to set the type themselves may do so without any copyright complications. From time to time these documents are published together as a Compendium, Biochemical Nomenclature and Related Documents; the most recent edition was published by Portland Press for IUBMB in 1992 (ISBN 1 85578 005 4).

A list of JCBN and NC-IUBMB publications is available through the web, and the full texts of the following are also there. Others will be added as time permits.

Recommendation	URL
Amino Acids and Peptides	http://www.chem.qmul.ac.uk/iupac/AminoAcid/
Biochemical thermodynamics	http://www.chem.qmul.ac.uk/iubmb/thermod/
Branched nucleic acids	http://www.chem.qmul.ac.uk/iubmb/misc/bran.html
Carbohydrates	http://www.chem.qmul.ac.uk/iupac/2carb/
Carotenoids	http://www.chem.qmul.ac.uk/iupac/carot/
Corrinoids (vitamin B12)	http://www.chem.qmul.ac.uk/iupac/misc/B12.html
Cyclitols	http://www.chem.qmul.ac.uk/iupac/cyclitol/
Electron transport proteins	http://www.chem.qmul.ac.uk/iubmb/etp/
Enzyme kinetics	http://www.chem.qmul.ac.uk/iubmb/kinetics/
Enzyme nomenclature	http://www.chem.qmul.ac.uk/iubmb/enzyme/

EC 1 Oxidoreductases	http://www.chem.qmul.ac.uk/iubmb/enzyme/EC1/
EC 2 Transferases	http://www.chem.qmul.ac.uk/iubmb/enzyme/EC2/
EC 3 Hydrolases	http://www.chem.qmul.ac.uk/iubmb/enzyme/EC3/
EC 4 Lyases	http://www.chem.qmul.ac.uk/iubmb/enzyme/EC4/
EC 5 Isomerases	http://www.chem.qmul.ac.uk/iubmb/enzyme/EC5/
EC 6 Ligases	http://www.chem.qmul.ac.uk/iubmb/enzyme/EC6/
Folic acid	http://www.chem.qmul.ac.uk/iupac/misc/folic.html
Glycolipids	http://www.chem.qmul.ac.uk/iupac/misc/glylp.html
Glycoproteins	http://www.chem.qmul.ac.uk/iupac/misc/glycp.html
myo-Inositol numbering	http://www.chem.qmul.ac.uk/iupac/cyclitol/myo.html
Lignan Nomenclature	http://www.chem.qmul.ac.uk/iupac/lignan/
Lipid Nomenclature	http://www.chem.qmul.ac.uk/iupac/lipid/
Membrane transport proteins	http://www.chem.qmul.ac.uk/iubmb/mtp/
Multienzymes	http://www.chem.qmul.ac.uk/iubmb/misc/menz.html
Multiple forms of enzymes	http://www.chem.qmul.ac.uk/iubmb/misc/isoen.html
Nucleic acid constituents	http://www.chem.qmul.ac.uk/iupac/misc/naabb.html
Nucleic acid sequence (incompletely specified bases)	http://www.chem.qmul.ac.uk/iubmb/misc/naseq.html
Peptide hormones	http://www.chem.qmul.ac.uk/iubmb/misc/phorm.html
Phosphorus containing compounds	http://www.chem.qmul.ac.uk/iupac/misc/phospho.html
Polymerized amino acids	http://www.chem.qmul.ac.uk/iupac/misc/polypep.html
Polypeptide conformation	http://www.chem.qmul.ac.uk/iupac/misc/ppep1.html
Polynucleotide conformation	http://www.chem.qmul.ac.uk/iupac/misc/pnuc1.html
Polysaccharide conformation	http://www.chem.qmul.ac.uk/iupac/misc/psac.html
Prenol nomenclature	http://www.chem.qmul.ac.uk/iupac/misc/prenol.html
Pyridoxal (vitamin B6)	http://www.chem.qmul.ac.uk/iupac/misc/B6.html
Quinones with an Isoprenoid Chain	http://www.chem.qmul.ac.uk/iupac/misc/quinone.html
Retinoids	http://www.chem.qmul.ac.uk/iupac/misc/ret.html
Steroids	http://www.chem.qmul.ac.uk/iupac/steroid/
Tetrapyrroles	http://www.chem.qmul.ac.uk/iupac/tetrapyrrole/
Tocopherols (vitamin E)	http://www.chem.qmul.ac.uk/iupac/misc/toc.html
Translation Factors	http://www.chem.qmul.ac.uk/iubmb/misc/trans.html
Vitamin D	http://www.chem.qmul.ac.uk/iupac/misc/D.html

