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THE SOCIAL IMPACTS OF TECHNOLOGY: TOWARD AN ASSESSMENT OF STOL AIRCRAFT POTENTIAL

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THE SOCIAL IMPACTS OF TECHNOLOGY: TOWARD AN ASSESSMENT OF STOL AIRCRAFT POTENTIAL

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INTRODUCTION

The present phase of the STOL assessment project draws from two of the three emphases recorded in our earlier efforts. Our past work examined the relationship of transport mobility to social change, surveyed public attitudes toward technology, and explored relationships between technological developments and various types of regulation. Because of limited funds and increased research needs to continue the next phases of each of these areas of inquiry, only the first two are currently being pursued. This report will outline the progress of the work being done on STOL assessment relating to (1) the mobility-and-social-change aspect of our research and (2) the analysis of the data on public attitudes toward technology.

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TRANSPORT MOBILITY AND SOCIAL CHANGE: STOL AND RURAL DEVELOPMENT

Background

Our work to date has resulted in an expanded definition of technology -- one which includes the cooperative relationships of individuals and groups who produce and distribute the technical capabilities, in addition to the technical ideas, prototypes, and machines. Technology assessment literature dealing with social change has been surveyed, with particularly close scrutiny of the methodological techniques it employs. Literature dealing with social change has been explored and its theoretical adequacy evaluated. With respect to the field of transportation, we have become familiar with some historical case studies in which technical innovation in physical mobility had indirect and often wide-ranging social and political impacts. Out of these studies we identified the following eight conditions as potentially germane to the analysis of the social-impact consequences of new transportation technology:

1. allocation of physical resources and the status of the environment
2. social organization of new transportation capabilities
3. substitutions for existing activities and functions
4. social redefinition of space
5. increased complexity of social systems
6. organized social responses to improved transport systems
7. broad social effects
8. government intervention

With this background of theoretical and historical inquiry, the next obvious step in our analysis of the social impacts of improved transportation capacity is empirical field study. Essentially, such a study would illuminate this problem: *The degree to which comprehensive social data on transport impacts can be gathered, understood, and developed into useful analytical propositions relating improved transportation capacity to other social changes in a community.*

Building hypotheses. Preliminary to going into the field, we are now engaged in developing testable hypotheses about the social consequences of air transportation. The eight categories listed above have guided the design of these hypotheses: we are attempting to identify, within each of those categories, a set of "dependent" variables, ones which might be particularly sensitive to changes in air transportation capability. Having deliberated on the kinds of information that could indicate each variable's presence and strength, we have constructed, in the practical context of an informal field investigation, a tentative checklist (see below, p. 4) as a basis for research. But these hypotheses and indicators will be significantly affected by the characteristics of the particular case actually to be the subject of field investigation. Really, the basic theoretical approaches to understanding the general change process are so problematical that reference to a tangible case must be made almost immediately. Thus, our efforts soon became most actively concentrated on locating a suitable place for field work.

Selection of the Site for our Field Study

Informally, we reviewed several possibilities including California, the Canadian Arctic, Nepal, and Ohio. Considering both its research attractions and its relatively easy accessibility, the recent airport development program in Ohio emerges as most likely to provide us the best field study situation. A visit by the Principal Investigator confirmed that likelihood.

Research opportunities in Ohio. Initial reconnaiscance suggests that the Ohio Airport Project provides a remarkable opportunity for real time-monitoring of the economic, social, and political development stimulated in essentially underdeveloped areas by air transport capacity. The sixty moderately small airports established over the past eight years represent an interesting natural

experiment involving successful policy implementation, the diffusion of innovation, and numerous instances of technology-triggered social change. For our purposes, the following circumstances seem to ensure rewards for undertaking research in Ohio: (1) the very magnitude of the activities carried on by the Ohio Airport Project, (2) the apparent cooperativeness of the Division of Aviation, the State Department of Commerce, and Ohio State University in making information readily available, and (3) the receptiveness of Ohio communities themselves to an exploratory field study of technology and social change.

