

# Appendixes

## A Framework for Assessing Standardization Issues

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To approach the discussion of standards objectively, one must begin with a sound conceptual idea of what constitutes a standard and how standards come about. This kind of analytic framework provides an objective basis for interpreting stakeholder viewpoints and adds rigor to the analysis. By identifying the key relationships in the standards setting process, it suggests the questions and issues that must be examined.

### *What Is Meant by Standards*

An analytic framework must begin with definitions, since definitions determine the scope of analysis. Moreover, the choice of definitions can have significant policy implications. How the term “standards” is used in this study, for example, will determine the terms of the debate and the range of government options developed for dealing with problems in the standards setting process.<sup>1</sup> The role for government may differ, for example, depending on whether one’s reference is product standards or safety and environmental standards.

Broad definitions used in everyday speech are generally not helpful. They are too vague to guide analysis. Precision is sacrificed for the sake of comprehensiveness. This is clearly the case for standards definitions. They tend to be exceedingly broad, in order to cover the full range of standards found throughout society. Included among the definitions of standards in Webster’s Dictionary are:<sup>2</sup>

“something established by authority, custom, or general consent as a model or example,” and

“something set up and established by authority as a rule for the measure of quantity, weight, extent, value, or quality.”

Although these definitions provide an overall notion of what constitutes a standard, they do not help focus the analysis. For this reason, researchers operationalize their definitions in accordance with the specific questions to be asked and problems to be solved. Economists, for example, generally seek to know how and under what

circumstances standards are set in the marketplace. Accordingly, they tend to view standards as an agreed upon set of specifications that define a particular product or that allow products to interoperate. Anthropologists, on the other hand, focus on the question of how individuals relate to their cultures. Thus, they consider standards to be the accepted rules of behavior that facilitate social interactions and that help individuals find their places in the world. Government bureaucrats are likely to view standards as the means to address a societal concern or to achieve a social end. They often equate standards with regulations.

This study asks how U.S. standards and standards development processes might affect U.S. trade. Thus, it needs to consider all standards and standards processes that influence national economic performance. For this purpose, three different kinds of standards are relevant. These include product standards, control standards, and process standards.

### **Types of Standard**

*Product Standards*—Product standards embody information. By specifying the characteristics of a product, they allow for product identification, interoperability, and quality control. Product standards can have a number of economic effects, both negative as well as positive. For example, by reducing consumer search costs, product standards will likely promote trade. On the other hand, when standards serve to limit product offerings, they may have the reverse effect. Product standards will also have an impact on innovation rates. If adopted prematurely, standards may inhibit technology improvements. But, when they allow for the development of competing, complementary products, standards can serve to encourage innovation.<sup>3</sup> When applied to the internal production process, standards can help increase efficiency and assure quality, thereby improving the overall competitiveness of a firm or industry. Whether or not standards effects will be beneficial or not in any given instance will depend on factors such as market structure<sup>4</sup> and the pace of technology change.

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<sup>1</sup> As Ross E. Cheit notes in quoting Charles Lindblom and David Cohen:

...we do not discover a problem ‘out there,’ we make a choice about how we want to formulate a problem. That choice reflects certain values and in turn constrains the realm of possible solutions.

Ross E. Cheit, *Setting Safety Standards: Regulation in the Public and Private Sectors* (Berkeley, CA: University of California Press, 1990), p. 150.

<sup>2</sup> Webster’s *New Collegiate Dictionary* (Springfield, MA: G&C Merriam Co., 1977), p. 1133.

<sup>3</sup> See Paul A. David, “Some New Standards for the Economics of Standardization in the Information Age,” Partha Dasgupta and P.L. Stoneman (eds.), *The Economic Theory of Technology Policy* (London: Cambridge University Press, 1987), ch. 8; and Paul David and Julie Ann Bunn, *Information Economics and Policy*, vol. 3., fall, 1988, pp. 165-202.

<sup>4</sup> For discussions of the impact of market structure on standards see, Marvin Sirbu and Steven Stewart, “Market Structure and the Emergence Of Standards” (mimeo), Carnegie Mellon University, October 1986; and also Timothy Bresnahan and Amit Chopra, “Users Role in Standard Setting: The Local Area Network Industry,” in *Economics of Innovation and New Technology*, vol. 1, No. 1/2, 1990.

