Standard Setting in the United States: Public and Private Sector Roles

D. Linda Garcia
Office of Technology Assessment, Washington, DC 20510-8025

Standards are ubiquitous, affecting our lives in a multitude of ways. Because the economic and social stakes in standards are so large, how standards are set is a matter of some concern. The standards development process must be fair to prevent any single interest from dictating the outcome. Equally important is the relationship between the public and private sectors. This article examines the evolution of the U.S. standards process and its basis in American political culture. It evaluates the system in the light of the many structural changes taking place in the world economy, and suggests that a new balance must be struck between public and private sector roles.

Standards affect our lives in many ways. Food and drugs must comply with health standards; cars use standardized, interchangeable parts; workplaces have safety standards; clothing comes in standard sizes; jobs are evaluated according to performance standards; telephones have standard interfaces; and bed sheets are sized to fit standard mattresses. Even our lives have become standardized through our reliance on technology.

Because the economic and social stakes in standards are so large, how standards are set is a matter of some concern. The standards-development process must be fair to prevent any single interest from dictating the outcome. Equally important is the relationship between the public and private sectors.

In the United States, almost half of all standards are set by the private sector as part of a voluntary consensus process in which all the key players—including government—participate. The system reflects American political culture, and the general preference for market-based, pluralist solutions. However, because standards serve both public and private functions, this arrangement has not been without tensions. And every so often these tensions have erupted from under the surface, as is clearly the case today.

The current U.S. standards process was adopted at the turn of the century, as the nation entered the industrial age. Its form reflects American political culture and the manner in which industrialization took place. In contrast to many other countries, where unified national standards bodies were established in conjunction with the state, standards development organizations in the U.S. first emerged in the private sector, in response to specific needs and concerns.

Today, however, the U.S. economy is in a state of flux due to a number of developments. These include the emergence of a highly competitive global economy in which the U.S. is no longer dominant; the rise of regional trading blocs, the growing importance of multinational corporations and other transnational, nongovernmental institutions, and the rapid advance of technology. Just as the industrial era gave rise to the present standards development system, so too these structural changes are placing new demands on it, raising questions about whether a new balance must be struck between the private and public sectors' roles.

The Evolution of Standards in the U.S. and the Key Players in the Process

Economically motivated standards have proliferated and become more highly valued, as economic relationships have become more intricate. Mass production meant standardized processes that required standardized parts. The demand for interoperable parts was especially prominent in the U.S., where the economic conditions for large-scale production were ripe. In no other country was there a geographic market large enough to absorb the output of a standardized commodity or stable enough to sustain continual large-scale production. Nowhere was there a labor or consumer market as large as that in the U.S., which could take advantage of an ever-expanding volume of mass produced capital and consumer goods (Williamson, 1951).

Standards were also spurred on in the U.S. by the extension of trade across the continent. As trade became more dispersed, standards were needed to assure that products manufactured in different locales could work together and be easily replicated, assembled, and

repaired. Moreover, standards were required to facilitate trading itself. For example, the railroad extended trade over vast regions, so procedures for billing and exchange were also standardized through bills of lading (Kirkland, 1961).

As the importance of standards increased, so did the number of people who had a stake in the selection of standards. Producers got involved in standardization when trade was extended across greater distances. Standards served as a trademark, allowing producers to differentiate their products from their competitors, and to price products for different markets. It was to this end, for example, that American farmers played such an important role in setting agricultural standards during the first half of the 18th century. They realized that by grading and classifying their products, they could set up separate distribution channels and increase their profits. Thus, when farmers moved west, they labeled their products by the region of origin, while wholesalers used names such as Goschen butter, Genessee flour, and Herkimer cheese as designations of grade (Beniger, 1986).

Suppliers were brought into the standards process with industrialization and the development of precision manufacturing. Recognizing that production costs could be greatly reduced with interchangeable parts, they began to produce to specifications. Gun manufacturing was one of the first industries in the U.S. to take advantage of production based on interoperable parts, followed by clock making and the manufacturing of bicycles and sewing machines. In 1813, Simon North signed a contract with the federal government to produce 20,000 pistols. His contract specifically stipulated that "the component parts of pistols, are to correspond so exactly that any limb or part of one pistol may be fitted to any other of the twenty thousand" (Radford, 1922, p. 270).