<u>Chemical recommendations of use to biochemists</u>

Bioinorganic glossary	www.chem.qmul.ac.uk/iupac/bioinorg/
Class names	www.chem.qmul.ac.uk/iupac/class/
Gold Book - chemical glossary	www.chem.qmul.ac.uk/iupac/bibliog/gold.html
Isotopic modification	www.chem.qmul.ac.uk/iupac/sectionH/
Medicinal chemistry glossary	www.chem.qmul.ac.uk/iupac/medchem/
Natural product nomenclature	www.chem.qmul.ac.uk/iupac/sectionF/
Physical organic chemistry glossary	www.chem.qmul.ac.uk/iupac/gtpoc/
Stereochemical terminology	www.chem.qmul.ac.uk/iupac/stereo/

If you want to search all these files then two searches are needed. All those which start www.chem.qmul.ac.uk/iupac/ can be searched, and separately those which start www.chem.qmul.ac.uk/iubmb/ may be searched.

Enzyme Nomenclature

The continuous process of discovering new enzymes requires a somewhat different approach for their nomenclature and classification; this is probably the single largest task of the committees. The system used is to allot each enzyme a recommended name and number to allow it to be identified, and the list so obtained has been published at intervals. Its most recent printed edition is Enzyme Nomenclature, published by Academic Press for IUBMB in 1992 (ISBN 0-12-227164-5 hardback or 0-12-227165-3 paper). Several supplements have also been published. This list is now available on the web, at: http://www.chem.qmul.ac.uk/iubmb/enzyme/

Classified under:

EC 1 oxidoreductases
EC 2 transferases
EC 3 hydrolases
EC 4 lyases
EC 5 isomerases
EC 6 ligases

This site is searchable. It contains the recommended name and number of each enzyme. An increasing fraction of these entries have links to the specifications of the enzymes, allowing these to be obtained on screen. These specifications include links to other bioinformatic databases as well as references and comments on the nature of the enzymes. It includes all enzymes approved or updated since the 1992 edition of Enzyme Nomenclature.

It is perhaps worth noting, as it has been a matter of long-standing confusion, that enzyme nomenclature is primarily a matter of naming reactions catalysed, not the structures of the proteins that catalyse them. This has allowed assignment of newly-discovered catalytic activities before anything is known about the structures of the enzymes. The links to databases of genes and protein structure allow the relationships between functional and structural classifications to be more readily accessed. The system of naming enzymes in terms of reactions, rather than structures, is one that works far better for enzymes that act on relatively small molecules than for those that handle polymers. Because of this a rather different system is used for the nomenclature of peptidases.

Information about new enzymes or corrections to existing entries may be reported directly from these web pages or by using the form printed in the back of the 1992 edition of Enzyme Nomenclature. Comments and suggestions on enzyme classification and nomenclature also may be sent to Dr S. Boyce, Department of Biochemistry, Trinity College Dublin, Dublin 2, Ireland, (E-mail: sboyce@tcd.ie). All new material is considered by the committees before approval. The work on enzyme nomenclature and its transfer to the web have been greatly facilitated by grants to K.F. Tipton from the European Commission (Framework 4 Programme) and the National Institutes of Health.

An Example of Standardization by International Scientific Associations: World Federation of Engineering Organizations Code of Ethics

MJ Peterson
Version 1; June 2009

[Final version adopted in 2001; available at www.wfeo.org Accessed April 2008]

I. Broad Principles

Ethics is generally understood as the discipline or field of study dealing with moral duty or obligation. This typically gives rise to a set of governing principles or values, which in turn are used to judge the appropriateness of particular conducts or behaviors. These principles are usually presented either as broad guiding principles of an idealistic or inspirational nature, or, alternatively, as a detailed and specific set of rules couched in legalistic or imperative terms to make them more enforceable.