Modification of Research Design

With plans currently underway to go "into the field" this summer to study the program of airport development in Ohio, definitions of variables and hypotheses for investigation are being refined. Tentatively, we have developed the following list of factors to be used as a point of departure in this field study:

(1) The Social Organization of the New Transport Capability

How is the airport run?

How are the planes owned, maintained?

(The technology itself may dictate certain forms of of organization)

(2) Political Responses to the New Transportation

Has local government acted to encourage or hamper development?

Has there been any organized support for air transport developments? Any organized opposition? What has been the political history of such groups?

(3) Sense of Local Community

What has happened to the sense of local pride? Is there a new community spirit, or does a previous unity now seen fragmented?

Do people individually feel more fulfilled, or more alienated?

(4) Specialization of Economic Activity

Economic growth and increased interdependence with other parts of society often lead to more specialized forms of economic activity: are there, for example, new medical specialists? new specialty stores? have traditional activities been subdivided, some lost to other geographic areas?

(5) Ties to Other Parts of Society

Is there more awareness of other cities, states, nations?

Is there more communication and joint activity with distant places?

Are other cities, other levels of government, more aware of this one?

(6) Social Norms

How are the value systems actually expressed and enforced?

Have, for example, dress habits changed? is traffic enforcement more strict, or less? has the crime level risen?

(7) Beliefs and Value Systems

Have new groups brought with them different values?

Has economic development changed the values held by the long-term residents?

(8) Demographic Changes

How have residence patterns, income levels, employment levels, and land prices changed as a result of the introduction of air transportation to the area?

Are people more conscious of economic and social divisions between groups in the community?

We anticipate that the most critical conceptual problem we will encounter in our study is the attribution of social changes in categories (5) through (8) above to the development of air transportation rather than to other concurrent developments.

Orientation to Ohio. As further background we are looking over the existing work in rural sociology, particularly with reference to Midwestern America. Even more particularly, we are reviewing data on several counties within Ohio to determine which ones our study might most usefully concentrate on. A note on the *scope* of our field research is in order here:

In the initial planning stages, we felt that to study two or three communities -- depending on field opportunities and costs -- would be sufficient to demonstrate the methodology and conceptual foundations for more extensive work.

But the richness of the situation calls for a more intensive probe this summer. We believe that, if resources can be obtained, a *six-county study* is most sensible. This would allow a greater range of critical variables to be investigated than would be possible examining only two or three communities. Ideally, funds would be furnished to tap the rich resources of information in Ohio State's College of Agriculture's Rural Sociology and Community Extension groups and to enlist the aid of the several faculty members of the School of Administrative Science who have expressed interest in our project. If funds are made available to put four rather than two researchers into the field this summer and to enable several faculty and students at Ohio State to assist in the operations, it seems likely that a transition stage might be effected which would lead to the kind of longer-term monitoring necessary for more precise information about the effects of the airport experiment. This in turn would complement whatever findings are yielded by the final phase of our NASA-funded inquiry into the potential social consequences of air transport.

Our major documentation effort will occur at the end of this calendar year after all our findings have been accumulated and analyzed. We are including in this present report, however, a summary of the facts of the Ohio experiment in order to reinforce the claims made above about its rich research possibilities and to demonstrate its relevance to many of the questions raised in STOL feasibility studies. The innovative proliferation of short runway airports throughout rural Ohio promises to provide "laboratory conditions" for studying the potential effects of the *Mutually Exclusive* mode of STOL implementation. One of several alternative systems of potential STOL operation, this one is limited to rural and/or relatively underdeveloped lands away from population centers, where STOL-based transport would be made available to areas not served either by regular airlines or by well developed rail networks. And while Ohio's geography

and highways are such that the State contains no utterly remote regions inaccessible except by air, the recent development of its air transportation corridors has increased personal mobility and economic activity in ways suggestive for the STOL potential in such regions. Depending on how significant a national priority the development of rural America becomes in the future, the *Mutually Exclusive System* may well take precedence over other potential modes of STOL implementation.