Consumers also gained from standardization. Mass produced goods were cheaper. Thus, many consumer goods such as cars, refrigerators, and vacuum cleaners, which were once regarded as luxuries, became more accessible to all. Between 1914 and 1924, Ford produced more than 15,000,000 standardized model Ts, the cost of which dropped during the same period from $950 to $240 (Williamson, 1951).

Standards also conveyed product information and provided greater quality control. One of the first product areas to benefit from standards was that of food. Responding to scandals in the meat packing industry, Congress passed the Pure Food and Drug Act of 1906. This legislation not only protected against misbranding and food adulteration, it also standardized containers for marketing fruits and vegetables, thereby eliminating false measurements and deceptive shapes. Later, the Department of Agriculture, continuing the standards program initiated during the First World War, developed standards for fruits, vegetables, peanuts, honey, butter, cheese, eggs, and meat, and established inspection stations at a number of key distribution centers. (Edwards, 1928).

The general public became even more attuned to the need for standards because of the many problems accompanying industrialization. With more and more mishaps due to the rapid expansion of technology, safety standards were introduced. An average of 1400 boiler explosions per year led the American Society of Mechanical Engineers to write a comprehensive boiler code in 1910. Once most states and cities had moved to adopt the code, such explosions were virtually eliminated (Nesmith, 1985).

With the advance of technology and its further deployment in industry, scientists and engineers began to play a special role, as a group, in standards development. Faced more and more with the need to quantify their results, they could not proceed in their work without more accurate standards of measurement and precision instruments to take these measurements. Thus, even though standards were a boon to industry, it was the scientists and not the industrialists who called for national standards to be developed through a Federal Bureau of Standards (Cargill, 1989).

Although the federal government became involved in standards as early as the mid-1980's through the work of the Office of Weights and Measures, and later with the establishment of the Bureau of Standards, it was not until World War I that the government's stake in standards was really brought home to the nation. In 1917, product diversity was so great it threatened to hinder the war effort. To deal with the problem, the government set up a Commerical Economy Board of the Council of National Defense. [The Board's] task was to simplify the use of labor, capital, and equipment for all industries. In 1918, the Board was incorporated within the War Industries Board, which eventually supervised the manufacture of over 30,000 articles of commerce (Cochrane, 1966).

Concern about the postwar economy led to continued government interest in standards in the period following the war. The hope that wartime simplification efforts would endure was dashed when manufacturers sought to revive consumer demand by increasing product diversity during the "buyers' strike" of 1919–1920. The government's response to the postwar slump was quite the opposite. Inspired by the report, *Waste in Industry,* written by the American Academy of the Federated American Engineering Societies, the government hoped to revive the economy by increasing economic efficiency through greater standardization (Hudson, 1928).

The driving force behind this crusade was Herbert Hoover, the Secretary of Commerce under President Harding. In contrast to the wartime simplification program that had focused on military products, Hoover's program was directed at the economy as a whole. To carry out the program he organized agencies within the

Department of Commerce to provide standards assistance to businesses at their request.

Balancing the Public and Private Interests in Standards

As more and more stakeholders became involved in standards, it became necessary to differentiate the responsibilites among them. Of prime importance was the relationship between the public and private sectors. Although the government actively promoted standardization at the turn of the century, it gradually relinquished this responsibility to the private standards development organizations. This division of labor continues to this day.

This American preference for private, pluralist solutions is as old as the Constitution itself. Presaging the loosely organized and fragmented standards system to be found in the U.S., Publius (a.k.a. James Madison), in the *Federalist Papers* (no. 10), argued that the only way to guard against domination by a majority faction is to promote a large number of diverse competing ones. Writing to Thomas Jefferson, Madison summed up this view (Plattner, 1982):

> *Divide et impera,* the reprobated axiom of tyranny is, under certain qualifications, the only policy by which a republic can be administered on just principles. (p. 11)

The founding fathers were successful in framing the Constitution to have just such an effect. From the outset of the new republic, Americans proved to have a penchant for joining factions and establishing associations (Wuthnow, 1991). Thus support for voluntary, private sector associations was reinforced by a general suspicion of the state and preferences for market solutions (Adams, 1984). Although these values were often supported more by rhetoric than practice, they were greatly popularized by the progressive movement, which had its heyday in the late 1880s, just at the moment when industrialization was primed to take off. Thus, whereas in many other countries government actively sponsored the growth and development of business, in the U.S. industrial development was managed, directed, and financed primarily by the private sector (Vogel, 1987).