Professions that have been given the privilege and responsibility of self regulation, including the engineering profession, have tended to opt for the first alternative, espousing sets of underlying principles as codes of professional ethics which form the basis and framework for responsible professional practice. Arising from this context, professional codes of ethics have sometimes been incorrectly interpreted as a set of "rules" of conduct intended for passive observance. A more appropriate use by practicing professionals is to interpret the essence of the underlying principles within their daily decision-making situations in a dynamic manner, responsive to the need of the situation. As a consequence, a code of professional ethics is more than a minimum standard of conduct; rather, it is a set of principles, which should guide professionals in their daily work.

In summary, the model Code presented herein expresses the expectations of engineers and society in discriminating engineers' professional responsibilities. The Code is based on broad principles of truth, honesty and trustworthiness, respect for human life and welfare, fairness, openness, competence and accountability. Some of these broader ethical principles or issues deemed more universally applicable are not specifically defined in the Code although they are understood to be applicable as well. Only those tenets deemed to be particularly applicable to the practice of professional engineering are specified. Nevertheless, certain ethical principles or issues not commonly considered to be part of professional ethics should be implicitly accepted to judge the engineer's professional performance.

This module was created by the International Dimensions of Ethics Education in Science and Engineering (IDEESE) Project at the University of Massachusetts Amherst with support from the National Science Foundation under grant number 0734887. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. More information about the IDEESE can be found at http://www.umass.edu/sts/ethics.

This case should be cited as: "World Federation of Engineering Organizations Code of Ethics." As cited in M.J. Peterson. 2009 "Module 2.1: Variation in International Regulatory Processes." International Dimensions of Ethics Education in Science and Engineering. Available www.umass.edu/sts/ethics.

Issues regarding the environment and sustainable development know no geographical boundaries. The engineers and citizens of all nations should know and respect the environmental ethic. It is desirable therefore that engineers in each nation continue to observe the philosophy of the Principles of Environmental Ethics delineated in Section III of this code.

II. Practice Provision Ethics

Professional engineers shall:

a.) hold paramount the safety, health and welfare of the public and the protection of both the natural and the built environment in accordance with the Principles of Sustainable Development;

b.) promote health and safety within the workplace;

c.) offer services, advise on or undertake engineering assignments only in areas of their competence and practice in a careful and diligent manner;

d.) act as faithful agents of their clients or employers, maintain confidentially and disclose conflicts of interest;

e.) keep themselves informed in order to maintain their competence, strive to advance the body of knowledge within which they practice and provide opportunities for the professional development of their subordinates and fellow practitioners;

f.) conduct themselves with fairness, and good faith towards clients, colleagues and others, give credit where it is due and accept, as well as give, honest and fair professional criticism;

g.) be aware of and ensure that clients and employers are made aware of societal and environmental consequences of actions or projects and endeavor to interpret engineering issues to the public in an objective and truthful manner;

h.) present clearly to employers and clients the possible consequences of overruling or disregarding of engineering decisions or judgment;

i.) report to their association and/or appropriate agencies any illegal or unethical engineering decisions or practices of engineers or others.

III. Environmental Engineering Ethics

Engineers, as they develop any professional activity, shall:

a.) try with the best of their ability, courage, enthusiasm and dedication, to obtain a superior technical achievement, which will contribute to and promote a healthy and agreeable surrounding for all people, in open spaces as well as indoors;

b.) strive to accomplish the beneficial objectives of their work with the lowest possible consumption of raw materials and energy and the lowest production of wastes and any kind of pollution;

c.) discuss in particular the consequences of their proposals and actions, direct or indirect, immediate or long term, upon the health of people, social equity and the local system of values;

d.) study thoroughly the environment that will be affected, assess all the impacts that might arise in the structure, dynamics and aesthetics of the ecosystems involved, urbanized or natural, as well as in the pertinent socioeconomic systems, and select the best alternative for development that is both environmentally sound and sustainable;

e.) promote a clear understanding of the actions required to restore and, if possible, to improve the environment that may be disturbed, and include them in their proposals;

f.) reject any kind of commitment that involves unfair damages for human surroundings and nature, and aim for the best possible technical, social, and political solution;

g.) be aware that the principles of eco-systemic interdependence, diversity maintenance, resource recovery and inter-relational harmony form the basis of humankind's continued existence and that each of these bases poses a threshold of sustainability that should not be exceeded.