**Control Standards**—Control standards are designed to address a societal hazard or problem. They generally define a range of acceptability with respect to the design, performance, and/or use of a product. Often taking the form of regulations, they range from such things as building codes to fuel economy standards.

Control standards have a number of economic impacts, and hence a potential to influence trade. They affect the supply and demand of a product, through their impacts on costs of production, price, and consumer perceptions. Fuel economy standards and airbag requirements, for example, not only increase the cost of automobile production, and the price consumers have to pay for cars; they may also create new marketing opportunities and new bases for competition that the market had overlooked.<sup>5</sup>

These impacts are global in their effects. Where U.S. standards are more stringent than those in other countries—as in the case of U.S. standards regulating tuna harvesting to protect dolphins—they may be perceived as nontariff trade barriers.<sup>6</sup> On the other hand, where—as in the case of fuel economy standards—foreign manufacturers are better prepared than their U.S. counterparts to meet U.S. requirements, standards can serve to make U.S. firms more vulnerable to foreign competition.<sup>7</sup>

**Process Standards**—process standards facilitate and support socioeconomic transactions and interactions. They define roles and relationships, establish the rules for interpreting behavior, and specify the way in which a particular procedure or process is executed. Process standards are inherent in all social interactions. Interpersonal relations cannot occur without some degree of mutual expectation. Language, itself, is based on a common understanding, as are simple gestures.<sup>8</sup> Shared expectations give coherence and meaning to social life. They are necessary for cooperation. When reenacted and reinforced over time, such normative expectations give rise to “standards” of behavior.<sup>9</sup>

Process standards also serve to govern economic interactions. In preindustrial societies, for example, economic interactions were often regulated by family relationships and codes of human behavior.<sup>10</sup> Bureaucracy provided a parallel function in more complex social organizations.<sup>11</sup> And the assembly line process was critical to the mass production of standardized products.<sup>12</sup> Moreover, when with the development of the railroad and other forms of modern transportation trade was extended over vast regions, procedures for exchange

<sup>5</sup> It is interesting to note, for example, that the United States is now a net exporter of airbags to Japan. Clarence Ditlow, Center for Auto Safety, personal communication.

<sup>6</sup> See, for one discussion, Keith Bradsher, “U.S. Ban on Mexico Tuna is Overruled,” *The New York Times*, Aug. 21, 1991, pp. D1 and D3.

<sup>7</sup> See for one discussion Rob Atkinson and Les Garner, “Regulation as Industrial Policy: A Case of the U.S. Auto Industry,” *Economic Development Quarterly*, vol. 1, 1977, pp. 358–373.

<sup>8</sup> Irving Goffman, *Frame Analysis* (New York, NY: Harper and Row, 1974).

<sup>9</sup> Norms “... designate any standard or rule that states what human being should or should not think, say, or do under a given set of circumstances.” Judith Blake and Kingsley Davis, “Norms, Values, and Sanctions,” Robert E.L. Faris (ed.), *Handbook of Modern Sociology* (Chicago, IL: Rand McNally, 1964), p. 456. They guide the behavior of individuals belonging to a group. People conform to norms not only for fear of punishment, but also because norms are internalized, so people believe they correctly define the right thing to do. John And Erma Perry, *The Social Web: An Introduction to Sociology* (New York, NY: Harper and Row, Publishers, 1979), p. 95.

<sup>10</sup> For a discussion of the relationship between social and economic interactions in preindustrial times, see Neil J. Smelser, *Social Change in the Industrial Revolution: An Application of Theory to the Lancashire Cotton Industry 1770–1840* (London: Routledge and Kegan Paul, 1970).

<sup>11</sup> As James Beniger notes,

One example from within bureaucracy is the development of standardized forms. This might at first seem a contradiction, in that the proliferation of paperwork is usually associated with a growth in information to be processed not with its reduction. Imagine how much more processing would be required, however, if each new case were recorded in an unstructured way, including every nuance and in full detail, rather than by checking boxes, filling blanks, or in some other way reducing the burdens of the bureaucratic system to only the limited range of formal, objective, and impersonal information required by standardized forms.

James R. Beniger, *The Control Revolution: Technology and the Economic Origins of the Information Society* (Cambridge MA: Harvard University Press, 1986), pp. 15–16.