The first American standards organizations were in keeping with this tradition. They generally emerged to deal with specific needs as they arose, and thus took a variety of forms. Often established on an industry-by-industry basis, there was little interaction between them (Cargill, 1989). The first American standards organization was the United States Pharmacopeial Convention, which was set up in 1829 to establish uniform standards for drugs. The American Iron and Steel Institute, established in 1855, was the first trade association to develop standards. The American Society of Civil Engineers, formed in 1852, was the first scientific and technical society involved in standards development.

The private sector approach survived the wartime simplification effort, and was reconfirmed by Secretary of Commerce Hoover, when he undertook the standardization crusade in 1921. Hoover was a staunch believer in the private sector. Accordingly, he set up the Division of Simplified Practice in the Department of Commerce to supply guidance, information, and assistance. But compliance with the program was purely on a voluntary basis (Cochrane, 1966).

The depression capped the voluntary approach to standards setting. In 1933, Congress cut the Bureau's standards appropriations and impounded its funds. As a result, the staff of the Simplified Practice Division was cut from 40 to four, and much of its work in the area of standards was transferred to the private sector organization, the American Standards Association.

Notwithstanding the American preference for voluntary standards, there were always a number of tensions in the standards-setting community. Consumers were among the first groups to question the system. In the wake of Hoover's standardization crusade, they began to question whether they had derived any benefits from it. It was clear that standardization had saved industry money, but consumers saw little evidence that these benefits were being passed down to them. They also looked to the Bureau for consumer product information, an area that business was loath to have government become involved in (Cochrane, 1966).

The business community also began to register complaints about the expansion of the Bureau's role, charging it with meddling in its affairs. Alarmed by the establishment of a trade standardization division at the Bureau, the American Engineering Standards Committee (AESC) formally petitioned the Bureau to withdraw from all commercial standards activities. Members of the Bureau refused to attend private sector meetings in protest (Cochrane, 1966).

With the government's retreat from the standards arena together with the proliferation of standards organizations, the need for national coordination of standards activity soon became apparent. Standards organizations were not only competing with one another to write standards, they were also writing conflicting standards, thus defeating the purpose (CRS, 1974).

The first steps toward coordination took place in 1918, during the war, when five national engineering societies, together with the U.S. Departments of War, Navy, and Commerce, formed the nucleus of an organization that was to become the AESC. In 1927, the representatives of 365 national organizations—technical, industrial, and governmental—were officially accredited by the AESC. The following year, this group was reconstituted to form the American Standards Association (ASA). However, despite the ASA, coordination contin-

ued to prove difficult because of competition among standards organizations (CRS, 1974).

The Second World War placed even greater demands for coordination on the U.S. standards community, again raising the question of the government's role in standards. To meet the needs of war, the government became involved in setting standards for consumer goods. At the behest of the Department of Commerce, a special consultant, Carroll L. Wilson, was asked to report on the standards problem, with particular attention to the role the National Bureau of Standards should play in the postwar period. Wilson concluded that both the government and the private sector standards programs fell short. Acting on Wilson's recommendations, the ASA broadened the scope of its concerns to include consumer goods. The ASA constitution was also revised so that all groups with an interest in a particular standard would have a voice in its development. Moreover, the revised constitution required that three at-large members be included on the association's board of directors in order to provide a greater voice for consumer interests (CRS, 1974).

The broadening of the ASA's mandate had only a marginal effect on its ability to serve as coordinator of all private sector standards activities. In February 1965, Francis L. LaQue, vice president of the International Nickel Co., issued a report on the state of the U.S. standards system which had been undertaken at the request of Herbert Holloman, Assistant Secretary of Commerce for Science and Technology. According to the report, the principal standardization problem in the US continued to be that of achieving legitimacy and coordination. The study noted that only 2300 of the 13,675 nationally produced and used standards were designated as American standards through the ASA. To overcome this problem, the report called for a national coordinating institution for voluntary standardization with international recognition such as that granted other national standards bodies. To assure such recognition, LaQue proposed that this institution have a federal charter, and that its standards be officially designated as U.S. standards (LaQue, 1965).