IV. Conclusion

Always remember that war, greed, misery and ignorance, plus natural disasters and human induced pollution and destruction of resources, are the main causes of the progressive impairment of the environment and that engineers, as an active member of society, deeply involved in the promotion of development, must use our talent, knowledge and imagination to assist society in removing those evils and improving the quality of life for all people.

Interpretation of the Code of Ethics

The interpretive articles which follow expand on and discuss some of the more difficult and interrelated components of the Code especially related to the Practice Provisions. No attempt is made to expand on all clauses of the Code, nor is the elaboration presented on a clause-by-clause basis. The objective of this approach is to broaden the interpretation, rather than narrow its focus. The ethics of professional engineering is an integrated whole and cannot be reduced to fixed "rules". Therefore, the issues and questions arising from the Code are discussed in a general framework, drawing on any and all portions of the Code to demonstrate their interrelationship and to expand on the basic intent of the Code.

Sustainable Development and Environment.

Engineers shall strive to enhance the quality of the biophysical and socioeconomic urban environment and the one of buildings and spaces, and to promote the principles of sustainable development.

Engineers shall seek opportunities to work for the enhancement of safety, health, and the social welfare of both their local community and the global community through the practice of sustainable development.

Engineers whose recommendations are overruled or ignored on issues of safety, health, welfare, or sustainable development shall inform their contractor or employer of the possible consequences.

Protection of the Public and the Environment.

Professional Engineers shall hold paramount the safety, health and welfare of the public and the protection of the environment. This obligation to the safety, health and welfare of the general public, which includes one's own work environment, is often dependent upon engineering judgments, risk assessments, decisions and practices incorporated into structures, machines, products, processes and devices. Therefore, engineers must control and ensure that what they are involved with is in conformity with accepted engineering practice, standards and applicable codes, and would be considered safe based on peer adjudication. This responsibility extends to include all and any situations which an engineer encounters and includes an obligation to advise the appropriate authority if there is reason to believe that any engineering activity, or its products, processes, etc. do not confirm with the above stated conditions.

The meaning of paramount in this basic tenet is that all other requirements of the Code are subordinate if protection of public safety, the environment or other substantive public interests are involved.

Faithful Agent of Clients and Employers.

Engineers shall act as faithful agents or trustees of their clients and employers with objectivity, fairness and justice to all parties. With respect to the handling of confidential or proprietary information, the concept of ownership of the information and protecting that party's rights is appropriate. Engineers shall not reveal facts, data or information obtained in a professional capacity without the prior consent of its owner. The only exception to respecting confidentially and maintaining a trustee's position is in instances where the public interest or the environment is at risk as discussed in the preceding section; but even in these circumstances, the engineer should endeavor to have the client and/or employer appropriately redress the situation, or at least, in the absence of a compelling reason to the contrary, should make every reasonable effort to contact them and explain clearly the potential risks, prior to informing the appropriate authority.

Professional Engineers shall avoid conflict of interest situations with employers and clients but, should such conflict arise, it is the engineer's responsibility to fully disclose, without delay, the nature of the conflict to the party(ies) with whom the conflict exists. In these circumstances where full disclosure is insufficient, or seen to be insufficient, to protect all parties' interests, as well as the public, the engineer shall withdraw totally from the issue or use extraordinary means, involving independent parties if possible, to monitor the situation. For example, it is inappropriate to act simultaneously as agent for both the provider and the recipient of professional services. If client's and employer's interests are at odds, the engineer shall attempt to deal fairly with both. If the conflict of interest is between the intent of a corporate employer and a regulatory standard, the engineer must attempt to reconcile the difference, and if that is unsuccessful, it may become necessary to inform.

Being a faithful agent or trustee includes the obligation of engaging, or advising to engage, experts or specialists when such services are deemed to be in the client's or employer's best interests. It also means

being accurate, objective and truthful in making public statements on behalf of the client or employer when required to do so, while respecting the client's and employer's rights of confidentiality and proprietary information.