<sup>12</sup> As described by Radford,

... a uniform product is most economically obtained by making all the contributory processes equally uniform, as nearly as may be with consistency to the requirements of manufacturing economy. Weaving a piece of cloth on the loom is a continuous process of assembling various standardized elements or like parts. It can hardly be called interchangeable work, because there is no possibility of interchanging parts after the goods are completed. Yet the general principle of standardization of process holds. It is advantageous commercially and technically to hold the process to uniform standards with specified limits or allowed variations.

G.S. Radford, *The Control of Quality in Manufacturing* (New York, NY: The Ronald Press Co., 1922), p. 275.

also came to be standardized—as in the case of bills of lading.<sup>13</sup>

As we move into an information-based, networked economy, economic interactions will likely be governed by standardized electronic procedures, such as electronic data interchange (EDI). EDI standards not only establish communication protocols for business interactions, they also determine the role relationships between suppliers, manufacturers, and consumers (see box A-1).

## Standardization Processes

Just as there are three different kinds of standards, so there are also three different methods of achieving these standards. Standards can be set in the marketplace on a de facto basis; they can be developed within the organizational framework of a standards setting body, and they can be established through administrative or regulatory processes.

*The De Facto Standards Setting Process*—De facto standards are set in the marketplace, through the process of exchange. They evolve from the bottom up, in accordance with the forces and mechanisms that drive the

market.<sup>15</sup> How well the standards process works depends largely on the functioning of the market.

When the market operates effectively, appropriate standards will emerge at the right time through the process of supply and demand.<sup>16</sup> Producers will agree on the “best” standard for a product in the face of competition from other suppliers and the demand of users. Producers may press for the adoption of their own standards. Or they may select strategically from among other competing standards, evaluating each in terms of its potential impact on costs of production, profitability, and market share. Users will demand standards that reduce purchasing prices, improve utility, and are easily integrated with other products and systems.

The market is said to fail when appropriate standards—measured in terms of efficiency—do not emerge in a timely fashion. Economists point out that market failures can occur for several reasons, some of which are directly related to the nature of standards themselves. Standards, for example, exhibit some of the characteristics that economists call ‘public goods. 17 Public goods are those goods whose benefits are available to everyone and from which no one can be excluded. Thus, no one can fully

<sup>13</sup> As noted by Kirkland:

A national railroad system required business innovations facilitating joint and through operations. Passengers must make connections with tolerable certainty and ease; the freight cars of a corporation must not come to a stop at some corporate terminus where an agency would have to unpack their cargo and transfer it to the cars of another carrier, like as not just across the street. Almost unchronicled and undated, the railroads introduced through bills of lading, and though shippers still carp at their limitations, these bills became the accepted method of freighting in the seventies;

Edward C. Kirkland, *Industry Comes of Age: Business, Labor, and Public Policy* (New York, NY: Holt, Rinehart, and Winston, 1961), p. 49. As Karl Polany notes, in preindustrial societies trading relationships were governed by standards relating to magic, etiquette, and norms of reciprocity. See Karl Polany, *The Great Transformation: The Political and Economic Origins of Our Time* (Boston, MA: Beacon Press, 1957 cd.), p. 57.

<sup>14</sup> Exchanges are reciprocal transfers of valued things between two or more autonomous units within a system. Societies have developed major institutional mechanisms to facilitate exchange transactions. The generic institution is, of course, the market, but there are a variety of other political and social institutions that carry out parallel functions. Underlying all exchange concepts of social behavior is the concept of goal or outcome—some configuration of system elements that is valued and sought. See for discussion, G.C. Homans, *Social Behavior: Its Elementary Forms* (New York, NY: Harcourt Brace and World, 1961); P. Blau, *Exchange and Power in Social Life* (New York, NY: John Wiley and Sons, 1964); and W. Ouchi, “Markets, Bureaucracies, and Clans,” *Administrative Science Quarterly*, vol. 25, 1980, pp. 129-42.

<sup>15</sup> As Garth Saloner describes:

Typically, de facto standards emerge as more and more agents adopt a focal alternative. The bandwagon process builds on its own momentum as the set of adopters of the standard grows making it even more attractive for others. Eventually the standard is so widely adopted that it is self enforcing. The benefits of going with the crowd become irresistible.

Garth Saloner, “Economic Issues in Computer Interface Standards,” *Economic Innovation & New Technology*, vol. 1, No. 1/2, 1990, p. 147.