Transportation and Rural Life: The Ohio Airport Project

Political Background. In 1964 Governor Rhoades began to fulfill part of his political platform -- the stimulation of economic and industrial growth in Ohio. One aspect of the overall strategy was to increase the availability of air transport for business executives in order to encourage them to establish industrial operations in mainly rural, sparsely populated counties. Ohio's eighty-eight counties are distributed rather evenly over the State, making something of a political checkerboard. By mid-1964 only about thirty counties could handle airplanes at all, and only twenty counties had airports which could handle the small executive Lear Jets which require about 4000 feet of runway. Of these twenty counties, ten were serviced by large metropolitan airfields from which scheduled airlines operated. Thus, less than a quarter of the Ohio counties had modern air transport facilities.

To finance development of additional small airports, the citizens of Ohio were persuaded in 1965 to pass a major bond issue of $5,000,000. These funds were to be made available to some sixty counties designated as potential recipients. While the county is not a particularly sensible basis for distributing airports in technical or physical transportation terms, as such it had powerful *political* appeal. In essence, the bond issue made available up to $100,000 each for counties to upgrade existing facilities or build new ones.

Airport Program Objectives. There are two levels of program goals, the manifest ones and those held more quietly by the Director of the Division of Aviation, Norman Crabtree. The official goals are three: (1) to stimulate industrial development in rural Ohio, (2) to divert significant amounts of general aviation traffic from existing major airfields, and (3) to increase flight safety among general aviation pilots. These objectives are fairly straightforward and to be expected. In a sense, they comprise the primary capacities of the airport and aircraft programs. But the intentions of the program do not stop with them. Director Crabtree, who has been with this program since its inception, feels two additional incentives: (4) to enable communities through their leaders to develop greater self-confidence and a capacity to solve their own problems, and (5) to begin regaining population balance between urban and rural sections of the State. These goals and objectives quite clearly have informed his own behavior and the type of program specifications worked out through the years.

The Current Status of the Program. There are now some sixty-two airports capable of handling executive aircraft on runways at least 4000 feet long, some with taxiways and lights. There are twenty-three industrial parks associated with these airports. There has been a reported 5% increase in employment, $250,000,000 in increased payrolls, and 60,000 new jobs. Over 1500 new or expanded industrial facilities have been built at a capital expenditure of about $1,000,000,000. There has been a significant decline in general aviation use of the ten major airfields, and flight safety has improved significantly.

Also, there has been at least episodic evidence of community self-development, along with accounts of leadership growth within a number of communities. Finally, there is fragmentary evidence that population trends are being altered in some

counties. It was reported that in at least two counties absolute population figures show an *increase* in rural population for the first time in years.

The magnitude of the effort can be summarized by comparing Ohio with other states in terms of airports per square mile. Ohio ranks first in order of magnitude, with one airport for every 207 square miles (1:207); California comes next, with a 1:798 ratio; and Texas is third, with one airport for every 1,091 square miles (1:1091). Ohio has been lifted into the air age with remarkable speed and relative magnitude.

Diffusion of Innovation. Without *any* question, the placement of a moderately small airport near a county seat in rural Ohio is an instance of acceptance of technical innovation by the affected community. The process is closely akin to that described by Rogers a number of years ago in *Diffusion of Innovations*.[1] Acceptance was also closely related to the objective of self-development. The State offered $100,000 to be used in upgrading an existing airstrip or the building of a new one if a community met certain technical and political specifications. Almost none of the facilities could be developed for that sum. Therefore, the communities were required to come up with the necessary additional resources. Local authorities were also required to show that they (1) had established a local Airport Authority, (2) had worked out the new zoning and land use plans, and (3) could develop the necessary additional resources. What was promised was "4000 feet of flat, straight county road." No county commissioner wanted an "airport." They immediately thought of Chicago's O'Hare Field or New York's Idelwild. But county roads they understood. And that was exactly what was called for -- specifications for the runways were the same as for straight county roads.

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[1] Everett M. Rogers, *Diffusion of Innovations* (New York: Free Press, 1962).

Another condition of the acceptance of this innovation -- probably the most important stimulus changing local institutions, ordinances, and perspectives -- was the high likelihood that if a runway were to be built, at least one industrial plant would move in shortly. Often, part of the Director's job was to convince a company to locate a new plant in a particular town. Often there was an explicit commitment on the part of the industry, though sometimes it was a matter of faith for the local county leaders. But innovation has been diffused all over the countryside of Ohio; so, increasingly, has industrial development.