Hoping to gain such a charter, the ASA adopted a new constitution and bylaws and took on the name of the United States of America Standards Institute. Characterizing itself as a federation of trade and other organizations it redefined its mission. Acting purely as a coordinating body, the Institute no longer intended to develop standards, rather, it would orchestrate their development through the combined technical talent and expertise of its member bodies and certify that these standards development bodies adhered to the consensus process (CRS, 1974).

The government and other members of the standards community resisted the effort of the ASA to strengthen its role. A national charter was not forthcoming and the FTC protested the use of the name USASI on the grounds that it suggested that the ASA was an official organization of the federal government. A compromise was reached and the ASA became the American National Standards Institute (ANSI). Reporting on the state of the U.S. standards process several years later, the Stanford Research Institute (SRI) saw little hope for the future. The situation, according to SRI, was in fact deteriorating (SRI, 1971, p. 3).

> There is little hope that the situation will improve in the next several years. In fact fragmentation is becoming worse. Up through the mid-1960s, a favorable solution appeared possible under the guise of the quasi-official American National Standards Institute (ANSI) .... Reportedly, however ANSI now has less support and less probability of succeeding as the nominal national voluntary standards coordinating agency than it did a decade ago.
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> At the same time, other standards organizations are attempting to strengthen their individual positions, portending less opportunity for a coordinated effort. A leadership conflict exists and will probably persist for some time.

The Consumer Movement and the Rise of Regulatory Standards

The federal government's interest in standards was rekindled in the late 1960s and early 1970s in response to consumer concerns about safety and antitrust matters. Ralph Nader first raised the issue in 1965, when he published *Unsafe at Any Speed,* which severely criticized automobile standards as they had been developed by the Society for Automotive Engineers. Other horror stories about the standards system abounded (Hamilton, 1978).

Congress was quick to react. In 1967 it set up a National Commission on Product Safety to analyze the effectiveness of consumer product standards. After reviewing more than 1000 standards, the Commission concluded that the system was "chronically inadequate both in scope and permissible levels of risk" (Hamilton, 1978, p. 1372). Moreover, it suggested that the volunteer sector process was unable to produce adequate standards, given the dominant role of industry. This attitude was reflected in much of the health and safety legislation that followed, which often made special provision for standards. It was also the basis on which Senator James Aboaurezk, in March 1975, and again in 1977, introduced the Voluntary Standards and Accreditation Act designed to give the federal government considerable control over the voluntary standards system.

Responding to consumer concerns and allegations of antitrust infringements and unfairness, the Federal Trade Commission also undertook a major investigation of the U.S. standards system. After extensive hearings, at which over 200 people testified, it too concluded that the entire standards process should be regulated. It pro-

posed a rule that would require standards setters to meet a substantive "fairness" criterion (Hamilton, 1978).

Another outcome of this period was a major increase in the number of federal agencies issuing standards. From the late 1960s until the early 1970s a rash of environmental, health, and safety legislation was passed, and agencies were created to administer these laws. Included among these, for example, were the Consumer Product Safety Commission, the Environmental Protection Agency, and the Occupational, Safety and Health Administration.

The U.S. Standards Development Process as it Exists Today

Were Publius to observe the U.S. standards process today, he might well be pleased. American standards organizations continue to operate in a pluralistic framework. Almost half of all standards are set as part of a voluntary consensus process, in which all, or most of the key players—including government agencies—participate.

On the other hand, times have changed. The U.S. is no longer an isolated, homogeneous agricultural society where the greatest danger is rule by an oppressive majority. Quite the contrary. Among the dangers that the U.S. faces today is a loss of competitiveness, due partially to a failure to lead in the international standards development process. Thus, like many reports on the U.S. standards process, Publius might be alarmed by the lack of leadership and failure to develop a national standards policy. However, leadership would require either that the private sector work cooperatively, or that the federal government assume a greater role. Ironically, neither remedy is likely, precisely because of the intensity of conflict that Publius prescribed.

Within the U.S. standards community, there are approximately 400 organizations involved in standards development. These groups are organized and function independently of one another. There are essentially five different types: trade associations, professional societies, general membership organizations, third-party certifiers, and consortia. All of these organizations are private sector, voluntary organizations; they arrive at decisions through a process of consensus, and all have mechanisms for participation, comment, and appeal. (Office of Technology Assessment, 1992).

