

Correspondence Regarding Science and Technology

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Noel

Lewis M. Branscomb
5 Hidden Oak Lane, Armonk, New York 10504
(914) 273-8018

Aug. 12

Dear Stu

I'm sending you a copy of the enclosed home typed report - based on a weekend meeting of a small group (Brooks, Sheldon, Wisner, myself) plus inputs from about half the T.F. members.

I send the original to Schwartz.

The enclosed table describes initial assignment proposals.

Please feed back some indications of priorities and of usefulness. We can't easily follow up all these issues in detail. However the group has strong inputs to make on energy, health, etc which I'm not pushing pending advice.

Yours
Lewis

WA

October 4, 1976

Mr. Roy J. Ingham
3219 Thomasville Road
Tallahassee, Florida 32303

Dear Mr. Ingham:

Governor Carter has asked me to respond to your letter of July 22 and to thank you for your views and concerns regarding science and technology. Your comments will be of help to him in further developing his policy positions.

Thank you, too for the enclosed articles and your recommendation of the statements in Technology Review.

We hope you will continue to support Governor Carter and Senator Mondale. They offer the promise of outstanding leadership -- something the people of our country want and deserve.

Sincerely,

Noel J. Sterrett
Science and Technology Coordinator
National Policy and Issues

Issued



July 22, 1976

Jimmy Carter
Plains, Georgia

Dear Mr. Carter:

The enclosed article describes the results of a study of public attitudes toward science and technology. Although, as the authors note, the population in the study was composed of adults residing in California, the results may be generalized with some caution to other sections of the U.S.

Although I have not yet read the Platform of the Democratic Party, I assume you are planning to take a position on this issue. May I suggest that the attached paper contains some highly important data on this topic; specifically, the difference in the public's attitude toward science, on the one hand, and technology, on the other.

One distinction between science and technology should be made. Contrary to the authors' claim that science and technology are undergirded by "a single web of logic and theory," I view these two disciplines as having fundamentally different logics. Science does not have preconceived ends. The scientist attempts to describe the designs that exist in nature. Technology has preconceived ends. The technologists (including engineers, architects, physicians, teachers - in general, anyone who creates artifacts, either material or processes, to attain some desired outcome) - do hold specific ends in mind - they have an image of what ought to be and design plans to attain them. Rather than describing designs in nature, they create designs to control nature. I believe it is precisely this distinction which the public intuitively grasps and accounts for their different reactions to these two phenomena.

I consider this concern with technology to be one which will gain in intensity and become an exceedingly sensitive political issue in the near future.

Peace,

Roy D. Ingham
3219 Thomasville Road
Tallahassee, Florida 32303

Mr. Jimmy Carter
Page Two
July 22, 1976

P.S. Although I suspect your advisor(s) on this subject are well informed on the literature on this topic, I have found the following articles to contain thoughtful statements:

1. "Towards a New Policy for Technology: The Outlines Emerge," John M. Logsdon, Technology Review, Oct/Nov 1972.
2. "Technology is for Mankind," Jerome B. Wiesner, Technology Review, May 1973.

RJI:ly

Enclosure

mitations are essentially the same for both the unperturbed and perturbed stratospheric calculations, it can be assumed that the differences between the results for the two cases will be more reliable than their absolute values. Future refinements in the model structure are being planned. These include primarily increased model resolution and incorporation of an enlarged chemical package, so that NO_x distributions can be predicted explicitly. This will permit a greater measure of confidence in the climatological results and should lead to a more detailed picture of the distribution of O₃, both in the natural stratosphere and in a hypothetically perturbed stratosphere.

References and Notes

1. P. Crutzen, *J. Geophys. Res.* **76**, 7311 (1971).
2. H. Johnston, *Science* **173**, 517 (1971).
3. S. Chapman, *Mem. R. Meteorol. Soc.* **3**, 103 (1930).
4. For example, see H. Dütsch, *Advan. Geophys.* **15**, 219 (1971).
5. For example, see M. McElroy, S. Wofsy, J. Penner, J. McConnell [*J. Atmos. Sci.* **31**, 287 (1974)] or P. Crutzen [*Can. J. Chem.* **52**, 1569 (1974)].
6. D. Cunnold, F. Alyea, N. Phillips, R. Prinn, *J. Atmos. Sci.* **32**, 170 (1975).
7. E. Lorenz, *Tellus* **12**, 364 (1960).
8. E. Hessvedt, *Can. J. Chem.* **52**, 1592 (1974).
9. One Dobson unit ($= 10^{-3}$ cm) is the thickness of the pure O₃ layer that would be obtained if all the O₃ in the vertical column were concentrated at normal temperature and pressure.
10. See R. Prinn, F. Alyea, D. Cunnold, A. Katz, in *The Second International Conference on the Environmental Impact of Aerospace Operations in the High Atmosphere* (American Meteorological Society-American Institute of Aeronautics and Astronautics, San Diego, Calif., 8 to 10 July 1974) (American Meteorological Society, Boston, 1974), pp. 180-186.
11. A. Broderick, J. English, A. Forney, in *American Institute of Aeronautics and Astronautics-American Meteorological Society International Conference on the Environmental Impact of Aerospace Operations in the High Atmosphere* (Denver, 11 to 13 June 1973) [*Am. Inst. Aeronaut. Astronaut. Pap. No. 73-508* (1973)].
12. Data quoted by A. Grobecker [*Acta Astronaut.* **1**, 179 (1974)] from calculations by J. M. English and A. J. Broderick (Climatic Impact Assessment Program Monograph II, U.S. Department of Transportation, Washington, D.C., in press).
13. N. Sundararaman, D. St. John, S. Venkateswaran, in preparation.
14. The erythral efficiency function used here was taken from P. Cutchis [*Science* **184**, 13 (1974), figure 8].
15. This research was supported as part of the Climatic Impact Assessment Program by the U.S. Department of Transportation through contract No. AT 11-1-2249. Computer time was provided by the Goddard Institute for Space Studies, New York, through grant NGR 22-009-727 from the National Aeronautics and Space Administration.

Technology Observed: Attitudes of a Wary Public

Supportive of science yet guarded about technology, the public is uneasy about future technological developments.

Todd R. La Porte and Daniel Metlay

The relatively recent prominence given to issues concerning the environment, notably the debate on supersonic transport, and to the so-called energy crisis reflects a growing uneasiness about technological matters among a generally acquiescent public. There no longer appears to be a broad consensus on the automatic benefits of technological development; its consequences are increasingly perceived as problematical. This new situation could affect both scientists and engineers in terms of the legitimacy accorded their work, the limits within which they may do it, and the level of resources made available for it. For even though a direct relationship between public attitudes and the way decision-makers behave is difficult to establish, the public's mood does create boundaries within which officials generally act.

This article presents findings concerning the public's attitudes toward tech-

nology and science which suggest that considerable refinement of our past generalizations is necessary. Evidence suggests that (i) the public makes a distinction in their evaluations of the outcomes of scientific work and technological work; (ii) the public's reaction to the impact of technology upon society is one of wariness and some skepticism; (iii) the public applies a rather wide range of sometimes contradictory values to its evaluation of technology; (iv) the public has a distrust of the institutions associated with decision-making in technical policy areas; and (v) a clear element of political ideology is present in the evaluations of technology made by an important segment of the public.

Only recently has there been sufficient evidence concerning potential public uneasiness about science and technology to stimulate systematic attempts to gauge prevailing opinion on these

matters. Most commentaries on these attitudes have been largely impressionistic. They note that the "golden age" of science and technology has passed. They agree that the widespread conviction about the inevitable benefits to come from scientific advance (a conviction pointed to as early as 1830 by de Tocqueville as imprinted on the American genius) has been severely eroded. Edward Shils sums up the case (1):

Whereas it was once believed that every new technological possibility was automatically and inevitably beneficial, the great achievements in outer space [among others] have helped to dim the light once cast by technological progress. . . . Science, engineering and technology have all become amalgamated into a single entity which is conceived as a source of damage and costly waste. The research workers, engineers, military men, industrialists, and politicians are seen as homogeneous groups with each section pursuing its own advantage at the expense of the rest of society.

This slackening in public approval has been attributed to a number of factors. Robert Morrison, for example, cites the distrust of the way power holders manipulate the world; the concern over maldistribution of resources; anxiety about the ethical implications of further technological advances in some areas of medicine and the biological sciences; and growing awareness that much scientific research lacks social relevance (2). The picture of the public mind presented in such commentaries

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Table 1. Should science and technology be controlled?

Statement*	Strongly agree		Agree-disagree		Strongly disagree
	1	2	3	4	5
	<i>Science</i>				
1. Allow studies; obtain future benefits	54.2	32.1	3.8	5.9	4.0
2. Science good, use of science bad	45.9	29.0	5.4	13.5	6.6
	<i>Technology</i>				
3. Control invention and life worsens	14.7	22.5	11.0	29.8	21.9
4. No interference with right to buy justifiable	18.1	26.8	8.3	27.1	19.6
5. Insufficient knowledge for regulation	21.4	25.1	10.8	27.4	15.3

* The full wording of the statements for agreement or disagreement were as follows: 1. Unless scientists are allowed to study things that don't appear important or beneficial now, a lot of very beneficial things probably won't ever be invented. 2. Basically all scientific discoveries are good things; it is just how some people use them that causes all the trouble. 3. Any attempt to control which inventions are widely produced or made available will make our lives worse. 4. No one should attempt to regulate which inventions are produced because it interferes with the individual's right to decide what he wants to buy. 5. No one should attempt to regulate which inventions are produced because they do not know how to do it. All data are expressed as percentages (percent across; $N = 980$). Those expressing no opinion ranged from 1.5 to 2.0 percent for statements 1 and 2, and from 4.1 to 5.6 percent for statements 3 to 5.

is painted in tones of suspicion and guarded pessimism. Cognizant of this decline in the prestige of science, still other writers appeal for circumspection lest negative public reaction lead to "harmful restrictions on all scientific research" (3).

But a somewhat different picture emerges from reports of recent work done by public opinion researchers (4-6). That the scientific community, and other interested publics, have fallen victim to "quick overgeneralization and grand simplifications as to the scope, source, and direction of anti-science sentiments" (4) is the finding of at least two studies (4, 5). These reports note that (i) most people feel that science and technology have made life better; (ii) the prestige of scientists and engineers is relatively high; and (iii) there is a high degree of confidence in the ability of science and technology to solve a wide range of social problems. The conclusion invited by such findings is that the American public is generally friendly toward the scientific community and that scientists and engineers may proceed with at least cautious optimism about the public fate of their activities.

That conclusion is predicated on the assumption that the public makes no distinction between science and technology and, further, that if the public generally is friendly toward scientists, then technologists—those who implement technological systems—need fear no animated opposition (7). But although a single web of logic and theory undergirds both scientific knowledge and technological implementation, our appreciation of their sociopolitical contexts is not enhanced by attributing to the public at large an implicit melding of their social effects.

Public opinion data do not speak for themselves. What they say depends upon the questions put to them. In the study reported here we sought answers to questions about the "general climate . . . for the development and use of scientific knowledge" and about the "choice of ends" to which they are directed (5, p. 96). Our findings suggest that the themes of available systematic studies as well as of the more pessimistic impressionistic accounts must be somewhat modified. They also tell us that equally misleading is the charge that those who are uneasy about or hostile toward technology are antirational or anti-intellectual. To accept this claim does nothing to assist in the discovery of what may be behind such antagonisms or to determine whether they are justifiable.

The Study Context

As part of a larger study of technology and social change, we set out in 1972 to probe public opinion on a wide range of technology-related topics. Accordingly, a survey was commissioned to gather information on the perceived importance of technology as a feature of social change; on criteria considered important in technology assessment; on approval or disapproval of 12 specific future technological capacities; on perceptions of technology's effects on the quality of life; and on attitudes toward scientific work as distinguished from technology. Using a multistage sampling design, we interviewed 980 adult Californians.

Since most policies with respect to science and technology are national in scope, the question of the generality of

our results should be raised; for strictly speaking "the public" referred to in what follows is the California population. However, that we can have confidence in the generality of the data we collected is indicated by national estimates of demographic characteristics such as age, income, sex, race, and occupational distributions obtained from the 1970 census: these estimates deviate no more, and usually somewhat less, than 4 percent from the California profiles. On only one characteristic, education, do national averages differ significantly from California's. The percentage of Californians (31.4 percent) with at least 1 year of college education is about 35 percent greater than the national average (23.3 percent). This slight skewing of educational distribution extends to our sample as well; 47 percent had at least 1 year of college. This higher education level suggests that Californians in general and our sample in particular may be, on the average, more likely than respondents in a national sample to be informed about science and technology. Over a wide range of attitudes we found no significant difference, however, among groups with different educational attainment (8, 9).

Moreover, when we compare our survey to that recently sponsored (5) by the National Science Foundation (NSF), several items common to both surveys show a reasonably high degree of correspondence in distributions (10). In short, evidence available from indirect indicators concurs that California does not deviate from the rest of the nation in important ways with regard to attitudes toward science and technology. Indeed, since the population of California is nearly one-tenth that of the entire United States and since its economy includes a large proportion of the total scientific and technological work done in this nation, our findings may have greater policy relevance than would be the case for data gleaned from any other single state or region.

Research in public opinion is beset with some formidable measurement problems. The data gathered are "opinions" and as such may be transiently held, possibly changing with time and circumstance. This may be particularly true when the attitudes examined are not central to the person interviewed; such is often the case with the data gathered here. In addition, the opinions measured may not be founded on correct factual information; thus, they can be altered by additional information

educational efforts or other means. Nevertheless, if we are interested in what the public at large thinks of science and technology, this technology with all its limitations is the only one available.

II Perceptions in Technology

Over the past 10 years an increasing amount of work has purported to describe some of the social effects of technology on people's lives, outlook, and values (11, 12). Some observers have argued that technology has become a source of disquieting changes in the human condition and that it (and science) is running rampant, beyond control. This argument is perhaps most strongly put by Jacques Ellul in his description of the "technological phenomenon," a pervasive situation where decision-making processes are so structured as to admit of only one outcome rather than the rather blind, never-ending implementation of new techniques (12). If such misgivings were widespread they would provide a milieu in which the control of science as well as technology could be sought. But such a situation hinges on a general public belief that scientific discovery and consequent technological implementation are nearly indistinguishable aspects of a continuous process.

Table 1 presents data related to several aspects of the public's evaluation of the social roles of science and of technology. For the purpose of this survey, we have chosen to define science and technology as follows (7): Science is, implicitly, the activity of discovering new knowledge and includes the development of prototype inventions. Technology, on the other hand, is the activity which leads to the widespread availability of products based predominantly on such scientific knowledge. The data show that there was considerable agreement that scientific activities are intrinsically beneficial and should not be controlled, but that the use to which scientific knowledge is put can make trouble. They also demonstrate that the standard defenses of technological autonomy are rejected by a substantial fraction of those interviewed. More people disagreed that regulating technology would affect the quality of life adversely than those who believed it would. Again, more people felt that the advantages of regulating technology outweighed the benefits of a laissez-faire approach. Interestingly, the sample was

Table 2. How disenchanted are people with technology?

Statement*	Low disenchantment		Inter-mediate	High disenchantment	
	1	2	3	4	5
	1. To go back to nature desirable	32.3	24.6	8.7	22.1
2. Life too complicated	24.5	33.3	8.0	24.3	10.0
3. Overdependence on machines	9.2	12.8	5.7	34.3	38.0
4. Technology can solve problems	5.5	10.3	5.2	30.9	48.3

* The full wording of the alienation-confidence statements was as follows: 1. It would be nice if we would stop building so many machines and go back to nature. 2. Technology has made life too complicated. 3. People have become too dependent on machines. 4. People shouldn't worry about harmful effects of technology because new inventions will always come along to solve the problems. All data are expressed as percentages (percent across; $N = 980$). The numbers of people expressing no opinion ranged from 1.5 to 2.6 percent.

almost evenly split with respect to judgments about whether or not the regulation of technology was possible. Taken together, these data imply that the public at large does not find the outcomes of scientific activity a problem. Rather it is the outcome of technological implementation—that is the source of concern, thereby creating a potential both for the demand and for the expectation that those outcomes should be regulated. A plausible corollary to these findings, somewhat at odds with other survey research, is that if the public came to see science and technology as indistinguishable on the practical level, the very large consensus favoring unregulated scientific activity might diminish rapidly.

Alienation and Confidence

Uneasiness about technology can have a more nearly Luddite character: the belief that further techno-industrial advance will result in net social loss. Expressions of longing for a return to nature or to a more simple life unencumbered by machines typify that troubled attitude as, to a lesser extent, does reduced confidence in technology's power to solve man's problems. People most disenchanted with technology tend to accept these notions. Table 2 presents the pattern of responses to four questions probing the degree to which the "alienated" attitude they convey is held by the public. It shows opinion to be divided on the desirability of returning to a more natural state and on whether life has been made too complicated by technology. While a little over half of those questioned did not agree with those notions, a third of the sample did. Thus, although the typical notions associated with technological alienation did not predominate among our sample, they were accepted by a strong minority.

More clearly evident were attitudes expressing a limited confidence in tech-

nology. Strong majorities, over 70 percent, agreed that we had become too dependent upon machines and that it is not sensible to expect technology to develop solutions to problems caused by technological development. These relatively high percentages seem to signal deep wariness about overdependence on or overconfidence in technology as a means for dealing with social problems associated with technological development. Perhaps more significant is the fact that only 5 percent expressed no "disenchanted" sentiments, 70 percent expressed at least two, and 50 percent three or four such notions.

In a sense, the data in Tables 1 and 2 provide evidence that Ellul's vision of a populace enamored with technique and unable to resist technological development for its own sake does not hold for our sample. An undercurrent of skepticism about dependence on technology does restrain wholehearted enthusiasm about its effects, and it is likely that if such skepticism grows, so will pressures for regulating technical development.

Technology, Past Benefits, and Value Criteria

Against this background, what can be said about the public's evaluation of specific existing technological developments? Our sample was asked to indicate whether each of five such developments have made life in general better or worse. The technologies in question were highly visible ones, widely implemented and quite well known to most people: household appliances, automobiles, automated factories, the space program, and atomic weapons. These things formed a measure of respondents' overall evaluation of present technology (13).

Figure 1 presents the distribution of this index. It reflects a distinctly positive evaluation of present technology

and is consistent with the results of the NSF survey (5). The data, therefore, show positive public response to past and present technological development, overlaid with a set of concerns about the more general consequences of that development. This combination of attitudes appears to reflect a tension in values, visible in the priorities held by the public which determine whether a technological development is "advantageous."

Respondents were asked to rank a number of social values—ranging from highly utilitarian values to more humanistic and egalitarian concerns—and to indicate the importance they should be given in evaluating technology's impact. Not unexpectedly there was no strong consensus on what values should be given priority. Yet a relatively high degree of support was expressed for a wider range of priorities than simply the economic values of employment and taxes which are often presented as the basis for decisions on technology-related public policy. Table 3 presents the percentages of respondents indicating what values were considered "extremely" important, as well as the average rank accorded them by the whole sample.

Not surprisingly, the impact of technological development on employment

was ranked as the most important consideration, though pollution effects drew the highest percentage of "extremely important" designations. Perhaps the most interesting result is that four of the seven values were believed to be extremely important by a majority of the sample. That the public considers a wide-ranging combination of values to be important criteria for evaluating the consequences of technical development complicates both the activities of technologists and the task of policy-makers, for some of these values seem clearly to be in tension. (Notably, neither the importance of the U.S. image abroad nor leisure time struck a particularly responsive chord in the public.)

Thus our data show that a plurality of the public seems to approve of the regulation of technology, that many more desire a wide range of values to be taken into account in its implementation, and that in varying degrees an uneasiness about the social consequences of this implementation is present. Now we ask what level of confidence our public expressed in the technology-related decisions made by its institutions of governance. The degree to which it regards those engaged in decision-making as legitimate provides an approximate answer.

Technology and Decision-Makers

Six situations in which decisions are made about how to implement a particular technology were set before respondents (14). The respondents were then asked to indicate which of eight actors or institutions would actually have the most (and the least) say in making each kind of decision (15). In addition, our respondents were asked to indicate who ought to have the most (and least) say in the same decisions. Estimates were then made of the degree to which the respondents felt that those actors whom they saw as actually making the decisions in these various technical areas were, in their opinion, really entitled to do so. Similarly, the degree to which respondents saw illegitimate involvement in decision processes can be estimated.

The specific results varied somewhat from one decision area to another, but several consistent patterns emerged. (i) Technical experts rated highly; they were seen as exercising legitimately a great deal of influence over decisions in each of the technical areas. (ii) Top government leaders drew considerably less support. Those interviewed perceived government leaders to be involved in all six areas, but in only two, space travel and military uses of space, was their presence seen as warranted. (iii) Business leaders received little or no confidence from our sample. While they were perceived to be influential in four of the six areas, they were not welcomed in any of them. (iv) The public saw itself as the "actor" most entitled to be involved in all decision areas in question. At the same time it saw itself as accorded least access to them—again in all six areas.

These data are consistent with a number of recent findings. Certain Harri Poll results have shown that the public places "a great deal of confidence" in scientists and engineers; the NSF-sponsored study (5) indicates that a substantial minority feels that "the degree of control which society has over technology should be increased." And market polls show a significant increase in the public's distrust of all public and private institutions. Apparently the institutions established to represent the values which people want used as criteria for decisions to be made about technology use have not kept up public confidence. At the same time, technical experts, scientists, and engineers, have been able to maintain it, at least until now, even

Table 3. What are the important values to be considered in the implementation of technology?

Goal	No. who considered goal of "extreme" importance (%)	Mean ranking	Standard deviation	N
To increase employment	60.6	3.00	1.55	933
To reduce pollution	72.3	3.16	1.74	929
To make life enjoyable	47.0	3.33	1.99	929
To reduce taxes	56.3	3.71	1.91	933
To improve the lot of poor people	59.7	3.76	1.69	929
To improve the U.S. image abroad	32.6	5.05	1.71	931
To increase leisure time	17.8	5.96	1.41	929

Table 4. Attitudes and characteristics of the "potential public" for technological politics.

Index	Matrix of association (Pearson's r)							
	1	2	3	4	5	6	7	8
1. Evaluation of technology								
2. Confidence in technology	.302							
3. Alienation from technology	-.402	-.349						
4. Effect on standard of living	.273	.279	-.255					
5. Public under-representation	-.311	-.229	.207	*				
6. Party/ideology	-.348	-.256	.358	*	.328			
7. Age	.211	.270	-.289	*	*	-.303		
8. Pollution rank	*	*	-.234	*	*	*	*	
9. Regulate technology	*	*	.300	*	*	*	*	*

* Correlation coefficients below $\pm .2$ and not significant.

the face of apparently substantial trust of the technological decision-making processes themselves.

This public confidence seems a signal accomplishment for the scientific and technological communities. It may rest on the public's perception of the technical expert's role as a man of knowledge; he is viewed as competent. Similarly, people's distrust of business and government could be a reaction to what they perceive as the inability of these groups to get things done correctly; that they consider failure on the part of businessmen and politicians to meet public commitments they may attribute simply to incompetence.

An alternative explanation can be found in the distinctions noted by Herbert Simon between factual and valuational premises as components of decision-making (16). The ability to render a competent decision requires actual knowledge. A person's knowledge about a decision situation legitimizes his involvement in it; hence, as we have just noted, the trusted stature of technical experts in the public's mind. But valuational elements also are an integral part of any decision process. Advocating certain social values, political and business leaders claim the right to participate in decisions on technological issues. In so doing—in setting goals and establishing priorities—they are expected to reflect the public's value interests; otherwise, they lose that right and their involvement in technological decision-making will begin to be considered invalid. That those interviewed in our survey evinced just such a mistrust of business leaders and government officials opens doubt that these decision-makers were really representing the public's value preferences. At the same time, the public clearly accorded itself legitimacy to participate in decisions on technological matters while feeling far removed from any access to the decision process.

These findings have direct implications for scientists and engineers: (i) As opposing value preferences continue to compete in the decision process, the scientific and technological communities will almost inevitably be drawn deeply into political controversy. Technical experts could be pressed to represent social values as well as to provide factual information for policy decisions (17). (ii) That members of the public are seriously disquieted about the existing decision processes related to technological development could result in

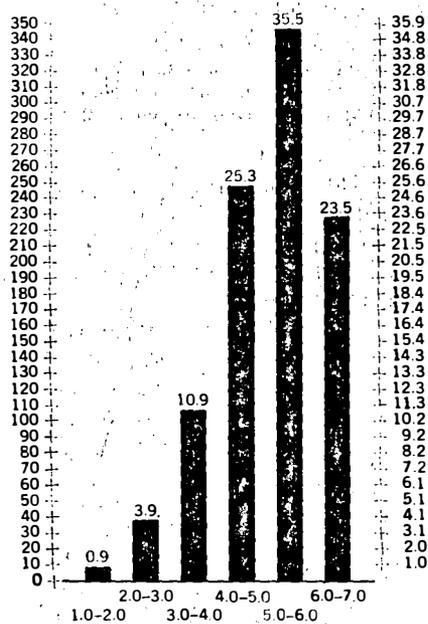


Fig. 1. Frequency distribution of Guttman index of evaluations of implemented technologies (mean, 4.846; variance, 2.100; standard deviation, 1.449).

strong pressure for its public control. (iii) Should that occur, and should the public begin to link scientific discovery determinantly to the negative effects of technology, the relative autonomy of science could diminish.

Technology and the Potential Public for Political Action

Whatever the public's attitudes, they are not likely to become the basis for public policy unless crystallized into articulate demands for change. Efforts to voice demands, to organize pressure for or against policies and political candidates come only from those portions of the general population motivated to action. Those people most likely to become involved in activities calculated to prompt policy action on technology-related matters we shall call here the "potential public" for technological politics (18).

Certain aspects of social life seem a priori to make people aware of and interested in policy for science or technology. More highly educated people, people who have voted in past elections, and people who hold jobs closely involved with some type of technology are likely to number disproportionately among the citizenry concerned with such policy. To the extent that the public enters into controversies involving technology, participants and leaders

in the debate are likely to come from the segment so described. To the extent that decision-makers monitor public attitudes, they will feel the views of this potential public disproportionately. How then did our respondents feel about the social effects of technological development?

Using the factors noted above, we developed a scale by means of which respondents scoring on its upper half were designated the potential public. Thirty-one percent of the sample (303 respondents) fell into this group. This number represents a fairly substantial proportion of our total sample, probably higher than the putative national figure, because of the higher education level of Californians. Comparison of the potential public with the remainder of the sample showed that the only major differences in demographic and political characteristics were that the potential public was somewhat younger, made several thousand dollars more per year, and on the average had 2 more years of education (about 2 years of college). While the potential public was a bit more "pro-technology" with respect to the variables reported above, the differences were too small to be substantively significant (19). In short, the potential public for technological politics is generally similar to the rest of our sample over a wide range of opinion.

A very interesting difference between the potential public and the rest of the sample, however, is the degree to which their attitudes are interrelated. For those not included in the potential public, most attitudes appear to be haphazardly organized. That is, they display no consistent pattern of internally coordinated opinion. But the potential public does exhibit a patterned and cohesive set of attitudes toward the outcomes of scientific work and toward technological activities. While we do not wish to suggest that the attitudes of the larger group are unimportant, its relatively random responses do indicate that it is not likely to be a source of much criticism. The issue area apparently lacks salience for these people. They are therefore likely to be acquiescent to policies governing technology, unless of course they are personally confronted with visible outcomes of such policies or lack of such policies as was the case for gas station owners, truckdrivers, and others during the recent fuel distribution emergency.

Nine indices were used to analyze relationships among this potential public's

Table 5. Regression coefficients from the "potential public," calculated for primary attitudes and other factors.

Index	Evaluation	Confidence	Alienation	Living standard	Representation	Party	Age	Pollution	Regulation	R
Evaluation of technology		.11	-.20	.15	-.16	-.17	*	*	*	.57
Confidence in technology	.11		-.24	.17	-.10	*	.15	*	.17	.49
Alienation from technology	-.18	-.21		-.11	*	.18	*	-.15	.24	.60

* Not significant at $P < .05$. The standard error in all instances ranged from .05 to .06; for regression, $N = 262$.

attitudes: (i) a technology evaluation index, as described in Fig. 1; (ii) an index of confidence in technology, composed of the last two items in Table 2; (iii) an index of technological alienation, in which we used the first two items in Table 2; (iv) an index of an effect on standard of living, indicating the degree to which it was believed that there would be "a decline in the standard of living if there were less technological development"; (v) an underrepresentation index, summarizing the degree of perceived illegitimate exclusion of the public in the decision-making process for three forms of public technology—rapid transit, military technology, and space exploration; (vi) pollution rank, indicating the importance placed on environmental concerns compared with other criteria; (vii) an index of technology regulation, in which we used the last three items in Table 1; (viii) age; and, (ix) a six-point scale combining party and ideological identification ranging from "liberal Democrat" to "conservative Republican" (20).

Our primary interests here are those attitudes toward technology which fall into three areas of opinion: (i) attitudes associated with evaluations about specific benefits of present technology; (ii) attitudes associated with confidence or lack of it about depending on technology to solve social problems; and, (iii) attitudes related to a feeling of disenchantment with, or alienation from, some of the general conditions prompted by technology. Such opinions would indicate how the potential public sees specific uses of technology for the near future and what its feelings are about the longer term, broader consequences of technological development.

The data show that the potential public, like the entire sample, was generally positive about the benefits of present technological development: over 65 percent indicated that these developments had been appreciably beneficial, while only 16 percent believed that they had not been. There was much less confidence in the idea that our depend-

ing on technology as a solution to present problems is sensible: only slightly over one-third (35 percent) felt quite sure that it is sensible, while almost half (49 percent) felt that it is not. Finally, while the feelings of the potential public did not extend to widespread alienation by the more general conditions prompted by complex technologies, 45 percent reported some sense of alienation.

The first three indices display a consistent set of relations. Table 4 shows that those who regarded present technology as beneficial also tended to express confidence in technology and to hold fewer alienated attitudes. Similarly, those who expressed confidence in the efficacy of technology also expressed less disaffection. Each of these indices had other correlates. Those people who positively evaluated present technologies also tended to believe that technology is necessary for maintaining our standard of living ($r = .273$) and to be less inclined to feel that the public is underrepresented in decisions about government-supported technologies ($r = -.311$). People who gave positive evaluations were, notably, somewhat older ($r = .214$) than those who did not and, probably associated with this age factor, they were relatively conservative politically. The intervening variable of ideology correlates ($r = -.348$) with the positive evaluations. The degree to which our respondents were confident or dubious about depending on technology for solving problems displayed a similar set of associations. For this variable, however, we observe a somewhat stronger relationship with age and a bit less pronounced association with political ideology.

The more general attitudes which we have summarized as a feeling of "alienation"—attraction to the idea of a less complicated and more natural world—were associated with the greatest number of other attitudes. Those who tended to express a disaffection toward technology also tended to put a lower evaluation on the benefits of technological

development and to have less confidence in technology as a problem solver. They were also more skeptical about the necessity of technological development for the sake of maintaining present standards of living ($r = -.255$) and were concerned about public representativeness in technological decision-making ($r = -.207$). In addition, their alienation was related to the conviction that the effects of pollution should be more taken into account whenever technological decisions are being made ($r = -.300$) and, perhaps more significantly, to an increasing propensity to consider seriously the need for regulating technology ($r = -.234$). Those tending toward feelings of alienation were relatively young ($r = -.289$). This age factor was probably associated with their partisan and ideological persuasions for they were also preponderantly Democratic and liberal ($r = -.358$). Thus in the potential public a number of attitudes based on judgments about the relationship of technology to economic well-being, on concerns for the environment and for democratic decision-making, and on approval of regulation of technology were consistently related to a more generalized condition of technological dissent.

To complete our analysis, regression coefficients were calculated for the primary factors to determine the proportion of variance explained by the set of attitudes discussed above (see Table 5). Some of the associations considered in Table 4 proved to be dependent upon an intervening variable. Nevertheless, age, political differences, dissatisfaction with decision-making, and value judgments remain important predictors of attitudes toward technology (21).

Summary

Our analysis of the interviews with a sample of the California public about a range of their attitudes toward technology shows that a modification of our understanding of the collective state of

mind on this subject is in order. The current assessment of the public as largely, and somewhat vacantly, enamored with science and technology does not hold. Nor does a picture of a public generally hostile and alienated by technology. Neither panglossian optimism nor prophecies of doom can be supported by these interviews. Rather a more mixed picture emerges. Out of that picture, a potential public can be isolated, whose mood it behooves science policy-makers to watch. This group tends to associate a number of related conditions with technological development; moreover, it is likely to make assessments on those relationships so perceived.

To the degree this group has "anti-technological" feelings, these feelings are clearly linked to the group's awareness that the social consequences of technology can produce conditions which threaten important values. The particular distribution of age and political identification suggests that those who are young and who identify themselves as "liberal" form the core of potential opposition to technological development and that such opposition is at least in part a function of different value preferences. The associations between political identification and attitudes about technology, distrust of decision-making, and concern for environmental impacts all make this point. In short, "technological dissent" cannot be written off as anti-intellectual and without foundation. It is, in fact, preeminently sensible.

What the alignments visible within the potential public portend for the future is not clear, although they do not allow us to accept an inference drawn from past studies—that because the young retain confidence in scientists and engineers all is well for the general climate of science and technology. We can only speculate whether, as these younger people grow older, they will carry their uneasiness about technology with them. Were they to do so, and were this group to be joined by still younger people who also hold these wary attitudes, the context of scientific and technological work could become much more fraught with political controversy. Another point emerging from our interpretation is how very crucial to continued free scientific inquiry is the distinction between scientific work and technological activities apparently now made by a sizable portion of the public. Should this distinction become

lost, perhaps through continual merging of science's role with technology's by the popular press, attitudes now mainly associated with technology could spill over to scientific research as well.

Yet our data also provide evidence of the successes of the scientific and technological communities. They have become such a critical part of life that people are seriously concerned with their future development. The opportunity is present for both communities to find ways of responding to the situation so that thoughtful action can be taken to implement technology for the benefit of the commonweal.

References and Notes

1. E. Shils, in *Civilization and Science: In Conflict or Collaboration?* CIBA Foundation Symposium (Elsevier, Amsterdam, 1972), p. 42.
2. R. Morrison, *Science* 165, 150 (1969).
3. P. Abelson, *ibid.* 173, 285 (1971).
4. A. Etzioni and C. Nunn, *ibid.* 181, 1123 (1973). See also *Science Indicators* (5, pp. 96-100).
5. National Science Foundation, *Science Indicators* (Government Printing Office, Washington, D.C., 1973).
6. For a review of other studies relating to public attitudes toward technology, see G. R. Funkhouser, *Public Understanding of Science: The Data We Have*, Workshops on Goals and Methods of Assessing the Public's Understanding of Science (Materials Research Laboratory, Pennsylvania State Univ., 1972); and I. Taviss, *Technol. Culture* 13, 606 (1972).
7. Our conceptions of science and technology include both the definition of their activities and the people who are mainly engaged in carrying them out. The definitions in both cases are familiar; see J. K. Fiebleman, *Technology, Culture* 2, 305 (1961); and C. Mitcham and R. Mackey, Eds., *Philosophy and Technology* (Free Press, New York, 1972). The people who animate science are, of course, scientists. Technology is carried out by engineers, architects, physicians, and technical experts of many kinds.
8. Other evidence bearing on the question of educational level and opinion response is mixed. Devine (9) reports no systematic differences between high and low educational groups on a range of policy questions, while others do find some differences of opinion [see, for example, S. Verba and N. Nie, *Participation in America* (Harper and Row, New York 1972)].
9. D. Devine, *The Attentive Public* (Rand McNally, Chicago, 1970).
10. In particular, *Science Indicators* (5) contains four questions that were designed to probe dimensions which we also examined in our California study: (i) the relative prestige and confidence adhering to a number of professions including business people, scientists, engineers, and national legislators; (ii) the need for increased social control of science and technology; (iii) the benefits of a number of technical capabilities including space exploration, military technology, health care, and mass rapid transit; and (iv) evaluation of present technologies. On the first three variables, both studies uncovered similar attitudes. Small differences are evident, but these could be attributable to method variance or sample error. On the fourth variable, much the same concordance is observable, though the California sample is somewhat less favorable to present technology than is the national sample. But, again, the differences could be due to measurement method: Our study used a scale of questions to measure the respondent's evaluation, while the NSF study simply asked the subject, "Have science and technology changed life for the better or for the worse?" Interestingly, however, if we cross-tabulate response on this variable with

such demographic characteristics as race, education, sex, income, and age we find the same general patterns emerging in both studies.

11. See especially Ellul (12); H. L. Neiburg, *In the Name of Science* (Quadrangle Books, Chicago, 1966); V. Ferkiss, *Technological Man: The Myth and the Reality* (Braziller, New York, 1969); L. Mumford, *The Myth of the Machine*, vol. 1, *Techniques and Human Development* (Harcourt Brace, New York, 1967); W. Sypher, *Literature and Technology: The Alien Vision* (Random House, New York, 1968). See also, J. D. Douglas, Ed., *The Technological Threat* (Prentice-Hall, Englewood Cliffs, N.J., 1971); M. Brown, Ed., *The New Technology and Human Values* (Wadsworth, Belmont, Calif., 1966); P. Goodman, *The New Reformation: Notes of a Neolithic Conservative* (Random House, New York, 1970); and L. Winner, *Public Policy* 20, 35 (1972).
12. J. Ellul, *The Technological Society*, translated by J. Wilkinson (Knopf, New York, 1956).
13. While the choice of these technologies was arbitrary we feel that they reflect the variance of opinion concerning technologies and that they are suggestive of the broad notions of technology seen as capability. These pre-suppositions were supported by the fact that the five items form a well-defined Guttman scale and when factor-analyzed they loaded strongly on a single factor. The scale had a coefficient of reproducibility 0.93, Menzel's coefficient of scalability is 0.67.
14. These included decisions on the regulation of energy consumption, mass public transportation, genetic engineering, data banks, and civilian and military uses of outer space.
15. These were congressmen, executive branch officials, the courts, consumer groups, business leaders, technical experts, the public in general, and no one.
16. H. Simon, *Administrative Behavior* (Free Press, New York, 1957), pp. 45-60. See also J. Thompson, *Organizations in Action* (McGraw-Hill, New York, 1967), pp. 134-149.
17. While this could conceivably occur we do not suggest that technical experts would be more able than any other group to do so with extraordinary effectiveness.
18. Our reasoning closely follows the arguments of those who distinguish between the generally uninvolved public and those who, by virtue of their education or personal association with issues, or both, are aware of them and hence likely to be motivated to act on them. See P. Converse, in *Ideology and Discontent*, D. Apter, Ed. (Free Press, New York, 1964); G. Almond, *The American People and Foreign Policy* (Praeger, New York, 1960); and Devine (9).
19. Even an *F*-test was just barely statistically significant at $P = .05$ for many of these variables.
20. The items for each index constructed loaded strongly on only one factor when the principal components solution was rotated to a varimax solution.
21. The most important cases were the relationship of age and party or ideology to technology evaluation and alienation on the one hand and to confidence in technology on the other. In the former case, the relationship has party or ideology intervening between age and the attitude in question. In that instance age does not have an independent effect; it disappears when party and ideology is controlled for. In the latter case, age has an independent effect which remains even after controlling for party and ideology. No attempt was made to develop a causal model because of the likelihood that the three major attitudinal variables are reciprocally related, a condition which would make any causal model underidentified.
22. This project was supported by the Ames Research Center, NASA (grant 05-003-0471). The scope of the survey was broadened by additional assistance from the International Technology Assessment Program, Institute of International Studies, University of California, Berkeley. The staff of the Institute of Governmental Studies assisted ably in this and several earlier studies related to the survey. We gratefully acknowledge the comments of Kai N. Lee and Miry Fenneman on earlier versions.

October 4, 1976

Mr. David Unell
10301 I10 Service Road, A150
New Orleans, Louisiana 70127

Dear Mr. Unell:

Governor Carter has asked me to thank you for your letter of July 22 regarding the space program. Our staff is currently working on this particular subject and will be reporting to Governor Carter soon. Your concerns will be of help to him in further developing his policy positions.

Thank you again for writing and we hope for your continued support for Governor Carter and Senator Mondale.

Sincerely,

Noel J. Sterrett
Science and Technology Coordinator
National Policy and Issues



Space
Exp. Spending
Issues

7/22/76

Dear Mr. Carter,

In all the media coverage of your campaign, I've failed to see any mention of your position in regard to spending levels on the Space Program.

Since this industry creates more jobs per dollar spent than any other (per a G. A. O. study) and helps reduce inflation by technological advances, an increase in spending levels would be in order.

I regard jobs and inflation the two most important issues in today's this election.

What is your position?

(over)

Yours Truly,
David Luell

Address -

D. L. UNWELL

10301 IIO SERVICE RD.

A150

NEW ORLEANS, LA. 70127

Phone - AC 504 - 246-3943

October 4, 1976

Mr Victor Alan Ramey
Micanopy, Florida 32667

Dear Mr. Ramey:

Governor Carter has asked me to thank you for your letter of July 20. He appreciates very much your taking the time to share your views about the space program with him. Your concerns will be of help to him in further developing his policy positions on the program.

Your continued support for Governor Carter and Senator Mondale is greatly appreciated.

Sincerely,

Noel J. Sterrett
Science and Technology Coordinator
National Policy and Issues

JULY 20, 1976
MIGANOPY, FLORIDA
32667

MR. JIMMY CARTER
PLAINS, GEORGIA

DEAR MR. CARTER:

THIS LETTER IS MORE THAN A CONGRATULATIONS ON YOUR WELL-DESERVED AND UNANIMOUS NOMINATION OF THE DEMOCRATIC PARTY. BEING A SOUTHERNER OF A SMALL SOUTHERN TOWN, I FEEL EVEN MORE KEENLY AWARE OF YOUR COURAGE AND DETERMINATION TO BE PRESIDENT. AS OF THIS MOMENT, I HOPE THAT YOU DO BECOME PRESIDENT. MY SMALL CONTRIBUTION TO THE DEMOCRATIC PARTY IS MEANT FOR YOUR CAMPAIGN.

HOWEVER, I FEEL OBLIGATED TO BRING SOMETHING TO YOUR ATTENTION. IN PRESIDENTIAL POLITICS, IT IS OF RELATIVELY LITTLE IMPORTANCE. BUT, TO MILLIONS OF INTELLIGENT AMERICANS, WHAT I SAY HERE IS VERY IMPORTANT.

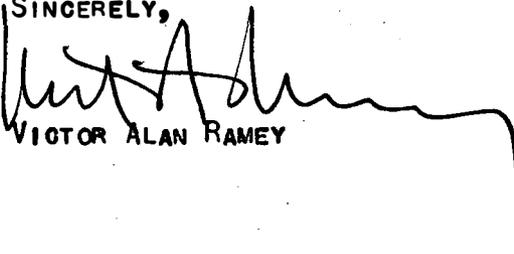
I FEEL THAT THE EXPLORATION OF SPACE CAN BE CONTINUED AND EXPANDED; AND THAT THIS EXPLORATION ~~DOES NOT HAVE TO COMPETE WITH OR DETRACT FROM PROGRAMS CONCERNING SOCIAL JUSTICE OR RE-EMPLOYMENT OR FOREIGN AFFAIRS OR ANYTHING ELSE.~~

I DARE SAY THAT THESE MILLIONS ARE DISTURBED BY THE RECENT DISCLOSURES THAT YOUR RUNNING MATE, SENATOR MONDALE, IS GENERALLY AGAINST SPACE EXPLORATION AND THAT HE FEELS THAT NASA TAKES FOOD OUT OF THE MOUTHS OF THE POOR.

I HAVE NO ECONOMIC TIES TO THE SPACE INDUSTRY OR TO THE PHYSICS OR CHEMISTRY DEPARTMENTS OF THE UNIVERSITY OF FLORIDA. I AM A SHIFT SUPERVISOR AT THE ALACHUA COUNTY DETENTION CENTER. BUT, I, WITH MILLIONS OF OTHERS, LOOK FORWARD EAGERLY TO EVERY NEW PHASE OF OUR SPACE PROGRAM. TODAY, FOR EXAMPLE, WITH THE LANDING OF VIKING I ON MARS, WE FELT GREAT EXCITEMENT, PROFOUND SPIRITUALISM AND EVEN PATRIOTIC PRIDE.

PLEASE DO NOT UNDERESTIMATE THIS POWERFUL AND DEEPLY HELD FEELING. I AM ASKING THAT YOU NOT SEEK TO DISMANTLE NASA OR THE SPACE PROGRAM, BUT TO EXPAND IT.

SINGERELY,



VICTOR ALAN RAMEY

October 4, 1976

Mr. Bobby Brant
344 Law Street
Darlington, B. C. 29532

Dear Mr. Bryant:

Your card to the "Family Weekly" has been forwarded to our office. The space program is under consideration by our staff now. If you have any input for us, please let me know.

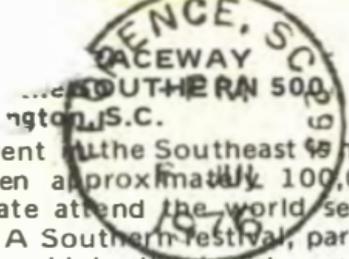
I hope you will support Governor Carter and Senator Mondale because they offer the promise of outstanding leadership -- something the people of our country want and deserve.

Sincerely,

Noel Sterrett
Science and Technology Coordinator
National Policy and Issues



D.
Starting



Greatest sporting event in the Southeast is held on Labor Day when approximately 100,000 fans from every state attend the world series of stock car racing. A Southern festival, parade and beauty contest add to the holiday event that begins on Friday before Labor Day.

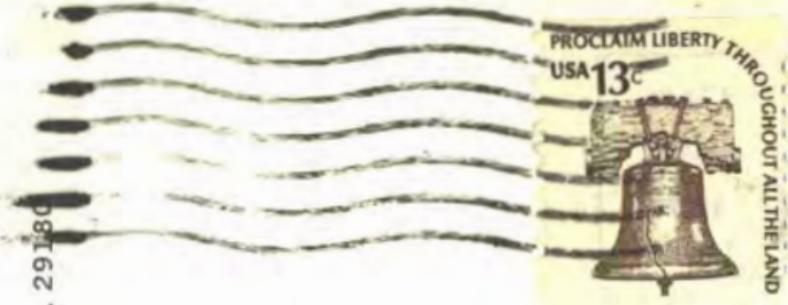
Photo Darlington Raceway

FOR JIMMY CARTER:

What is your position on space exploration? If you became President, would you advance it or cut back on it?

- Bobby Bryant
344 Law St.
Darlington, S.C.
29532

Pub. by Photo Arts, Winnsboro, S.C. 29180



Post Card

"Ask"
Family Weekly
641 Lexington Ave.
New York, N.Y.
10022

October 4, 1976

Mr. Anthony J. Asaro
368 Penn Avenue
Staten Island, New York 10306

Dear Mr. Asaro:

Governor Carter has asked me to thank you for your letter of July 22. The space program is under consideration by our staff now and we'll be reporting to Governor Carter soon. If you have any particular input for us, please let me know.

I hope you will support Governor Carter and Senator Mondale because they offer the promise of outstanding leadership -- something the people of our country want and deserve.

Sincerely,

Noel Sterrett
Science and Technology Coordinator
National Policy and Issues

Asaro

368 Penn Avenue
Staten Island, New York 10306
July 22, 1976

Govenor Jimmy Carter
Plains, Georgia 31780

Dear Govenor Carter:

I am a Physics and Earth Science teacher. Since you are a scientist, I was wonerding where you stand on developing Space Resources? As you know, the spinnoffs' from the space program have helped the United States economically, socially, medically, and politically. A good number of teacher-scientist like myself, with an interest in space, wonder where you stand on this issue. Another question relating to this: Are you a member of the NATIONAL SPACE INSTITUTE?

I am a regestered Republican, but; like your appeal and style. You appear to be an honest, sincere, good, and intellegent individual. We have not had a man in the White House like you for a long time. You seem to be a logical choice for President. I try to convince the people I come in contact of that fact.

Best of Luck with the election.-----Mr. President-----

Sincerely yours,
Mr. Anthony J. Asaro
Mr. Anthony J. Asaro

P.S. Please don't send a form letter.
Thankyou.

October 4, 1976

Mr. Colin Hunter
490 Easy Street, Apt. 9
Mountain View, California 94043

Dear Mr. Hunter:

Governor Carter has asked me to thank you for your letter of July 5. The space program is under consideration by our staff now and we'll be reporting to Governor Carter soon. If you have any particular input for us, please let me know.

I hope you will support Governor Carter and Senator Mondale because they offer the promise of outstanding leadership -- something the people of our country want and deserve.

Sincerely,

Noel Sterrett
Science and Technology Coordinator
National Policy and Issues

ISSUES DEPT
MANNED SPACE
FLIGHT

490 Easy St. Apt. 9
Mountain View, CA 94043
July 5, 1976

Gov. Jimmy Carter
Carter Headquarters
Plains, GA

Dear Governor Carter:

I am considering whether I should vote for you. I would like to know your position on the future direction of the space program, particularly the manned space program, especially the space shuttle.

I would be happy to receive a position paper, copy of a speech, or a personal letter.

Sincerely,



Colin Hunter

October 4, 1976

Mr. Douglas L. Love
208 S. Sale Street
Ellettsville, Indiana 47429

Dear Mr. Love:

Governor Carter has asked me to thank you for your letter. He appreciates very much your taking the time to share your views about the environment. Your concerns will be of help to him in further developing his policy positions.

The space program is under consideration by our staff now and we'll be reporting to Governor Carter soon. If you have any particular input for us, please let me know.

Thank you again for writing and we hope for your continued support for Governor Carter and Senator Mondale.

Sincerely,

Noel J. Sterrett
Science and Technology Coordinator
National Policy and Issues

Issues
- Conservation
- Space

Douglas L. Love
208 S. Sale St.
Ellettsville, In.
47429

Jimmy Carter & Organization
Plains, Ga.

Greetings.

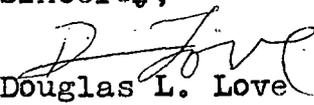
I watched your fishing party on the news the other night, and it looked like a lot of good, ecological fun until you started putting de-oxidant into the water. That could have been your fatal mistake. The environmentalists and anti-power freaks got the message that when it comes to getting the big fish, you'll do anything.

I am in environmental publishing and education. I have been accused of destroying the environment by those who do not want to understand what I am trying to do. Therefore, I would like to let you take the opportunity to tell me about these de-oxidants, their biodegradability, the amount you used vs. recommended dosages, and what it did to the ecosystem of your pond. I realize that this pond is your own private property, etc., but of course you are looking at a lease on some public property that I want to be able to trust you with.

The McCarthy in '76 committee asked me to get him on the ballot in Indiana, as I am anti-partisan. (Anti Daley, actually.) I have left off doing this, as I believe you are doing what McCarthy wants to say he's doing. But if this de-oxidant thing is as bad as it looked on TV, I might have to start getting some petitions out. I think it's going to be close, and although a few McCarthy electoral votes may go your way, anything detracting from your strength in Indiana would definitely hurt your chances against any of the boyscout-Fascists running in Party X.

While I've got your press releases coming as a response, let me know your position on the space program. Be as detailed as you can about military involvement and funding. Also, I am curious as to how much tobacco you raise.

Sincerely,


Douglas L. Love

P.S. Church looks like another nice guy. Why not run two "nice guys" for P & VP?

October 4, 1976

Dr. Louis D. Friedman
1440 E. New York Drive
Altadena, California 91001

Dear Dr. Friedman:

Governor Carter has asked me to thank you for your letter of July 15 and for sharing your views about the space program. Your concerns will be of help to him in further developing his policy positions. This program is under consideration by our staff now and will be reporting to Governor Carter soon.

Thank you again for writing and we hope for your continued support for Governor Carter and Senator Mondale.

Sincerely,

Noel Sterrett
Science and Technology Coordinator
National Policy and Issues

Issues Dept
Space Program
July 15, 1976

Governor Jimmy Carter
% Post Office
Plains, Georgia 31780

Dear Governor:

Recognizing that you are the probable next President, and your consequent responsibility to formulate the national program and policies for the next several years, this letter is being written to express alarm at a short-sighted, de facto, policy now underway. I refer to potential cessation of deep space exploration.

While, as you have undoubtedly found in your campaign, it can hardly be claimed that space exploration is a major national issue; it is hard for me to imagine a broader, more enlightening hope for an American theme. Deep space exploration, borne out of national prestige and reaction to Russian pre-eminence, offers even a greater vision to our people. It is an alternative (perhaps the only one) to war and weapon-making for advancing the technology and the aspirations of society.

It is now well established that scientific and social benefits of planetary exploration are immediate and profound for mankind. The climatology of Venus and Mars has already opened our eyes to possible Earth atmospheric evolution as a result of man's modification. Similarly, the study of Lunar, Martian, Venusian, Outer Planet satellite and Mercurian composition will undoubtedly have far reaching significance in the search and management of our terrestrial resources. But it is the economic and social significance of space exploration that requires support of your new administration.

Interestingly enough, this support does not require major new funds or programs. It does require commitment and purpose. Long term activities, like deep space exploration, can only be planned and conducted effectively if there is a feeling of commitment and purpose -- beyond the transitory ones of yearly programs. The United States now spends less than one-tenth of one percent of its budget on deep space endeavors. The economic, social, national and international benefits from our unmanned explorations have been achieved at a yearly cost less than that of a single weapons system (like the ABM, B-1, Trident, etc.).

But, since 1970 only two new planetary projects have been approved. Right now the planetary science community is looking forward to its destruction. Ironically this occurs while receiving its most exciting data ever -- but, the early 1980's will see no planetary encounters save for a single Saturn flyby four years after its 1977 launch. If the community dies then what exploration can we conduct?

Gov. J. Carter

-2-

July 15, 1976

What is required is a base of exploration. Less than \$300M/year (8% of NASA's budget, 0.1% of the nation's) would provide such a base. It would also provide the opportunity to conduct a sustaining, cost-effective and exciting adventure for humanity.

"Knowledge, more than guns or butter is the true power of modern states." These words written by Lawrence Lessing in 1964 are more true today and for the future. The American ethic of building a great future requires us to explore our frontiers, to understand our environment and to contemplate our place in the universe. This cosmic perspective of thinking is the alternative to a hidebound future. Your support of deep space exploration can and should provide impetus, purpose and benefits for mankind.

Sincerely,

A handwritten signature in black ink, appearing to read "Louis D. Friedman". The signature is fluid and cursive, with a large, stylized "F" and "D".

Louis D. Friedman, Ph.D

1440 E. New York Drive
Altadena, California 91001

October 4, 1976

Mr. Ken Denney
Route 3
Carrollton, Georgia 30117

Dear Mr. Denney:

Thank you for your letter of July 15. Please accept my apologies for the delay in responding to you.

Governor Carter appreciates your taking the time to share your views with him on the space program. As one who hopes to represent all the people of our country, he values your concerns and recommendations. They will be of help to him in further developing his policy position on the space program.

I hope you will continue to support Governor Carter and Senator Mondale. I enclose a bumper sticker per your request to demonstrate your support.

Sincerely,

Noel Sterrett
Science and Technology Coordinator
National Policy and Issues

Enc.

July 15, 1976

Jimmy Carter Presidential Campaign
P.O. Box 1976
Atlanta Georgia, 30301

Gentlemen:

I am interested in Mr. