3th International Conference on Public Communication of Science and Technology (PCST), Montreal,Canada,10-13 April,1994

AN APPROACH TO IMPROVED REPRESENTATION IN SCIENCE AND TECHNOLOGY DECISION-MAKING

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Abstract

This paper briefly reviews democratic theories and practical experience in the United States to define design parameters for participatory processes within science and technology policy. An institutional model is offered to provide direct participation, technical planning, and meaningful access to local, state, and federal government agencies.

Introduction

Reviewers of science and technology policy often identify a need for greater public participation. Lewis Mumford, one of the most noted advocates for change, saw a technological world built by a power elite. The result was a dehumanized social order. Transforming the prevailing order would require that large institutions and technological structures be "reduced to human proportions and brought under direct human control" (Mumford 1964, 429). More recently, in a survey of American technology, Hughes (1989) concluded that technological systems stay in motion through the momentum of existing technical assets and institutions. Meaningful change would require "a counterforce of comparable magnitude" (Hughes 1989, 461-462). He offers the possibility that current inertia could be challenged by changing social values and the social construction of technology. The goals of this reconstruction would be a shift away from military and mass consumer markets to feature public goods that are customized to local preferences. Winner (1977; 1986; 1993) builds the case for changing perceptions of technological change and control. He suggests constructing institutions where "the claims of technical expertise and those of a democratic citizenry would regularly meet face to face" (Winner 1986, 56).

Even within the network of social construction, a feeling of empowerment over science and technology is difficult, if not impossible, to locate. Scientists bemoan the whims of politicians lacking scientific literacy. Engineers often see themselves beholden to corporate management interests. Business leaders feel bound by overly restrictive government regulations. And government actors, with significant financial resources, see their effectiveness drained by fragmentation. Given the current dynamic, can new institutions be crafted that are equitable and empowering to all parties?

The remainder of this paper outlines the necessary parameters for improved representation in science and technology decisions and offers an institutional structure for consideration.

Comprehensive Participation

A discussion of new institutions aimed at increasing public participation in technical decisions should begin with a caution. There is a danger of participatory mechanisms for science and technology outpacing participatory processes in general. An effective process designed around technical issues could lead to a bias toward technical solutions. Mumford notes that even when addressing problems resulting directly from science and technology, it "would be a gross mistake to seek wholly within the field of technics for an answer" (Mumford 1934, 434). To mediate this concern, a participatory process should address policy in a comprehensive fashion.

What can be gained from existing processes in the broader context of public policy? Osborne and Gaebler (1993, 166-194) review efforts toward greater participation or "customer-driven" government. They note that government agencies are generally bureaucratic rather than customer-driven. Government agencies, however, can choose to select citizens as their primary customers. For example, the U.S. Department of Housing and Urban Development can shift priorities from the articulated interests of real estate developers to those of poor urban residents. Based on the experience of model government programs, Osborne and Gaebler define seven benefits to customer-driven public services:

1) the process establishes accountability with the public;

2) direct public feedback depoliticizes traditional decision-making;

3) direct input from citizens stimulates policy innovation;

4) the public has the opportunity to make choices;

5) the outcomes of the process reduce government waste;

6) the process encourages public empowerment, engaging additional human energy toward workable solutions; and

7) the process serves equity.

Even though these benefits were listed for public services in general, they are consistent with calls for greater participation in science and technology decisions.

While participatory mechanisms are rare in the United States, isolated models do exist. Berry, Portney, and Thomson (1993) reviewed success stories in neighborhood-based participation. Dayton, Ohio was one of four cities studied in detail. Dayton, a relatively small city of 180,000 residents, developed a neighborhood system of Priority Boards. Board members are elected by mail ballots, hold open meetings monthly, and are responsible for the development of annual needs statements for the community they represent. The review of best practice within this type of institution highlights three elements of success. Institutions should:

1) have authority to allocate resources, rather than advisory roles;

2) develop ownership in the process from traditional government administrators; and

3) offer complete representation for a given population, rather than be designed to forward a particular group or neighborhood.

This form of institution and body of experience offers a comprehensive base from which to work to improve processes for technical decisions.

Augmenting Participation

Before turning to technical decisions, the degree of participation to be expected needs to be addressed. Beyond activists personally threatened by technical developments, there is little evidence that the American public desires greater involvement. A report from the National Science Foundation (NSF), for example, noted that "rarely does a scientific or technological issue come up for a direct vote by citizens, or even figure prominently in the election of candidates." Rather than citizens participating in decision-making, the NSF report states that a "tacit consensus" supports public financing on science and technology, and after all "citizens can use their power to reverse policy decisions on specific issues . . . if they care enough about the issue to mobilize" (National Science Foundation 1983, 145).