<sup>16</sup> In a well functioning market, economic relations are governed by self interest, so it is self interest that drives outcomes. Accordingly, producers seek higher profits; workers better wages and improved quality of work life; investors higher returns on their investments; and consumers higher quality products at lower prices. The market is considered to work well when it maximizes the goals of efficiency and economic growth. This situation is most likely to occur when each individual and each group in the system carry out rationally conceived, specified roles that, taken together, are designed to maximize production. The goal of efficiency is achieved by economizing; decisions are made on the bases of cost/benefit analyses, and technology is applied to substitute more efficient processes for less efficient ones. The market will work most effectively when it replicates a state of perfect competition in which each producer selects the combination of factors of production that will maximize profits and each consumer seeks to maximize preferences. See, for discussions of the assumptions and values that underlie the marketplace, Duncan MacRae, *The Social Function of Social Science* (New Haven, CT: Yale University Press, 1976), especially chs. 5 & 6. See also Robert Heilbroner, *The Nature and Logic of Capitalism* (New York, NY: W.W. Norton and Co., 1985).

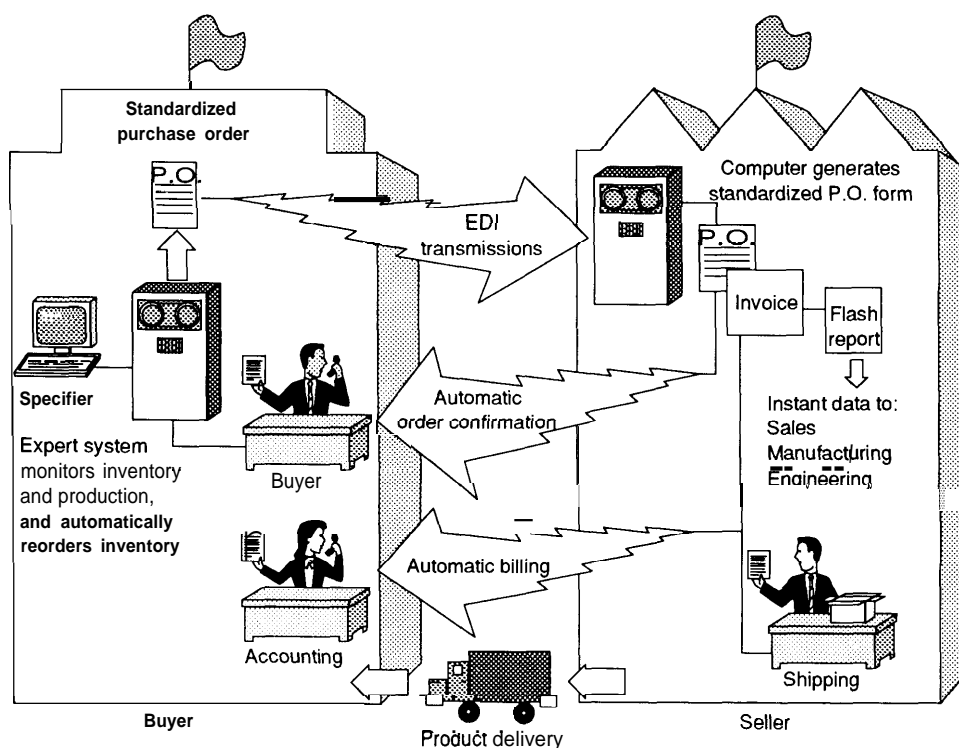
<sup>17</sup> Pure public goods will not be produced privately. There are only a few pure public goods, one example being national defense. Other goods, like education and standards, are impure public goods. These combine aspects of both public and private goods. Although they serve a private function, there are also public benefits associated with them. Impure public goods may be produced and distributed privately in the market or collectively through government. How they are produced is a societal choice of significant consequence. If decisions about impure public goods are made in the market, on the basis of personal preferences alone, then the public benefits associated with them may not be efficiently produced or equitably distributed. See Edwin Mansfield, *Macroeconomics Theory and Application* (New York, NY: W.W. Norton, 1970)

### Box A-1—Electronic Data Interexchange

Electronic data interchange (EDI) is a notable example of how information and communication technologies are emerging as important strategic tools for efficient and effective business operations. EDI is essentially the modern, computer-based method by which companies order, invoice, and bill their products and services. Such common transaction functions as invoices, shipping notices, and bills, which traditionally have entailed the transfer and processing of paper documents, are replaced by electronic transfers between the businesses' computers.