While functioning independently, many of these standards bodies coordinate their activities through the American National Standards Institute. Having no official charter, ANSI is, in effect, the "self-designated" national coordinating body for U.S. standards development organizations as well as the internationally accepted member body in the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). Receiving the bulk of its financial support from the private sector contributions, ANSI's existence depends on its ability to continually meet the needs of its diverse memberships, a task that has not always been easy (OTA, 1992).

The voluntary consensus process requires cooperation and trust to succeed. There is little bureaucratic structure to otherwise hold it together. Unresolved disputes and disagreements not only distract from the main purposes of standard setting—they also undermine the legitimacy of the system, both in the opinion of its members as well as in the eyes of the rest of the world. Such is the case in the U.S. standards world today (OTA, 1992).

Support in the U.S. for private sector standards development hides some deep-seated divisions within the standards community itself. Although most members firmly believe in the voluntary consensus process, they differ about what "openness" means. The American Society for Testing Materials (ASTM) insists that true consensus requires the participation of *all* interested parties, even if this requires subsidizing some groups. On the other hand, ANSI as well as others, argue that due process requires only that the process be open so all have an opportunity to participate. They contend that willingness to pay is an essential measure of interest in the process (OTA, 1992).

Members of the standards community also disagree about which organizations produce the "best" standards. For instance, many professional societies claim that their standards are technologically superior, since their members participate not as representatives of any group or interest, but rather as individual engineers. Some industry groups argue the opposite. Standards set by professional societies, they contend, do not reflect market forces, and they are often insensitive to industry competitive issues (OTA, 1992).

Standard-setting bodies also compete to sell standards, which is another important source of contention. Many of these organizations resemble publishers; they orchestrate standards setting in exchange for the right to sell standards and other value added, standards-related services. Sales from standards, for example, account for 80% of the income of ASTM, 60% of that of the National Fire Protection Association, and 28% of that of ANSI. Competition and turf battles among these and other standard setting bodies often revolve around these sales. These struggles are likely to become even more intense and convoluted in the future with the growth of a world market for standards and the emergence of new global competitors. This economic competition is compounded by personality conflicts in the standards-setting community, some dating back a number of years. There is little trust or respect among the leadership. People characterize one another in acrimonious terms (OTA, 1992).

The interests of some standard-setting organizations are also beginning to diverge from those of manufacturers. In a highly competitive global economy, for example, it is important for manufacturers to have their standards adopted on an international basis. They may even want to "give" their standards away in an effort to develop new markets. However, such a policy is not in the interest of those standard-setting organizations, whose livelihoods generally depend on standard sales. In addition, manufacturers may want to speed up standards development and implementation, but standard-setting organizations often hesitate to put their standards electronically online due to copyright concerns (OTA, 1992).

Conflicts in the standards community weaken the U.S. position internationally. Aware of these disputes in their most minute detail, European standards makers use them to their advantage. Even so, Europeans would prefer that the U.S. presented a united front to the rest of the world. "The United States," they say, "is a major economic power, and it must play its role in international standard setting accordingly (OTA, 1992, p. 13)." Europeans emphasize how difficult it is to negotiate with one body speaking authoritatively for the U.S., "when you are unclear about its actual power, and who it really represents." They complain that one moment they are told the ANSI speaks for all the United States; but the next, the ASTM is knocking at their doors (OTA, 1992).

Internecine warfare in the standards community also raises questions about the ability of the voluntary standards organizations to carry out the public trust delegated to them. In a recent display of these problems, ANSI charged before the Office of Management and Budget (OMB) that certain parties in the Department of Commerce are undermining ANSI's authority through their actions. However, three other major U.S. standard-setting organizations quickly took exception to this charge, claiming that they fully support the Department of Commerce's actions (OTA, 1992).

Paralleling the lack of unity in the private sector standards community is a lack of coordination and policymaking at the federal level. While this is not a new problem, its consequences will be more serious in the future. As the U.S. expands its role in a global economy, new trade-offs among standards goals must be negotiated. Free trade objectives are already coming into conflict with environmental and safety goals. Under such circumstances, coordination and conflict resolution among federal agencies are essential. Moreover, with the growing importance of standards, rapid technological advance, and the shift to a global economy, the federal government needs some ongoing organizational capability to identify problems, set goals, and evaluate system performance (OTA, 1992).

