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34. L. G. Humphreys, *Science* **166**, 167 (1969).
35. J. Bowers, "Factor Structures and Predictive Validities of College Ability Tests for Regularly Admitted and Disadvantaged Beginning Freshmen at the University of Illinois," paper read at the American Educational Research Association convention, Minneapolis, 3 March 1970. In *J. Educ. Meas.* **7**, 219 (1970) Bowers examines prediction equations for a larger group of such students and warns about difference in the college-grade criterion for special-program versus regular freshmen. For further comparison of black and white students at the University of Illinois, see S. C. Davis, J. W. Loeb, L. F. Robinson, *J. Negro Educ.* **39**, 359 (1970).
36. This is a highly unpopular point of view, labeled illiberal or worse by many blacks and whites, as I have learned from reactions to several of my letters which state this viewpoint. See (*25*); J. C. Stanley, *Harvard Educ. Rev.* **37**, 475 (1967); *ibid.* **38**, 346 (1968); W. F. Brazziel, *ibid.* **37**, 646 (1967); *ibid.* **38**, 346 (1968); J. C. Stanley, *Science* **163**, 622 (1969); *ibid.* **167**, 123 (1970); *Trans-action* **7**, 54 (November 1969); W. H. Friedland and H. Edwards, *ibid.* **7**, 62 (December 1969); J. C. Stanley, *College Board Rev.*, No. 77 (Fall 1970), p. 24; *APA Monitor* **1**, 9 (December 1970).
37. G. Joseph and B. Newsom, *Cornell Alumni News* **70**, No. 8 (June 1968), p. 10.
38. See, for example, economist J. D. Owen, *Towards a More Consistent, Socially Relevant College Scholarships Policy* (Center for Social Organization of Schools, The Johns Hopkins University, Baltimore, Rep. 61, January 1970).
39. J. McPartland, *Johns Hopkins Mag.*, **21**, No. 20 (April 1970), p. 22. Neither McPartland nor I advocate racially, ethnically, or socioeconomically segregated schooling at any level. As noted earlier, most colleges in the United States are only mildly selective, if at all. Somewhere there is a college easy enough for almost any high school graduate. Unfortunately, the applicant with poorly developed academic abilities may not be near a suitable college. Comprehensive open-door community colleges, in particular, are not nearly widely enough available. See W. W. Willingham, *College Board Rev.*, No. **76** (Summer 1970), p. 6.
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47. D. T. Campbell, *Amer. Psychol.* **24**, 409 (1969).
48. The views expressed in this article are those of the author. They should not be construed as reflecting official or unofficial policies of the College Entrance Examination Board or The Johns Hopkins University. An earlier version of this article appeared in September 1970 as Report No. 79 of the Center for Social Organization of Schools, The Johns Hopkins University. I thank John M. Stalnaker for his penetrating written comments concerning that report.

# Participatory Technology

## Citizen participation in the public development, use, and regulation of technology is examined.

James D. Carroll

In recent decades the idea of the alienation and estrangement of man from society has emerged as one of the dominant ideas of contemporary social thought. While interpretations of the concept of social alienation vary, Etzioni (*1*) has expressed the core of the idea as "the unresponsiveness of the world to the actor, which subjects him to forces he neither comprehends nor guides. . . . Alienation . . . is not only a feeling of resentment and disaffection but also an expression of the objective conditions which subject a person to forces beyond his understanding and control."

There is considerable speculative and observational testimony and some empirical evidence (*2*) that the scope and complexities of science and technology are contributing to the development of social alienation in contemporary society. Keniston (*3*), for example, suggests that technology and its effects have been a factor in the alienation of many young people. At the same time he notes that the attitude of many young people toward technology is ambivalent because a revolt against the effects of technology must inevitably exploit the technology it opposes. In a different vein, De Jouvenel (*4*) has testified to the adverse psychological impact of scientific and technological complexities on sustaining general confidence in one's judgment. "Because science saps such individual confidence, we have a problem, which I feel we can meet but which it would be imprudent to deny." In a more general observation Mesthene (*5*) recently has referred to "the antitechnology spirit that is abroad in the land."