The potential of direct public participation should be viewed from two perspectives. Laird (1993) argues that two approaches to democratic theory should be considered relative to participatory decisions. The first is direct participation. Direct participation implies that individual citizens are directly involved in decision-making. The second theory, pluralism, focuses on the behavior of groups. Voluntary groups are created and used by individuals to promote collective interests. Interest groups have the potential to gather and assess information on complex subjects.

When establishing processes for direct participation, public disinterest, alienation, and apathy prove difficult to overcome. Existing systems for participation have not been found to increase in the number of people willing to participate. In addition, upper- and middle-class citizens are more likely to actively participate, further damaging the prospects for fair representation.[1] On the other hand, Berry, Portney, and Thomson (1993) found that citizens do place a high degree of confidence in their neighborhood boards and feel well represented. In addition, the process encourages a stronger sense of community and empowers people to work within government.

Using the pluralism model also raises doubts that public participation will be truly representative. Rothenberg (1992) explores interest groups through a detailed case

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[1]. Kingdon (1984, 56); and Berry, Portney, and Thomson (1993, 285).

study of Common Cause, a leading lobbying organization based in Washington, D. C. Even among the organization's membership, interest in active participation was found lacking. Organizational leadership worked to overcome a largely inactive membership in order to legitimize statements of grassroots support. Judging from the experience of direct participation and the behavior of interest groups, new institutions should seek to improve representation rather than more utopian visions of pure democracy.

A demonstrated way of overcoming a lack of participation is the combination of open forums and citizen surveys. Fiorino (1990) defines the criteria of participation theory as direct participation from non-technical citizens; decision authority; forums for consensus building; and near parity between citizens, government, and technical representatives. These criteria are best achieved by complementary approaches to participation. Surveys of public opinion may be used to complement public forums and ensure that they remain representative.[2] For example, surveys and ballots were used to select and rank goals in metropolitan Louisville, Kentucky (Fetherling 1993). Using a legion of volunteers, the process identified and prioritized important issues such as crime, recreation, transportation, and employment opportunities. Random samples of the population were supplemented by focus groups, as well as interviews with local business and government leaders. An assertive advertising campaign was waged to encourage participation.

Involving the Technical Community

New institutions should strike a balance between the need for public participation and the value of technical advice. Brooks (1993, 211-212) defines tradeoffs between technical planning and pluralism along two continuums. The first continuum stretches from planning within the technical community to responding to forces external to that community. A second continuum runs from elite centralized planning to decentralized participation including technical and non-technical actors. The extremes of either continuum are seen as undesirable.

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2. For an assessment of survey mechanisms for the evaluation of public goods, see Mitchell and Carson (1989).

The value of technical advice is two-fold. First, the value of any decision-making body depends on the quality of information available. The technical community must be involved (positivist and Luddite alike) and comfortable in the process in order to obtain the best available information and related opinions. The process should not always put the scientist and engineer on the defensive. An institution that persistently concentrates on technology running amuck cannot hope to win the endorsement of the technical community. The second value of involvement from the technical community is its role in planning.[3] The technical community should be invited into the participatory process to help articulate possibilities unknown to laypersons. Certain options would simply not be considered by anyone without knowledge of a given technology's present or projected capabilities.

The process of public participation should be on-going, involving participants in planning, as well as risk avoidance. Planning is important for the process to win influence with existing government agencies. Kingdon (1984) points out the importance of setting the agenda of public debate. Public policy is set by the power and interplay of numerous actors. Those in authority tend to be most receptive to information when it is related to issues already on the agenda. Even pressing matters may have to await a policy window. An institution that is ultimately crisis-driven will likely miss opportunities to set the agenda and exploit policy windows when they occur. When specific problems do arise, they can be addressed within established institutions. In conflict situations, familiarity with a standing institution is preferable to participants meeting the unknowns of an ad hoc forum.

Given the involvement of the technical community, how can the interests of laypersons be protected from the vested interests within the technical community? Established ground rules may serve to differentiate value judgements from statements of objective technical information.[4] Wenk (1986, 187-228) encourages information "uncontaminated by self-interest" and "packaged to reveal uncertainties and implications." One possible check on the "power of the elite" is the documentation of assumptions. Technical analysis could include a list of

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3. See, for example, Wenk (1986, 187-228).