Being a faithful agent includes not using a previous employer's or client's specific privileged or proprietary information and trade practices or process information, without the owner's knowledge and consent. However, general technical knowledge, experience and expertise gained by the engineer through involvement with the previous work may be freely used without consent or subsequent undertakings.

Competence and Knowledge.

Professional Engineers shall offer services, advise on or undertake engineering assignments only in areas of their competence by virtue of their training and experience. This includes exercising care and communicating clearly in accepting or interpreting assignments, and in setting expected outcomes. It also includes the responsibility to obtain the services of an expert if required or, if the knowledge is unknown, to proceed only with full disclosure of the circumstances and, if necessary, of the experimental nature of the activity to all parties involved. Hence, this requirement is more than simply duty to a standard of care, it also involves acting with honesty and integrity with one's client or employer and one's self. Professional Engineers have the responsibility to remain abreast of developments and knowledge in their area of expertise, that is, to maintain their own competence. Should there be a technologically driven or individually motivated shift in the area of technical activity, it is the engineer's duty to attain and maintain competence in all areas of involvement including being knowledgeable with the, technical and legal framework and regulations governing their work. In effect, it requires a personal commitment to ongoing professional development, continuing education and self-testing.

In addition to maintaining their own competence, Professional Engineers have an obligation to strive to contribute to the advancement of the body of knowledge within which they practice, and to the profession in general. Moreover, within the framework of the practice of their profession, they are expected to participate in providing opportunities to further the professional development of their colleagues.

This competence requirement of the Code extends to include an obligation to the public, the profession and one's peers, that opinions on engineering issues are expressed honestly and only in areas of one's competence. It applies equally to reporting or advising on professional matters and to issuing public statements. This requires honesty with one's self to present issues fairly, accurately and with appropriate qualifiers and disclaimers, and to avoid personal, political and other non-technical biases. The latter is particularly important for public statements or when involved in a technical forum.

Fairness and Integrity in the Workplace.

Honesty, integrity, continuously updated competence, devotion to service and dedication to enhancing the life quality of society are cornerstones of professional responsibility. Within this framework, engineers shall be objective and truthful and include all known and pertinent information on professional reports, statements and testimony. They shall accurately and objectively represent their clients, employers, associates and themselves consistent with their academic, experience and professional qualifications. This tenet is more than 'not misrepresenting'; it also implies disclosure of all relevant information and issues,

especially when serving in an advisory capacity or as an expert witness. Similarly, fairness, honesty and accuracy in advertising are expected.

If called upon to verify another engineer's work, there is an obligation to inform (or make every effort to inform) the other engineer, whether the other engineer is still actively involved or not. In this situation, and in any circumstance, engineers shall give proper recognition and credit where credit is due and accept, as well as give, honest and fair criticism on professional matters, all the while maintaining dignity and respect for everyone involved.

Engineers shall not accept nor offer covert payment or other considerations for the purpose of securing, or as remuneration for engineering assignments. Engineers should prevent their personal or political involvement from influencing or compromising their professional role or responsibility.

Consistent with the Code, and having attempted to remedy any situation within their organization, engineers are obligated to report to their association or other appropriate agency any illegal or unethical engineering decisions by engineers or others. Care must be taken not to enter into legal arrangements which compromise this obligation.

Professional Accountability and Leadership.

Engineers have a duty to practice in a careful and diligent manner and accept responsibility, and be accountable for their actions. This duty is not limited to design, or its supervision and management, but applies to all areas of practice. For example, it includes construction supervision and management, preparation of shop drawings, engineering reports, feasibility studies, environmental impact assessments, engineering developmental work, etc.

The signing and sealing of engineering documents indicates the taking of responsibility for the work. This practice is required for all types of engineering endeavor, regardless where or for whom the work is done, including but not limited to, privately and publicly owned firms, crown corporations, and government agencies/departments. There are no exceptions; signing and sealing documents is appropriate whenever engineering principles have been used and public welfare may be at risk.