### Participatory Technology

In this article I analyze the incipient emergence of participatory technology as a countervailing force to technological alienation in contemporary society. I interpret participatory technology as one limited aspect of a more general search for ways of making technology more responsive to the felt needs of the individual and of society. The term *participatory technology* refers to the inclusion of people in the social and technical processes of developing, implementing, and regulating a technology, directly and through agents under their control, when the people included assert that their interests will be substantially affected by the technology and when they advance a claim to a legitimate and substantial participatory role in its development or redevelopment and implementation. The basic notion underlying the concept is that participation in the public development, use, and regulation of technology is one way in which individuals and groups can increase their understanding of technological processes and develop opportunities to influence such processes in appropriate cases. Participatory technology is not an entirely new social phenomenon, but the evidence reviewed below suggests that its scope and impact may be increasing in contemporary society.

I first analyze several facts of which people are becoming increasingly aware that suggest why participatory technology is emerging as a trend, and I then analyze different forms of this trend. Finally, I evaluate some of its implications.

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## Underlying Realizations

One primary reason for the emergence of participatory technology is the realization that technology often embodies and expresses political value choices that, in their operations and effects, are binding on individuals and groups, whether such choices have been made in political forums or elsewhere. In the language of contemporary political science, by "political value choices" I mean choices that result in the authoritative allocation of values and benefits in society. In its most significant forms politics culminates in the determination and expression of social norms and values in the form of public law, public order, and governmental action. To an indeterminate extent, technological processes in contemporary society have become the equivalent of a form of law—that is, an authoritative or binding expression of social norms and values from which the individual or a group may have no immediate recourse. What is at issue in the case of the computer and privacy, the supersonic transport and noise levels, highway development and the city, the antiballistic missile and national security, and the car and pollution is the authoritative allocation of social values and benefits in technological form.

The second realization is a correlative of the first. Technological processes frequently are the de facto locus of political choice. They are often political processes in which issues are posed and resolved in technical terms. In the absence of appropriately structured political processes for identifying and debating the value choices implicit in what appear to be technical alternatives, technical processes become, by default, the locus of political value decisions. In the context of a concern for the environment, technical questions of waste disposal systems involve value choices. In the context of a concern for urban development, technical questions of highway location and development involve value choices. In the context of a concern for privacy, technical questions of data collection and retrieval involve value choices. Technological processes often embody significant value questions that are difficult to identify and resolve in public forums because the processes are technically complex and occur in administrative organizations to which citizens do not have easy access.

Third, there is the realization that the public order of industrial society is not particularly well structured for identifying, publicizing, and resolving in public forums political questions implicit in technological processes. The public order of industrial society is founded on, and perpetuates, values, compromises, and perceptions that are being rendered obsolete by transformation of the social and political conditions from which they were derived. The public order of industrial society preeminently expresses perceptions of material need and the values of economic growth—perceptions and values rooted in the experience of material want and economic insecurity of past generations. Because of the development of powerful technologies of production, and because of other factors, these perceptions and values, as embedded and expressed in public institutions and processes, do not encompass the total area of concern, which is expanding to include the quality of the environment, race, urban development, population growth, educational opportunity, the direction of technology, and other matters. Established means of structuring and expressing political concern themselves often border on obsolescence, because they are often based on geographical and functional jurisdictions that are unrelated to the issues on which the public must take action. If these jurisdictions were otherwise defined—for example, were defined to include an entire metropolitan area—they might provide the structure for more effective representation of diverse views and might facilitate public action through bargaining and tradeoffs.

Today, in the face of population growth and technological complexity, legislative bodies, except in unusual cases such as that of the antiballistic missile, delegate to administrative agencies the responsibility for regulating, developing, and controlling technology. The general objectives of these administrative agencies involve mixed questions of value and technique, and the agencies resolve such questions in terms of their bearing on realization of the general objectives. Often the general objectives further the interests of individuals and groups allied with a particular agency. To the Department of Defense the question of the desirability of developing, maintaining, and transporting chemical and biological agents is primarily a matter of national defense policy. It is not primarily a question of the humaneness of such agents, or of their ultimate effects on the environment, or of their value or threat to man in contexts other than that of national defense.

By default, the responsibility for scrutinizing mixed questions of technology and value from the perspective of societal well-being often passes to special-interest groups and to individuals who may or may not be in a position, or be well equipped, to learn of and to influence such decisions. This is one aspect of the more general phenomenon of the devolution of authority from public representatives and administrators to "private" groups and individuals in contemporary society.