Electronic data interchange improves the efficiency and effectiveness of operations by empowering businesses to purchase supplies and to produce and distribute products precisely when and where they are needed. The company's computer system, for example, will initiate a purchase order and execute the purchasing transaction when an item is requested and removed from the inventory. The price, terms, and conditions of the contract are all stored in the computer. In addition to the considerable savings gained as inventory costs are reduced, EDI also minimizes human clerical error and the considerable processing costs involved with paper transactions. By reducing or eliminating the prolonged and often error-plagued paper trail, large retailers and manufacturers are able to gain a competitive advantage by streamlining transactions with their suppliers and buyers.

SOURCE: Office of Technology Assessment, 1992.



How electronic data interchange internally and externally expedites business transactions.

SOURCE: Reprinted from *Datamation*, Mar. 15, 1988 Copywrite 1990 by Cahners/Ziff Publishing Associates, L.P.

appropriate the benefits. As a result, public goods are underproduced. Standards often fall into this category.<sup>18</sup>

Other market failures may also weaken standards development processes. If the most efficient standards

choices are to be made, all interested parties must have access to accurate and timely information.<sup>19</sup> However, information about standards, like standards themselves, is a public good, and is therefore likely to be underproduced. Even when standards-related information can be pack-

18 C. Kindelberger, "Standards as Public, Collective, and Private Goods," *Kylos*, vol. 36, pp. 377-395; see also Sanford Berg, "Technical Standards as Public Goods: Demand Incentives for Cooperative Behavior," *Public Finance Quarterly*, 17, January 1989, pp. 35-53.

19 For a discussion of market failures due to lack of information, see Joseph Farrell and Garth Saloner, "Coordination Through Committees and Markets," *Rand Journal of Economics*, vol. 19, summer 1988, pp. 235-252; and Joseph Farrell and Garth Saloner, "Standardization Compatibility, and Innovation" *Rand Journal of Economics*, vol. 16, spring, 1985, pp. 70-83.

aged for sale like other commodities, thus yielding an adequate return, its price may limit distribution so that people have insufficient information to make sound decisions.

Some kinds of technologies are subject to greater market failures than others. For example, networked technologies—such as information and communication technologies—often have large installed bases, making it particularly costly for users to shift to a new, more technologically advanced standard. Thus, they may fail to adopt the socially optimal standard, due to what economists call “excess inertia.”<sup>20</sup> At the same time, these technologies also exhibit “increasing returns to adoption,” a situation that occurs when the benefits to the user of a technology increase with the number of users. Under these circumstances, the wrong standard might be chosen due to “excess momentum.” Not wanting to be left off the network when a major adopter moves to a new standard, users may rush too quickly to jump on the bandwagon.

*The Voluntary Consensus Process—Standards can also be set through organizational processes that reduce transaction costs and facilitate information exchange and negotiation among key players.*<sup>21</sup> Such processes can provide for better coordination than the market when

levels of uncertainty are high, when there are frequent recurring exchange activities among the parties, and/or when information exchange is complex.<sup>22</sup> These three conditions often occur in the area of standards development.

Just as markets function in a somewhat predictable fashion, so too do organizations.<sup>23</sup> Moreover, organizations, like markets, facilitate exchange transactions.<sup>24</sup> However, whereas marketplace participants act independently of one another, those involved in organizational activities are joined together and cooperate to achieve their respective goals.<sup>25</sup> To understand organizational behavior, therefore, one needs to look at organizational goals and the norms and role relationships that are designed to achieve them. The more formal the organization, the more defined these relationships are.<sup>26</sup> But, even in informal organizations, stable, consistent relationships eventually develop as behavior, attitudes, values, and criteria come to be associated with specific activities. Organizations can survive only so long as they continue to fulfill the needs and expectations of their members.<sup>27</sup>

In the United States, standards setting in voluntary consensus bodies is nonhierarchical. As in the case of the marketplace, decisions tend to rise from the bottom. Because relationships are somewhat fluid, these standards

<sup>20</sup> Joseph Farrell and Garth Saloner, “Horses, Penguins and Lemmings,” H. Landis Gabel (ed.), *Product Standardization and Competitive Strategy* (Amsterdam: North Holland, 1987), p. 11. As the authors note:

Excess inertia arises when not enough users are willing to go out on a limb by adopting the new technology. This is most likely when network externalities are strong and there is a great deal of uncertainty about whether a lead would be followed.