4. For an overview, see Street (1992, 115-137).

assumptions that draw linkages to stated objectives. Stated assumptions should be free from technical jargon and designed to bring to light the existence of value judgements.

Defining an Approach

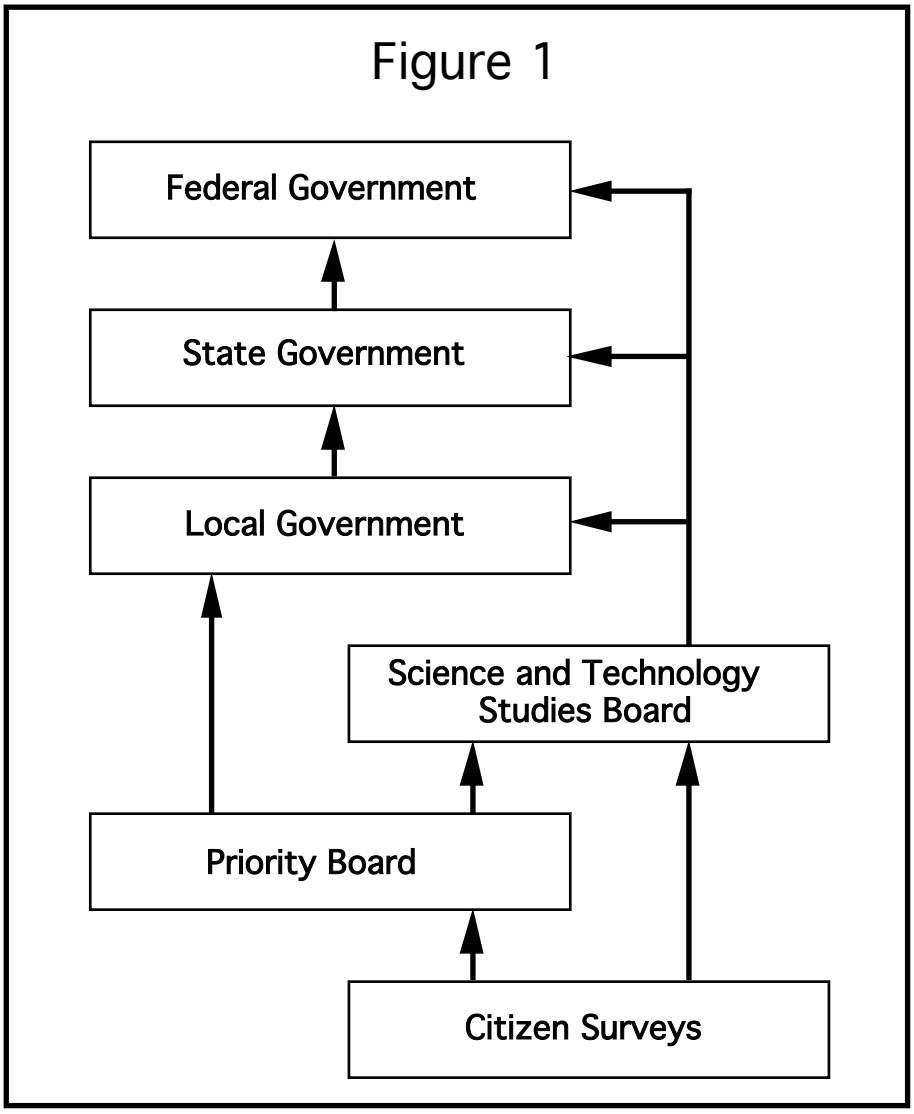
Given the lessons of existing participatory processes and the demands of science and technology policy, a list of parameters may be assembled. In brief, a process for participatory decision-making should:

1) not be limited to technology-laden problems or solutions;
2) offer the opportunity for direct participation and face-to-face consensus building;
3) have genuine authority, including the opportunity to set the agenda for policy debate;
4) earn a sense of ownership from existing government representatives;
5) provide fair and equitable representation for all citizens;
6) offer access to interest groups;
7) complement participation through analysis of public opinion;
8) earn a sense of ownership from the technical community;
9) seek to identify value judgements embodied in technical issues; and
10) include planning functions.

With these ten points in mind, institutional mechanisms may be crafted. Figure 1 shows one possible approach to participatory decision-making. To achieve face-to-face consensus building at the local level, the process begins with community-based Priority Boards. The geographic scope for each Board could be a neighborhood, city, county, or multi-county region, depending on population density. This is not a forum for technological opportunities and threats. It is an open forum for setting community priorities in general. People within the

community should have equal access to the Board and should participate directly. A Board's responsibilities would include not only setting goals and priorities, but also establishing criteria. Criteria are important for setting the guidelines for further discussion. For example, a neighborhood may select economic development as a key priority, but set the criterion that development should not threaten the ethnic diversity of the community. The Boards would also be responsible for designing and coordinating surveys to judge public opinion. Each Board would report directly to the appropriate local government agency. Each community would have to develop organizational mechanisms to suit current institutions and procedures.

An independent Science and Technology Studies (STS) Board would add a technology assessment to the annual priority statements of one or more Priority Boards. Where population density warrants, multiple STS Boards may operate within the same municipality. STS Boards would work within the priorities and criteria established by the Priority Boards. Secondary research and interviews would be conducted and meetings held to collect relevant information. Both individuals and interest groups would be involved, thereby meeting the challenge of direct participation and pluralism. The STS Boards would also participate in developing surveys in cooperation with the Priority Boards. Neighborhood representation on the STS Boards would keep them focused on neighborhood priorities and serve coordination between the two entities.



Parallel reporting of the Priority and STS Board would provide a process where technical solutions could be judged relative to non-technical approaches. At the local level, reports would be received by the same local authorities as the annual needs statements. In addition, technology assessments by local STS Boards could be compiled by a state-level science and technology agency.[5] State agencies could then use these inputs to influence federal policy. Numerous approaches could be used to enter into federal policy mechanisms. States, individually or collectively,

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[5]. Every state in the United States has at least one science and technology agency (Phelps and Brockman 1992). While the scope of state agencies varies widely, the tasks defined here could easily be undertaken.

could offer reports directly to the administrative branch through the White House Office of Science and Technology and to the congressional branch through the Senate and House Committees on Science and Technology. The National Academy of Sciences could be called upon to compile state input for national dissemination. States could also request their members of Congress to engage the Congressional Office of Technology Assessment (OTA) in more detailed analysis of federal policy options.

An Illustration

To understand the operation of such an approach, consider an illustration. Suppose a survey of a local community identifies a growing concern for the welfare of older residents. The Priority Board, recognizing demographic patterns and growing medical costs, considers the issue of importance. Goals and criteria are discussed in an open forum. The Board finalizes objectives to bring greater support and independence to older residents. The Board also reviews a wide range of non-technical approaches. For example, community organizations could work to increase the number of volunteers willing to assist seniors in their own homes and become more involved in hospital out-patient procedures. In addition, the city government could act to revise zoning ordinances and building codes to prepare the housing stock for a more elderly population. The Priority Board offers these non-technical options directly to the appropriate local authorities.

The Science and Technology Studies Board could decide to respond with an assessment of additional options to aid seniors. The assessment could include electronic home-monitoring systems and possible multimedia applications. Value judgements emerging from the discussion might include protecting the rights of privacy and the need for intergenerational human contact. These views would be summarized and incorporated into the final written assessment. The STS Board could also look for opportunities to use local universities and state resources to develop additional long-term solutions. The end result is that government is served with both technical and non-technical options to address an issue raised through direct public participation.

The Workplace

The emphasis of this paper has been on public goods. Many important technical issues, however, lie within the workplace.[6] In the United States, management prerogatives within the industrial and commercial sectors remain strong. The federal government, however, shows a willingness to regulate the conduct of private enterprise. Recent interventions include requirements that employers identify chemical hazards in the workplace, provide extended parental leave, and give pre-notification of plant closings and major layoffs. The Priority and STS Boards defined above would be free to address the positive and negative roles of local businesses in the community. While not a step toward workplace democracy, the process does offer greater access to government which, in turn, could lead to greater influence on the private sector.[7]

Implementation

The process outlined in this paper may fall primarily on existing institutions. The greatest challenge in implementing a process of this nature would be at the local level. Neighborhood associations, such as the network of Community Development Corporations (CDC), would need to achieve active participation from their residents. Expertise would need to be cultivated to collect public opinion and create STS Boards. At the state and federal levels, minor alterations in the responsibilities of current organizations and government agencies could successfully implement a workable process. While the process would not be costly to implement, institutional difficulties should be anticipated due the inevitable swings of power and influence.

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6. Technology and control in the workplace have received considerable attention; see for example Shaiken (1984) and Zuboff (1988).

7. For an advanced model of workplace democracy, see Milner (1990).

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