Taking responsibility for engineering activity includes being accountable for one's own work and, in the case of a senior engineer, accepting responsibility for the work of a team. The latter implies responsible supervision where the engineer is actually in a position to review, modify and direct the entirety of the engineering work. This concept requires setting reasonable limits on the extent of activities, and the number of engineers and others, whose work can be supervised by the responsible engineer. The practice of a "symbolic" responsibility or supervision is the situation where an engineer, say with the title of "chief engineer", takes full responsibility for all engineering on behalf of a large corporation, utility or government agency/department, even though the engineer may not be aware of many of the engineering activities or decisions being made daily throughout the firm or department. The essence of this approach is that the firm is taking the responsibility of default, whether engineering supervision or direction is applied or not.

Engineers have a duty to advise their employer and, if necessary, their clients and even their professional association, in that order, in situations when the overturning of an engineering decision may result in breaching their duty to safeguard the public. The initial action is to discuss the problem with the

supervisor/employer. If the employer does not adequately respond to the engineer's concern, then the client must be advised in the case of a consultancy situation, or the most senior officer should be informed in the case of a manufacturing process plant or government agency. Failing this attempt to rectify the situation the engineer must advise in confidence his professional association of his concerns.

In the same order as mentioned above, the engineer must report unethical engineering activity undertaken by other engineers or by non-engineers. This extends to include for example, situations in which senior officials of a firm make "executive" decisions which clearly and substantially alter the engineering aspects of the work, or protection of the public welfare or the environment arising from the work.

Because of the rapid advancements in technology and the increasing ability of engineering activities to impact on the environment, engineers have an obligation to be mindful of the effect that their decisions will have on the environment and the well-being of society, and to report any concerns of this nature in the same manner as previously mentioned. Further to the above, with the rapid advancement of technology in today's world and the possible social impacts on large populations of people, engineers must endeavor to foster the public's understanding of technical issues and the role of engineering more than ever before.

Sustainable development is the challenge of meeting current human needs for natural resources, industrial products, energy, food, transportation, shelter, and effective waste management while conserving and, if possible, enhancing the Earth's environmental quality, natural resources, ethical, intellectual, working and affectionate capabilities of people and socioeconomic bases, essential for the human needs of future generations. The proper observance to these principles will considerably help to the eradication of the world poverty.

<end>

IDEESE Module 2.1 Resources

In Class Evaluation

Version 2; July 2010

Part 1: The following are some possible response you might have to the material in this Module. Please circle the response that is closest to your thoughts after this module.

Key	
SA	Strongly Agree
A	Agree
UN	Undecided
D	Disagree
SD	Strongly Disagree

Statement	Your Response				
1. I now realize that there is a lot more communication and interconnectedness between countries than I realized.	SA	A	UN	D	SD
2. I do not think that it is very important for scientists/ engineers to pay attention to the international aspects of their work.	SA	A	UN	D	SD
3. I realize that my career will probably have some global or international aspects.	SA	A	UN	D	SD
4. I now realize there are more social implications related to my career than I thought about previously.	SA	A	UN	D	SD
5. I am more aware that the work I might do will involve ethical as well as technical choices.	SA	A	UN	D	SD
6. I am more aware now of the complications related to different ethical expectations in different countries.	SA	A	UN	D	SD
7. I feel there should be one set of ethical guidelines developed that could be used to guide the work of scientists/engineers, regardless of the country in which they work.	SA	A	UN	D	SD
8. I feel that each culture has its own ethical standards, and those standards should not be dictated by other cultures or countries.	SA	A	UN	D	SD
9. I think that ethical guidelines should be a part of international treaties.	SA	A	UN	D	SD
10. I think that it is sufficient for an international company to comply with each nation's ethical standards, independent of the location of the company's headquarters.	SA	A	UN	D	SD

Part 2: In this section, please identify one specific example that you remember as having the most impact on you. Please leave the line blank if nothing seems relevant.

1. Increased intercommunication that exists now between countries.

_____

2. Social implications of work done by scientists and engineers.

_____

3. Decisions about ethics in relation to different countries.

_____

4. Any other specific ideas that were important to you from this module.

_____

<end>

This was created by the International Dimensions of Ethics Education in Science and Engineering (IDEESE) Project at the University of Massachusetts Amherst with support from the National Science Foundation under grant number 0734887. Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. More information about the IDEESE can be found at http://www.umass.edu/sts/ethics.