<sup>21</sup> As noted by Saloner:

...another major advantage of the committee system over de facto standard setting is that the committee is more likely to lead to the adoption of a single standard whereas with de facto standardization rival “standards” can battle out in the market place, diminishing the network externalities on both. Moreover, committees are able to workout technical compromises, performing a useful function in the process. On the other hand, committees are often criticized for their slowness; consensus building takes time and participants with a lot to lose after their preferred standard is not adopted may delay adoption of a rival standards.

Saloner, op. cit., footnote 15, 1990, p. 147.

<sup>22</sup> Oliver E. Williamson, *Markets and Hierarchies: Analysis and Antitrust Implications* (New York, NY: The Free Press, 1975); See also, Robert E. Parks, “Economics and Standards: Sharing the Cost of Doing Business,” *Optics and Photonics News*, January 1992, p. 59.

<sup>23</sup> As defined by social psychologists Daniel Katz and Robert L. Kahn:

All social systems consist of the patterned activities of a number of individuals. Moreover, these patterned activities are complementary or interdependent with respect to some common output or outcome.

Daniel Katz and Robert L. Kahn, *The Social Psychology of Organizations* (New York: John Wiley & Sons Inc., 2nd ed., 1978), p. 21. See also Karl E. Weick, *The Social Psychology of Organizing* (New York, NY: Random House, 1979).

<sup>24</sup> See, for a discussion, L.B. Mohr, “The Concept of Organizational Goal,” *The American Political Science Review*, vol. 67, 1973, pp. 470-81.

<sup>25</sup> Each participant has a goal or criteria for judging the success or failure of each transaction. However, loyalty to an organization often supercedes personal goals. As Duncan MacRae has pointed out:

[Exchange theory] cannot account for the devotion of a particular member of a group when self-interest might dictate that he leave, remaining in it even as its prospects decline, out of loyalty to the organization, his fellow workers and members, and its symbols.

Duncan MacRae, op. cit. footnote 16, p. 225.

<sup>26</sup> As described by Blau and Scott, for example:

Formal organizations exist when the goals to be achieved, the rules the members are expected to follow, and the status structure that defines the relationships between them (the organizational chart) have not spontaneously emerged in the course of social interaction but have been consciously designed a priori to anticipate and guide interaction and activities.

P.M. Blau and W. R. Scott, *Formal Organizations* (San Francisco, CA: Chandler, 1962), p. 5.

<sup>27</sup> As noted by Katz and Kahn:

As human inventions, social systems are imperfect. They can come apart at the seams overnight, but they can also outlast by centuries the biological organisms that originally created them. The cement that holds them together is essentially psychological rather than biological. Social systems are anchored in the attitudes, perceptions, beliefs, motivations, habits, and expectations of human beings.

Op. cit., footnote 23, p. 37.

bodies depend on participants acting within the organizational norms that define the purpose of group participation and interaction. Most American standard development bodies are governed primarily by norms relating to due process and voluntary consensus. When the gap between individual behavior and these norms becomes too wide, these standards bodies will lose their legitimacy and the support not only of their members but also of the larger society of which they are a part.

People participate in the voluntary standards development process for a number of reasons. They may, for example, want to influence the development of standards,<sup>28</sup> or they simply may want to keep abreast of technological developments.<sup>29</sup> However, participation is not without costs. In voluntary organizations, members must not only cover the administrative costs of the organization; they must also provide the personnel needed to develop standards. These costs are considerable, so members expect a return for their investment. Continued participation requires observable--if not measurable--membership benefits. When benefits appear to be lacking, voluntary standards bodies will become ineffective and eventually fail.<sup>30</sup>

The incentive to participate will likely vary in different industries. In industries such as telecommunications, for example, the incentive to participate in standards setting will likely be high. If communication systems fail to work together, there can be no services to sell. Support for

standards setting will also be greater in industries comprised of a few large companies. They are more likely to see a return on their investments, since there are fewer to share the benefits.<sup>31</sup> This has been the case, for example, in the automotive and petroleum industries. Industries subject to government regulation are also likely to be actively involved in standards setting, if only for preemptive reasons.<sup>32</sup>

*Regulatory Standards Processes*—Standards can also result from political choices. Standards developed in the political arena are often referred to as regulatory standards. In contrast to market standards, which are based on exchange relationships, regulatory standards are based on authority relationships.<sup>33</sup> They are established by legitimate government authorities and mandated from the top down.