A 1977 Department of Commerce report on the U.S. standard-setting process, as well as the 1965 LaQue report, both called for a unified, national standards policy. They proposed the establishment of some form of government body, where policies should be considered. However, this type of solution was unpopular—especially in the business community—and nothing came of it.

The problem of coordination was eventually addressed on a limited scale with the establishment of an interagency committee. In accordance with OMB Circular A-119, the Department of Commerce was directed to set up an interagency consultative mechanism to advise the Secretary and agency heads in implementing federal standards policy (as defined in the Circular); to coordinate agency views; and to develop, where possible, a single, unified position. DOC assigned this task to the Interagency Committee on Standards Policy, which operates under the direction of the National Institute of Standards and Technology (NIST). Overall oversight rests with OMB, and the committee is required to report back to it every three years (OTA, 1992).

While active during its first year, this interagency committee has reportedly not met for the last year and a half. Meetings focused on implementing the federal policy to encourage agency use of voluntary standards, as directed in its mandate. The committee also set standards for agency participation in voluntary standards bodies and laid out guidelines for public sector use of private certification bodies. Participants claim, however, that scant attention was devoted to evaluating existing policy or finding ways to improve it. Nor was there much effort to identify future standards issues or to view them strategically as part of the industrial infrastructure (OTA, 1992).

The Office of Management and Budget reviews the work of the Interagency Committee every three years. Although OMB is the ultimate coordinating mechanism in the federal government, it can do little more than establish a policy directive. There is little staff support in the area of standards. The deputy director of the Office of Federal Procurement Policy is in charge of overseeing Circular A-119. However, there is no one person at OMB who focuses explicitly on standards (OTA, 1992).

Having no comprehensive national standards policy of its own, the U.S. has tended to disregard or underestimate other governments' efforts to build standards into their industrial policies. Most other countries not only view standards as a strategic marketing device to help develop markets abroad, but also as part of their industrial infrastructure, to enhance economic productivity, reduce costs, and provide for greater quality control. Thus, for example, the European Community as well as Japan have programs to educate and train domestic companies in the use of standards, to subsidize national participation in international standards organizations, and to subsidize and provide technical training for standardization efforts in developing coun-

tries where there is considerable market potential (OTA, 1992).

The U.S. has no equivalent policies or programs. Failure to appreciate the implications of standards policies and the growing importance of standardization could have serious consequences for U.S. industry. As the U.S. adjusts to a changing global economy, more and more industries are not only dependent on trade, they are also increasingly affected by standards. It is estimated, for example, that of $83 billion in exports of manufactured goods, some $40 billion is, or will be, subject to European Community product safety standards alone (OTA, 1992).

Standard setting is likely to be even more important to the nation in the future due to the economy's growing reliance on technology. Just as specialization and assembly line production provided an impetus for standardization during the industrial era, so too networked production and computer-assisted work are increasing the demand for standards today. Machines require more precision than humans, because they are less flexible in adjusting to errors and omissions. Moreover, in a global information-based economy, networking technologies provide a basis for productivity and economic growth. These technologies will become the basis of an infrastructure for all economic activity. If networks fail to interconnect for lack of standards, the nation could suffer considerable economic loss (OTA, 1992).

The growing pace of technological change will also drive the need for standards development. The faster the advance of technology, the greater the risk in R&D and product development. Standard-setting processes can help to reduce uncertainty in rapidly changing technological environment. Participants in the process learn first hand about new technologies. Morever, by developing reference models in the anticipation of actual standards, manufacturers have a general target toward which they can direct technology development. Standard setting, therefore, will increasingly be an important aspect of any national economic policy aimed at encouraging innovation and economic growth (OTA, 1992).

Many of the standard-setting problems identified in this article are persistent problems, which have been cited before. The inability of the U.S. to deal with these problems reflects the high stakes and significant ideological differences involved. There are no perfect solutions. Stakeholders strongly disagree about what constitutes a perfect state of affairs. Thus any politically viable solution will entail compromises. Above all, it will require a fresh perspective that objectively considers both the problems of the system and the ways in which all participants—public as well as private—can join to resolve them (OTA, 1992).

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