Public Policy Implementation. Successful diffusion of innovation into selected communities was the intention of announced state policy. Implementation of Governor Rhoades' intent was systematically pursued at both the local and State levels, involving numerous State agencies as needed to assist the Division of Aviation. In a sense, the story of the administrative and political activities supporting this policy was the other half of the innovative process. Apparently, Director Crabtree, with an occasional assist from the Governor, helped clear the way for development by dealing with potentially disruptive private and public organizations not in the communities and enabled the communities to "get it together."

An aspect of research in the area of policy determination is the examination of the legislative, political and administrative activity which enabled the Division of Aviation to get its job done. This covers the original legislative intent, the matter of the Bond Issue Election, the climate of cooperation among public agencies in Ohio, the battles with the FAA, the changes in operations occasioned by the shift in the State's political complexion in 1972, and the rise of ecological awareness. The federal government's involvement has been minimal; only five new airports have received any federal funds.

On the other hand, the difficulties with the FAA make an interesting story, one which essentially deals with the problem of nationally oriented regulations which inhibit the flexibility of local development and change.

One of the continuing battles engaged in by the Division of Aviation is its controversy with the FAA over authorizing the use of field support equipment and obtaining clearance for using fields for certain types of activities. At present the FAA regulations are such that none of these fields could be used by scheduled airlines. But in fact the Division of Aviation does not see this restriction as important. Perhaps it is even diverting and challenging: a number of incidents have occurred illustrating the Director's tactics in getting around the problems with the FAA. More detailed recounting of these incidents must await a later occasion. Suffice it to say that they involve the invention of new field lights, the development of a "mik-a-lite" system in which the field lights can be turned on temporarily from the air through the use of radio frequencies, the design of very inexpensive taxiway markers, and other construction innovations. In each case, the Director had been confronted with regulations pitched to maintain safety throughout the entire United States, irrespective of the location of the airfield. Given the FAA's doctrine, neither the specific and less rigorous conditions of Ohio nor the difference in the type of intended use of the airports could be taken into consideration. Director Crabtree was most inventive in "teaching" the FAA that it might be sensible to become more refined in its approach. One instance of getting FAA clearance involved the use of the President's needs for heliport facilities.

The most important aspect of the Division's role is perhaps in running interference for the communities in getting the construction done by reducing barriers from private organizations located outside the community and finding

less expensive construction methods. A good deal of this expediting has had to do with reducing the out-of-pocket costs of earth moving. The experiences here include activities involving the Peabody Company and Vinton, Ohio; a labor union-built runway; the National Guard Engineers' training and community service; and the Governor and a national gas pipeline company. In each case, the State officials worked informally to decrease for the communities the financial and political costs of construction.

Air Transport Capacities and Socio-economic Change

Two main questions obtrude in assessing the broad social effects of this technology: (1) What are the conditions associated with strong initial impact of airport introduction compared with weak or no impact? and (2) What types of changes occur consequent to construction or upgrading of an airport facility?

In the Ohio case, almost all of the conditions which seem associated with strong impact are related to how much industry moved in. That is, when a combination of the following factors was present, considerable relative growth in local industry occurred:

(1) When there were already-established sewer and water facilities.

(2) When the local work force appeared likely to accept a reduced wage from that offered in the highly urban areas. Rural residents were often willing to do so, for in many instances they were commuting up to sixty miles one way each day to work in urban factories. They would accept up to a 20% reduction in wages to work near their homes.

(3) When the local work force was likely to have better job discipline than the urban work force. This was usually the case, as is illustrated particularly by the situation at Millersburg, which is near an Amish community. 30% of the staff of the factories around Millersburg is made up of these Amish.

(4) Where the location was "close" in flight time to other plants of a company and/or to metro-areas. The Ohio Airport Project essentially services business notables. The rationale is that these are the people who make things happen: if they can get into and out of smaller communities with ease, they will become amenable to building their plants there -- particularly with the added incentive of relative cost advantages compared to urban areas.

(5) When there is a readiness of the "local notables" to get themselves together and seize the opportunity. (One example of a failure to do so occurred at Urbana, Ohio: local leaders there refused to condemn a piece of land near the existing airport for runway extension. It was rumored that their action was due in part to the fact that the several factories in that town are non-union. The plants proposing to move in belonged to strongly organized union companies. The locals did not want the spread of unionization. The opportunity for development passed them by, and now they want funds which have been exhausted.)

One can imagine a number of other conditions plausibly attending the growth of local industry. The ones listed above are simply those that emerged in the discussions between the Principal Investigator and people well acquainted with the "Ohio situation." These conditions will be used in forming hypotheses about strong impacts.

Longer-term changes consequent to and perhaps directly related to the advent of the airports and the movement of industry will be the heart of our projected study. What else, that is, has happened in these communities besides the growth of local industry and of air traffic? The types of changes we will be seeking will, among others, include the following:

(1) Changes in the local notables' social situation (as in Washington Court House, for example) and other aspects of the local scene, such as the effects of the rise in the tax base, and more general social changes among residents of a particular area, etc.

(2) Changes in elite patterns associated with the arrival of new industry-related notables as they become integrated with the local political and social milieu. To what degree do they become local leaders in service organizations, in Kiwanis, Rotary, etc.?

(3) Evidence that the introduction of airport-associated activities has led to increased leadership skills within the community. For example, have the local notables begun to work together in a sustained way?

(4) Changes in population trends within the affected counties. Have these been perceptibly altered for any particular types of groups, etc.?

(5) Changes in the character of local self-awareness. Is there evidence to suggest that the activities associated with the airport have altered the character of the communities' self-awareness, sense of themselves as integral communities, etc.?

Suffice it to say, there are a number of potentially interesting "spinoffs" from the introduction of increased air transport capacities that deserve attention.

A more systematic approach to them is outlined above on pages 4 and 5. The Ohio experience offers us a chance to learn a good deal about the effects of air transport at the community and state levels and about how aircraft is used by business. Initial work has been done to develop a way of screening the counties so that we can select those which would make up the most appropriate sample. The legislative background work has also been started. Ultimate results will depend on the scope and intensiveness afforded by the funding we can secure.

THE PUBLIC'S ATTITUDES TOWARD TECHNOLOGY -- IMPLICATIONS FOR STOL DEVELOPMENT

Refining the Predictive Model of STOL Acceptance

Work on this segment of the overall project has gone into its concluding phases. We anticipate a final report on the data analysis by the end of the summer. This will be the basis for more precise evaluations of the public's preference rankings of STOL and other transport and NASA mission technologies and of the impact of certain technology assessment criteria and governance (control) factors on perceptions of STOL.

Our earlier analysis showed that public reaction to STOL appears to be slightly positive. Although part of that reaction was frankly neutral, insofar as three-quarters of our sample expressed the belief that STOL's effect on them personally would be negligible[1] and STOL was ranked squarely in the middle (sixth) of a favorability hierarchy evaluating twelve newly projected technologies,[2] more than half of our sample perceived STOL to be potentially beneficial and less than one-third of them felt it would have any "negative consequences."[3] Thus, opportunities do exist for developing a favorable climate for STOL acceptance, particularly if NASA emphasizes STOL's part in opening job opportunities, reducing travel time and saving space, and if its decision makers intervene at the design stage to control problems of pollution, air traffic, and siting.

Nevertheless, STOL does not appear to represent the public's idea of the *best* way of investing the nation's transportation dollar nor the most urgent priority requiring NASA's expertise and R&D resources. Its strongest

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[1] See Table 10, Chapter III, 1972 Progress Report. Significantly, in spite of the low degree of impact on their personal lives perceived, respondents do believe that STOL's impact would be considerable for the "average man."

[2] Table 18a.

[3] Tables 11 and 12.

competitors in these respects are *metropolitan rapid transit* and *energy research*. The public's preference is definitely weighted in favor of high speed ground systems over STOL transport. Even more portentious for the support of STOL development may be the public's acute awareness of a possible energy crisis. It is noteworthy that the data obtained *in 1972* indicated that the public more readily favors research to develop the capability of tapping solar energy to meet that contingency than it does the development of the STOL aircraft potential. With increasing media attention *now* being focused on imminent shortages of fuel and deficiencies in the supply of power for domestic use, it is not unlikely that this priority will be heightened in the public's mind in a way that could diminish the relative support/acceptance of STOL. Decision making about STOL becomes of necessity part of the overall problem of designing fair and effective future energy consumption policies. As a transport technology with heavy energy needs, STOL's highly capital-intensive nature makes any decision to invest in it difficult to reverse. Therefore, planning for STOL development must, along with land use factors, take energy consumption factors particularly into consideration.

In spite of these problems, our data shows that most people are prepared to accept STOL as a good thing if they can simply become convinced that it carries with it a high probability of generalized benefits and a low chance of exacting generalized costs. STOL designers and NASA administrators can recognize this and act accordingly. But there is a further implication in our findings which reveals factors at work over which these planners may have *no* control, factors which may confound any attempt to produce an opinion atmosphere favorable to STOL. They are present in a subtle, but definitely perceptible, drift toward *technological dissent*. Should that tendency spread to a generalized dissatisfaction with existing technologies,

the introduction of new ones, including STOL, will be met with mounting resistance. Our current analysis is probing what in our last report we suggested might be "the emergence of a 'technological ideology' -- a logically consistent set of...beliefs and attitudes" which organize to constrain opinion about technology (p. 114). We are scrutinizing our data for further demonstrations of the validity of our earlier findings. In the process a more definitive assessment of how the public views its own stake in STOL development (and other NASA-related technologies) will be carried out.

In examining the evidence of the operation of that "technological ideology," we shall examine in greater detail our earlier hypothesis that there is an association between uneasiness over technology's repercussions and a generalized feeling of social and political discontent and distrust of industrial and governmental leadership. We have already discovered that opponents of STOL tend to reason from something of a "belief system" about technology, within which they perceive potentially detrimental social effects of STOL that *go beyond* the more obvious concerns over ecological damage and safety hazards. These effects have to do with the unwholesome tensions, dislocations, and too-hectic pace of post-industrial society.[1] And while "STOL supporters" outnumber "STOL opponents" something like two to one, the "ideological" conviction behind the opposition, as compared to the relatively passive acquiescence characteristic of acceptance, suggests that the minority might be prompted to wage active opposition, with little activity on the part of the majority. Such a possibility will be carefully explored as we go on to examine perceptions of STOL in terms of refined technology assessment and control criteria. Such an examination will do much to fill in the political profiles of STOL's putative supporters and opponents. Thus far, we can document little more than that for the latter environmental consciousness outweighs concern for industrial development and disenchantment marks their regard for the conventional wisdom whose central tenet is faith in the inevitable efficacy of technology.

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[1] See items 4, 8, and 9 of Table 14, Chapter III, 1972 Progress Report

Interim Related Activities Generated by STOL (Survey Data) Research

In addition to narrowing our survey data to STOL-specific considerations, we have also been concerned with broadening it in terms of its overall policy implications for technological development. Our related studies have resulted in two papers written during the reporting period which now await publication: "THEY WATCH AND WONDER -- The Public's Attitudes Toward Technology: A Survey," by Todd La Porte and Daniel Metlay, and "A Study of the Attitudes and Behavior of Technological Dissent" by Daniel Metlay. (These studies have been circulated to the academic and scientific communities and are readily available to interested readers of the present report.)

Both studies bear witness to the growing salience of technology as a political issue. The first shows how the *values* behind implementing decisions are being called to account: "To limit consideration [criteria for developing or not developing technologies] to questions of economic profitability is no longer acceptable to the general population" (p.36). Apparently also on the defensive are the *institutions and the leadership* making the decisions about technology which affect virtually the entire population. Scrutinized for its political implications is that same disjuncture noted in the last STOL progress report to Ames between those perceived as actually wielding the decision making power and those perceived as more legitimately entitled to do so. The other study, that on "technological dissent," elaborates the distinction between a technology's primary capacity and its secondary consequences. Focusing primarily on the collision between environmental interests and those of unfettered industrial/technological development, the author demonstrates the utility of viewing technological controversies in the light of the threat posed by secondary consequences of technology to certain values

which they would affect adversely. Each of these studies on technology and society shares in common with our STOL research the attempt to answer the questions of why some technologies find support among the general population and why others do not. Indeed, the findings just noted derive in large part from earlier work on the survey data executed for the STOL study. We repeat the most central results of that work here both to show how our several overlapping efforts interrelate and reinforce each other and, in the stricter context of this present report, also to summarize into a convenient capsule the crucial information diffused throughout the highly technical third chapter of our 1972 Progress Report:

1. In general, the public spontaneously indicates that it perceives technology to be associated with major changes since World War II. Almost half of those questioned in our recently conducted survey noted some aspect of technology as at least one major change effected since that time. (Relevant figures are charted in Tables 1 and 2 of the Progress Report.)

2. Overall, the public's response to a series of past technological achievements is positive: over 47% of the sample believe that these technical achievements have been quite beneficial; only about 6% indicate strongly negative reactions. (Refer to Figure 1, Progress Report.)

3. Negative attitudes toward past technical achievements are associated more with lower income groups and with politically liberal attitudes than they are with high income groups and with politically conservative attitudes. (Tables 5 and 9.)

4. Overall attitudes toward twelve newly projected technical developments show considerable variation: in the perceived likelihood of their effects upon the respondent, in his perception of their effects upon the "average man," and in the degree to which respondents oppose or support these proposed new technological capacities. (Table 18a)

   (a) Technical capabilities most favored are associated with the technological developments in areas of perceived national crisis, e.g., urban mass transportation needs and dwindling energy resources. Drawing most opposition are further developments in space travel, techniques of genetic manipulation, and large data banks for the storage of information to be used in governmental or business decisions concerning individual members of the public. In the latter instance, invasion-of-privacy issues are clearly uppermost in people's minds.

   (b) There is considerable variation in responses concerning the likelihood of beneficial or harmful effects should these technologies be implemented. (See Table 19 for a comparison of reaction to *STOL* with reaction to *monorails, solar energy collection, the SST,* and *space travel.*) For example, respondents were considerably more certain that benefits would accrue from *urban mass transit facilities* than from either the *SST* or from more *space travel.* The reverse was true with regard to the certainty of harmful effects.

   (c) The most significant indicator of likely support or opposition to a proposed technology is the degree of certainty respondents express about its changes resulting in *beneficial* consequences. The next most important indicator is the degree of certainty associated with *harmful* effects. Other variables have limited to insignificant utility in explaining degrees of support or opposition.

5. In assessing the importance of various decision criteria which might be used in technology-related decisions, the sample ranked *full employment* and *environmental security* criteria well above effects upon taxes and harm to the poor. Effects upon the international image of the United States and upon leisure time were ranked the lowest. (Tables 23 and 24)

6. There is considerable evidence of a wide separation in people's minds between those they believe *are* influential in making technology-related decisions and those they believe *should be* influential. For example, in each of six types of decisions, the public is regarded as having the *least say*, although in each case respondents cited "the public" as the group which *should have the most say* in these same decisions. Other data (presented in Figure 8 and Table 26) shows the relative positions of other potential decision actors. "Technical experts" appear in all decision areas as the group meriting the second greatest degree of influence in technology-related decision making.

Results of our follow-up studies in technology and society, including an elaboration of those just enumerated, have been presented at several professional conferences. These include the annual meetings of the American Society for Public Administration, Los Angeles, California, April 2 - 5, 1973; the Western Political Science Association, San Diego, California, April 5 - 8, 1973; and the American Association of Public Opinion Researchers, Asheville, North Carolina, May 19, 1973. In each case, our presentations have met with enthusiasm and have evoked a variety of professional inquiries into our activities.

Future Developments

NASA's sponsorship of the public survey portion of the STOL research project will come to an end with our final report later in the year. But the study of public attitudes toward technology which was initially undertaken as part of the technology assessment research on STOL aircraft may not terminate. As a result of preliminary interest from the National Science Foundation and the American Association for the Advancement of Science, we have been encouraged to attempt a national survey based on the California study done for NASA-Ames. A proposal seeking support for this nationwide survey has gone forward, and we are awaiting the decision of the NSF.