Standards might be set in the political arena for a number of reasons. For example, if the market structure for standards setting is uncompetitive, economic outcomes will be inefficient. Some market decisions might fail to incorporate or account for environmental, safety, and other social externalities.<sup>34</sup> In some cases, standards decisions entail conflict of values and policy trade-offs. Their resolution may require abroad-based consideration of values. Timeliness may also be a factor. Decisions based on authority can be very efficient, because, once established, the marginal cost of exercising authority is generally very low.<sup>35</sup>

<sup>28</sup> As Marvin Weiss has pointed out, businesses may support voluntary consensus processes if they believe they can exert more influence in this arena than in the market place. See, for a discussion, Martin B. H. Weiss, *Comparability Standards and Product Development Strategy*, unpublished paper, Telecommunications Program, Department of Information science, University of Pittsburgh, Pittsburgh, Pennsylvania, Mar. 24, 1988; William Lehr, "The Case of Two Data Transport Standards: IEEE's 802.6 Man Versus the Ansi X3'S FDDI Interface," presented to the 19th Annual Telecommunications Policy Research Conference, Solomon Island, Maryland, September 30, 1991.

<sup>29</sup> With the shift towards anticipator standards, this is an increasingly important rationale. As noted by Sirbu and Hughs:

As standards become more frequently developed in advance of well defined market demand, the process comes to resemble the act of innovation in which firms struggle to develop new technologies to satisfy unclear needs. Firms frequently misapprehend either the technology, the market, or both. The complexity of the issues being addressed mean that much of the effort in the development of standards lies in the process of educating the participants to a common perception of the problems to be solved.

Marvin Sirbu and Kent Hughs, "Standardization of Local Area Networks," Department of Engineering and Public Policy, Carnegie Mellon University, (mimeo) April 1986.

<sup>30</sup> Noting that little research has been done looking at such failures, Paul David suggests that:

future work should assess the costs born by private companies, and the incentives that appear to justify the resource expenditure entailed in having personnel participating regularly in standards-writing groups. Moreover, the literature on coordination could be linked better to the micro-institutional arrangements of the voluntary standards organizations.

Paul David, *op. cit.*, footnote 3, pp. 28-29.

<sup>31</sup> See for a discussion, Mancur Olsen, *The Logic of Collective Action: Public Goods and the Theory of Groups* (Cambridge, MA: Harvard University Press, 1971).

<sup>32</sup> For example, flammability standards in the upholstered furniture industry were only developed by the industry trade association after a notice of proposed rulemaking appeared in the Federal Register. See Harvard Business School, *The Upholstered Furniture Flammability Issue* (Boston, MA: Intercollegiate Case Clearing House, 9-680-084, 1980). Ross E. Cheit, *op. cit.*, footnote 1.

<sup>33</sup> One can say that authority relationships exist whenever "one, several or many people explicitly or tacitly permit someone else to make decisions for some category of behavior." Charles E. Lindblom, *Politics and Markets: The World's Political- Economic Systems* (New York, NY: Basic Books, 1977), pp. 17-18.

<sup>34</sup> See for a discussion, Robert Kuttner, *The Economic Illusion: False Choices Between Prosperity and Social Justice* (Philadelphia, PA: University of Pennsylvania Press, 1984).

<sup>35</sup> Charles Lindblom, *Politics and Markets*, *op. cit.*, footnote 33.