Fourth, there is the realization that, in contemporary society, political action directed toward the achievement of political value objectives, such as the production of 2.6 million housing units a year, often depends on the ability to translate the desired objective into technical tasks. Marcuse (*6*) observes that "the historical achievement of science and technology has rendered possible the *translation of values* into technical tasks—the materialization of values. Consequently, what is at stake is the redefinition of values in *technical terms*, as elements in the technological process. The new ends, as technical ends, would then operate in the project and in the construction of the machinery, and not only in its utilization [emphasis in the original]."

To a considerable extent, the achievement of more effective processes of education, housing, delivery of health care, postal service, public safety, and urban development depends on the political and technological capacity of contemporary society to agree on, and to translate, value objectives into technological acts. Traditional legislative declarations of intent are not sufficient. The establishment of a right to a decent home in a suitable environment requires more than a legislative act declaring that such a right exists. It also depends on the development of technical capability to translate the right into reality.

This does not mean that, in the formulation of political objectives, a technological, problem-oriented mode of thought must replace humanistic, intuitive, moral, and other modes of thought. It means that other modes of thought often depend for realization in public life and action on their expression in technical form, and that the development and control of that form is itself a political value-oriented act.

Fifth, there is the realization that the status enjoyed by technology as an agent for both bringing about and legitimatizing social change contributes to the growth of participatory technology. There is a tendency, stressed by Ellul (*7*), Rickover (*8*), and others, for contemporary man to accept change in technological form as inevitable and irresistible. In some cases, new technologies probably are accepted because of the specific results they produce for the individual, such as the mobility that, under some conditions, is made possible by the automobile. But there seems to be an additional social, psychological, and economic element at work—what Ellul calls "technological anaesthesia"—that generates acceptance of technological innovation irrespective of the particular effects that may result. Many people seem willing to use cars in urban areas even though such use may contribute little to mobility and may adversely affect the environment and health. It seems paradoxical but true that, while some changes in institutions and behavior are strongly resisted, other changes often are readily accepted when a technological element in the situation is the agent of change.

Participatory technology is one limited way of raising questions about the specific technological forms in terms of which social change is brought about. It is directed toward the development of processes and forums that are consistent with the expectations and values of the participatory individuals, who may resort to them in the absence of other means of making their views known. In participatory technology, however, as in other participatory processes, the opportunity to be heard is not synonomous with the right to be obeyed.

I here analyze three kinds of activities to illustrate some of the empirical referents of the concept of participatory technology.

## Litigation

The first is the citizen lawsuit, directed toward the control and guidance of technology. As Sax (*9*) indicates, "The citizen-initiated lawsuit is . . . principally an effort to open the decision-making process to a wider constituency and to force decision-making into a more open and responsive forum. . . . [The] courts are sought out as an instrumentality whereby complaining citizens can obtain access to a more appropriate forum for decision-making."

The courts, of course, rely heavily on adversary proceedings, various forms of which have been suggested (*10*) as appropriate for handling scientific and technological issues involving the public interest. Not only can litigation restrict the use of technology, it can also lead to the modification and redevelopment of existing technology and stimulate the development of new technology to satisfy social values expressed in the form of legal norms, such as a right to privacy.

The legal response to cases involving technology has taken two forms. The first is an extension of those aspects of the legal doctrine of standing which determine who has a right to be heard in court on particular issues involving activities undertaken or regulated by public agencies. The second is a search by legal scholars, practicing lawyers, and judges for systems of conceptual correspondence in the terms of which scientific and technological developments and activities can be conceptualized and evaluated as changes in social values and norms that may warrant a legal response. The appropriate role of law in the regulation of genetic experimentation is an example.

An extension of the doctrine of standing has occurred in several recent cases involving technology, although the extension is not limited to such cases. In the words of the United States Supreme Court (*11*), "The question of standing is related only to whether the dispute sought to be adjudicated will be presented in an adversary context and in a form historically viewed as capable of judicial resolution." The basic question is "whether the interest sought to be protected by the complainant is arguably within the zone of interests to be protected or regulated by the statute or constitutional guarantee in question" (*12*). The question of standing is a question not of whether a party should win or lose but of whether he should be heard.

The current extension of the doctrine is sometimes called the "private attorney general" concept. Under this concept a private citizen is allowed to present a case as an advocate of the public interest. A leading case is Scenic Hudson Preservation Conference *v.* Federal Power Commission (*13*), decided by the Second Circuit of the United States Court of Appeals on 29 December 1965. On 9 March 1965 the Federal Power Commission granted a license to Consolidated Edison Company to construct a pumped storage hydroelectric project on the west side of the Hudson River at Storm King Mountain in Cornwall, New York. A pumped storage plant generates electric energy for use during peak load periods by means of hydroelectric units driven by water from a headwater pool or reservoir. The Storm King Project, as proposed by Consolidated Edison, would have required the placement of overhead transmission lines on towers 100 to 150 feet (30 to 45 meters) high. The towers would have required a path some 125 feet wide through Westchester and Putnam counties from Cornwall to the Consolidated Edison's facilities in New York City—a distance of 25 miles (40 kilometers). The petitioners were conservation and other groups and municipalities who claimed that the project, as designed by Consolidated Edison and as approved by the Federal Power Commission, would destroy the character of the land and the beauty of the area.

The Federal Power Commission argued, among other things, that the petitioners did not have standing to obtain judicial review of the legality of the license because they "make no claim of any personal economic injury resulting from the Commission's action."

The Court of Appeals held that the petitioners were entitled to raise the issue of the legality of the license and the licensing procedure even though they might not have a personal economic interest in the question. The court reasoned that a citizen has an interest in actions that affect the nature of the environment, and that this interest is arguably within the zone of interests that are or should be protected by law. On the merits of the case, the court held that the Federal Power Commission was required to give full consideration to alternative plans for the generation of peak-load electricity, including a plan proposed by one of the petitioners for the use of gas turbines.

The Scenic Hudson case is significant because it set a precedent for the enlargement of the opportunity of citizens, acting as citizens and not as private parties, to secure judicial review of the actions of public agencies, and of actions of the interests these agencies often regulate, in cases involving technology as well as other matters. The decision supports the proposition that, in certain cases, citizens will be recognized in court as advocates of a public

interest, on the grounds that, as members of the public, they have been or may be injured by the actions complained of. They need not claim that they have been or will be injured economically or otherwise as private persons (*14*).

The development of the "private attorney general" concept does not mean that substantive changes will automatically occur in the constitutional, statutory, and common law doctrines that regulate rights and duties pertaining to the development and use of science and technology. The work of analysts in the areas of law, science, and technology—analysts such as Patterson (*15*), Frampton (*16*), Cowan (*17*), Miller (*18*), Cavers (*19*), Mayo and Jones (*20*), Korn (*21*), Green (*22*), Ferry (*23*), Wheeler (*24*), and others (*25*)—indicates the difficulties of developing systems of conceptual correspondence between scientific and technological developments and legal concepts and doctrines. Scientific, technological, and legal systems often further different values and serve different purposes, and the reconciliation of conflicts in these values and purposes is only in part a juridical task. The "private attorney general" concept, however, does invite more active judicial scrutiny of such conflicts and may contribute to substantive changes in legal doctrine in the future (*26*) in areas such as the computer and privacy; air and water supply and pollution; noise control; medical, genetic, and psychological experimentation; drug testing and use; nuclear energy and radiation; food purity and pesticides; and the control and handling of chemical and biological weapons.

While the legal form of citizen participation in the control and development of technology has severe limitations because it tends to be (i) reactive rather than anticipatory, (ii) controlled by restrictive rules of evidence, and (iii) subject to dilatory tactics, litigation has proven, over time, to be a significant element in the efforts of individuals and groups to influence the processes and institutions that affect them.

### Technology Assessment

A second form of participatory technology comes within the scope of existing and proposed processes of "technology assessment." While the concept of technology assessment can be interpreted to include the kinds of legal action I have discussed (*27*), the term usually is used to refer to activities that are somewhat more anticipatory in nature and broader in scope.

To some extent "technology assessment" is a new label for an old activity —the attempt to comprehend, and to make informed decisions about, the implications of technological development. The movement to formalize and improve this activity in a public context was initiated in 1967 by Senator Edmund Muskie (*28*) in the Senate and by Representative Emilio Q. Daddario (*29*) in the House of Representatives. This movement has successfully directed attention to some limitations in the way technological questions are currently considered in the American system of politics and government.

"Technology assessment" was defined in the bill introduced by Daddario in the House of Representatives on 7 March 1967 as a "method for identifying, assessing, publicizing, and dealing with the implications and effects of applied research and technology." The bill asserted that there is a need for improved methods of "identifying the potentials of applied research and technology and promoting ways and means to accomplish their transfer into practical use, and identifying the undesirable by-products and side effects of such applied research and technology in advance of their crystallization, and informing the public of their potential danger in order that appropriate steps may be taken to eliminate or minimize them."

The strengths and weaknesses of various forms of existing and proposed technology assessment are extensively analyzed in the hearings conducted by the Muskie (*30*) and Daddario (*31*) subcommittees; in the studies undertaken for the Daddario subcommittee by the National Academy of Sciences (*32*), the National Academy of Engineering (*33*), and the Science Policy Research Division of the Legislative Reference Service (*34*); and in related analyses, such as those made by the Program of Policy Studies in Science and Technology of George Washington University (*35*).

In these hearings and reports, citizen participation in technology assessment is both described and advocated. The analysis by Coates (*36*) of 15 case histories of technology assessments identifies one case that involved direct citizen participation—the examination of consumer products undertaken by the National Commission on Product Safety, which was established by Congress on 20 November 1967. In 1968 and 1969, the commission investigated the safety of such products as toys and children's furniture, architectural glass, power mowers, power tools, glass bottles, and aerosol cans. Citizens testified before the commission and directed the commission's attention to various incidents and problems. Coates observes that citizens participated in this particular assessment because the experience of members of the public with various products was itself part of the subject matter of the inquiry. There was no direct citizen participation in the other assessments examined by Coates, but the subject matter of several of the assessment processes suggests that some form of citizen contribution, either direct or through representative intermediaries, would have been appropriate. This is true, for example, of the assessments of environmental noise, and of future public transportation systems of advanced type.

In his written testimony submitted to the Daddario subcommittee, Mayo (*37*) stresses the importance, in assessment processes, of direct participation or representation of persons affected by a technology. He emphasizes the fact that technology assessment has a dimension beyond the identification and analysis of the impacts of technology. This is the dimension of evaluation of the social desirability or undesirability of such impacts. Since different segments of the public may view the impacts in various ways, as beneficial or detrimental, comprehensive evaluation is difficult without direct inputs from such segments. While special-interest groups can be relied on to express their views, they cannot safely be regarded as representative of the views of all major segments of the public that may be concerned.

Of the various hearings and reports generated by the Daddario subcommittee, the report of the technology assessment panel of the National Academy of Sciences places the greatest emphasis on citizen participation and representation. This panel asserts that legislative authorization and appropriation processes are inadequate as technology assessment processes because legislative processes frequently consider only the contending views of well-organized interest groups and often do not direct attention to long-range consequences. The panel further argues that, while technology assessment occurs in industry and in government agencies, with few exceptions the basic questions considered concern the probable economic

and institutional effects of a technology on those who are deciding whether to exploit it. Existing processes fail to give adequate weight to "the full spectrum of human needs" because not enough spokesmen for diverse needs have access to the appropriate decision-making processes.

In the judgment of the panel, extensive citizen participation and representation in the assessment process is necessary both for practical reasons and for reasons of democratic theory. There are two practical reasons. First, citizen participation in the early stages of the development of a technology may help to avoid belated citizen opposition to a technological development after heavy costs have been incurred. Second, "objective evaluation" is impossible unless the diverse views of interested parties have been considered. On the level of political theory, the panel suggests that, in a democratic framework, it is necessary to consider the views of those who will be affected by a particular course of action.

The National Academy of Sciences panel explicitly acknowledges that technology assessment in some of its aspects is a political process because it involves questions of value (*32*, p. 83): "We can hope to raise the level of political discourse; we must not seek to eliminate it." The panel concludes (*32*, pp. 84 and 87) that there is a "need to accompany any new assessment mechanism with surrogate representatives or ombudsmen to speak on behalf of interests too weak or diffuse to generate effective spokesmen of their own. . . . Means must also be devised for alerting suitable representatives of interested groups to the fact that a decision potentially affecting them is about to be made. . . . *Whatever structure is chosen, it should provide well-defined channels through which citizens' groups, private associations, or surrogate representatives can make their views known. . . . It is particularly important to couple improved assessment with improved methods of representing weak and poorly organized interest groups*" [emphasis in the original].

As the National Academy of Sciences report states, and as Folk (*38*) stresses, to be effective technology assessment must function as part of the political process. What is at issue is the distribution and exercise of a form of decision-making power over technology. New technology assessment processes and structures probably would open decision-making processes to a wider constituency than now exists, and might change the distribution of power over some decisions involving technology. At the very least, new processes and structures might make it difficult for those accustomed to making technological decisions to do so without the knowledge of many other concerned people. It is doubtful that new assessment processes would be regarded as neutral either by those who now dominate technological decision-making processes or by those who might disagree with the results. Even though every effort were made to analyze questions of value as dispassionately as possible, or to exclude such questions entirely from assessment processes, dissatisfied parties almost certainly would attack the results and seek to offset them by other forms of political action.

Persuasion, bargains, and trade-offs in values are at the heart of political processes. Whether effective assessment can or should attempt to avoid these processes is questionable. Because technology assessment is to some extent a political process, the participation or representation of citizens may be not only desirable from the perspective of democratic theory but also necessary in political practice. Even such participation may not assure the effectiveness of the process in a larger political context.

### Ad Hoc Activity

A third form of participatory technology encompasses a variety of ad hoc activities of individuals and groups beyond the scope of structured processes of litigation and assessment. This form includes activist intellectualism of the sort undertaken by Carson (*39*), Nader (*40*), and Commoner (*41*); quasi-official action of the kind undertaken by Congressman R. D. McCarthy concerning chemical and biological warfare (*42*); political and informational activities (*43*) of the sort undertaken by such groups as the Citizens' League Against the Sonic Boom, the Scientists' Institute for Public Information, the Sierra Club, Friends of the Earth, and Zero Population Growth; and sporadic activities of loose coalitions of individuals and groups energized by particular situations and issues.

Rather than attempt to survey such ad hoc activities, I here briefly describe and analyze an example of abortive participation that occurred in 1967 and 1968 in the initial efforts to develop a new town on the site of Fort Lincoln in Washington, D.C. (*44*). In some ways the Fort Lincoln example is typical of problems that often arise in processes of citizen participation in urban development. In other ways the case is distinctive because the primary purpose of the Fort Lincoln project was to demonstrate on a national basis the potentials of technological and administrative innovation for urban development.

On 30 August 1967, President Johnson publicly requested several members of his administration and of the government of the District of Columbia to begin at once to develop a new community on the site of Fort Lincoln, which consists of 345 acres of nearly vacant land in the northeast section of Washington, D.C. The President explained the purpose of the project as the development of a community that would demonstrate the potentials of administrative and technological innovation in urban development. The Fort Lincoln project was conceptualized as the leading project in a national program to develop "new towns intown" on federally owned land in various cities throughout the country.

On 25 January 1968, Edward J. Logue, who had achieved national recognition as an urban development administrator in New Haven and Boston, was retained as principal development consultant for Fort Lincoln. In the following 10 months, Logue and his associates developed an ambitious and innovative plan (*45*) that was based on, among other things, a thorough analysis (*46*) of the potentials for technological innovation in the development of Fort Lincoln and on a proposal (*47*) for an innovative educational system for the new community.

Fort Lincoln was a federal urban renewal project. Some form of citizen participation in urban renewal projects is required by law. Logue and the government officials involved in the Fort Lincoln project had had extensive experience with citizen participation in other urban development projects, including a model cities project in Washington, D.C. In developing the plans for Fort Lincoln, they made extensive efforts to fashion a participatory structure that would be acceptable to the citizens of the northeast section of Washington. For the most part they failed. Political activists in the area perceived the technical planning process as the locus of political opportunity and choice concerning such questions as the number of low-income families to be housed on the site. Although these activists disagreed over

who could speak for the citizens, they agreed that the residents of the area should be granted funds to hire professionals to participate with and for them in the technical planning and development processes. At one point the Department of Housing and Urban Development offered to grant money for this purpose to the council that represented the citizens, but for various reasons the council rejected the offer.

The Nixon Administration suspended development of Fort Lincoln in September 1969, pending further study. One analyst (*48*) has argued that the project was suspended because neither federal nor local officials believed that the development plan was either technologically or politically feasible. Other analysts (*49*) have suggested that the project was suspended because members of the Nixon Administration regarded it as a personal undertaking of President Johnson's and as an example of the overly ambitious social engineering activities of "the Great Society."

The struggle over citizen participation diminished support for the project in the neighborhood and among its potential supporters in other areas of the city. No strong political constituency favored the project. The Nixon Administration could and did suspend it without antagonizing any strong or vocal interest group.

Fort Lincoln is one example of the extent to which technical planning and development processes can become the locus of political conflict when these processes are perceived as the de facto locus of political choice. It is also an example of some of the difficulties that can arise in the course of efforts to reconcile the dictates of administrative and technological reasoning with the dictates of the political thinking of participating individuals in particular situations.

## Problems

Like many other participatory processes, participatory technology raises questions about the adequacy of the theory and practice of representative government.

According to traditional theories of American public life, citizens should express their demands for public action to their political and governmental representatives. Conflicting demands should be reconciled by persons elected or appointed to policy-making positions in which they are publicly accountable for their actions. Administrative and technical processes are not, in theory, the appropriate locus for the exercise of political influence and the reconciliation of political conflicts, because these processes are not usually structured as open political forums, and because most administrators and technical people are not directly accountable to electorates.

This theory of government is a prescriptive rather than a descriptive one. It does not correspond well with the realities of the exercise of political power in and through administrative and technical activities. Among other things, increases in population, the expansion of the public sector, and the increase in technological complexity have changed the number and, to some extent, the nature of demands and possibilities for governmental action in recent decades. While legislative bodies and individual elected officials continue to respond to some of these demands, many other demands are considered and resolved in administrative processes of limited visibility. The very act of translating most legislation into specific processes usually involves an exercise of political choice. Furthermore, agencies often invite demands upon themselves as a way of expanding the scope of their support and powers.

The politicalization of administration in this century, especially in response to the activities of interest groups, is a widely recognized phenomenon (*50*).

Participatory technology is an attempt to influence public agencies directly, and, through them, the quasi-public and private interests they often influence and regulate. Like other participatory processes, participatory technology in some of its forms circumvents traditional processes of expressing demands through elected representatives and of relying on representatives to take appropriate action.

The hazards of participatory technology are many. On the one hand it can be used by administrative and technical people in a manipulative way to generate the illusion of citizen support of a particular course of action. On the other hand it can degenerate into forums for the exercise of obstructionist, veto-power techniques and paralyze public action. It can generate an overload of demands that agencies are not equipped to handle. It can be used as an instrument by an aggressive minority to capture decision-making processes and to impose minority views on a larger community. It can simply shift the locus for the exercise of "the tyranny of small decisions" (*51*) from one group to another or merely enlarge the core group that exercises control. Finally, it can lead to the dominance of technological know-nothing over the judgments of qualified individuals who are legally responsible for, are dedicated to, and understand processes of public action.

At the same time, as Spiegel and Mittenthal (*52*) observe, "Citizen participation can occur in partnerships with a governmental unit as well as against it. Its nature can be cooperative and integrative or conflicting and oppositional. . . ." Participatory technology, if appropriately structured, can contribute to decision-making processes that take into account alternative points of view, and can help an agency perform its functions in a more effective and open manner. It can provide a means by which the individual who feels powerless in the face of technological complexity can find a forum for the expression of his views.

The basic questions are these: In what cases is citizen participation in technological processes warranted, and according to what rationale? How should participation be structured and conducted? How much weight should participation be given in decision-making processes?

To provide a priori answers to these questions is impossible because of the variety of situations to which they apply. For this reason it is recommended that public agencies, scientific and technical associations, and individual members of the scientific, technological, and political communities undertake analyses of these questions in the various situations for which they have responsibility or to which they have access. No single activity by a particular organization such as the National Academy of Sciences can meet the need. The analysis must be as broad-based as the activities to which these questions apply.

At the same time, the men responsible for policy making in foundations should consider the establishment of an experimental center for responsive technology. Such a center would analyze, on a continuing basis, the question of the ways in which public participation in technological decisions involving a public interest can be structured, and would support such participation in appropriate cases. The center might also support the education of proponents of technology, who would be qualified to recognize alternative conceptions of the public interest in technological matters and to present these conceptions to decision-making bodies.

## Summary

The hunger to participate that exists today in various segments of the American public is in part a response to what some people perceive as an unresponsiveness of institutions and processes to the felt needs of the individual and of society. It is also, in part, an expression of a desire for a redistribution of power in American public life.

Technology is one of the major determinants of the nature of public as well as private life in contemporary society. Participatory technology is an attempt on the part of diverse individuals and groups to influence technological processes through participation in existing or new public processes by which technology is or can be developed, controlled, and implemented. Like other processes of direct citizen participation in governmental decision making, it raises many questions about the adequacy of existing theories and practices of representative government. These questions cannot be answered on an a priori basis. Members of the educational, scientific, technical, and governmental communities should analyze these questions in an effort to develop answers that are appropriate to the particular situations for which they are responsible and with which they are concerned.


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