Relations based on authority, however, require legitimacy;<sup>36</sup> people must explicitly or tacitly allow decisions to be made for them. In democratic societies, political authority is based on the rule of law. Thus authority is exercised through laws, rules, and regulations, setting forth who can exercise control under the circumstances.<sup>37</sup> In the United States, standards decisions must be made in accordance with the Administrative Procedure Act, which requires that the decisionmaking process be open to all interests and prohibits *ex parte* proceedings. Executive Orders also require government standards makers to base their decisions on cost-benefit criteria.<sup>38</sup> In addition, Office of Management and Budget (OMB) Circular A-19 directs regulatory agencies to use private sector standards whenever “feasible and consistent with the law.”<sup>39</sup>

As in the market place, and the voluntary consensus process, standards setting in the political arena can fail. The process may breakdown if regulatory agencies are ineffective and fail to achieve public interest goals. This could occur, for example, if regulators are ‘captured’ by

special interest,<sup>40</sup> or if complex bureaucratic processes and procedures stifle the regulatory process. At a more fundamental level, regulatory standards can lose legitimacy.<sup>41</sup> As happened in the late 1970s, the public may challenge the government’s right to set regulatory standards in certain areas.<sup>42</sup> Problems may also arise, if the government is unable to agree on standard goals.

## The Standards Universe

Taken together, these three kinds of standards and three kinds of standards processes can be paired to form a matrix that scopes the standards universe and the standards setting processes and problems to be analyzed in this study (see figure A-1). It illustrates that all three kinds of standards can be established in any one of the three standards processes. The particular process by which standards are established is often the result of historical circumstances and/or political and cultural choice. Thus, this matrix can be used to highlight temporal and cross national comparisons.

<sup>36</sup> The notion of legitimacy as a basis for authority was developed by Max Weber. See for a discussion *Max Weber Economy and Society: An Outline of Interpretive Sociology* (ed.), by Guenther Roth and Claus Wittich (New York, NY: Bedminster Press, 1968, especially ch. 10, “Domination and Legitimacy.” See also, Robert A. Nisbit, *The Social Bond: An Introduction to the Study of Society* (New York, NY: Alfred A. Knopf, 1970), especially ch. 6, “Social Authority.”

<sup>37</sup> A primary feature of democratic or representative government is that government decisionmakers can and should be held responsible to elected officials and ultimately to the electorate for decisions made and policies followed. It is this accountability, rather than the good will of the decisionmaker, that must be served as the basis for assurance that activities are conducted in the public interest. To assure such accountability, it is necessary that the public and its representatives have information regarding the means by which a decision is reached, the bases for that decision, and the means by which action can be taken to modify or reverse that decision. See, Government Regulatory Activity: Justifications, Processes, Impacts, and Alternatives, Report to the Congress by the Comptroller General of the United States, June 3, 1977, PAD-77-34, p. 43.

<sup>38</sup> See, for one example, Executive Order 12291, 1981.

<sup>39</sup> OMB Circular No. A-19, sec. 6(A) (Oct. 26, 1982).

<sup>40</sup> For the classic discussion of regulatory capture, see Marver H. Bernstein, *Regulating Business by Independent Commission* (Princeton, NJ: Princeton University Press, 1955); See also, Bruce M. Owen and Ronald Braeutigan, *The Regulation Game: Strategic Use of the Administrative Process* (Cambridge, MA: Ballinger Publishing, 1978); and George J. Stigler, *The Citizen and the State: Essays on Regulation* (Chicago, IL: The University of Chicago Press, 1975).

<sup>41</sup> Regulatory standards are also less aligned with market forces and the incentives of the relevant economic actors. Garth Saloner, *Op. cit.*, footnote 15, 1990, p. 148.

<sup>42</sup> For a discussion of one such a shift in the public’s mood, see Michael Pertschuck, *Revolt Against Regulation: The Rise and pause of the Consumer Movement* (Berkeley and Los Angeles, CA: University of California Press, 1982).



**Figure A-I—Standards Universe**

Type of Standard by Goals

Standardization mechanism	Control	Product/quality	Process/interoperability
De Facto	Warner-amex Database-privacy standards	VCR standards	Language customs Bills of lading Computer interface standards
Regulatory	Auto safety regulations Fuel economy standards	NSA encryption standards Department of Agriculture Product classification standards	Open network architecture standards ETSI standards for European telecommunication standards
Voluntary Consensus process	Standards for medical devices Pressure vessel standards Petroleum standards	Refrigerator standards	Map-top protocols for OSI/standards Standards evolving legislation Electronic data interchange standards

The three kinds of standards and three kinds of standards processes can be paired to form a matrix that scopes the standards universe and the standards setting processes and problems to be analyzed in this study.

SOURCE: Office of Technology Assessment, 1992.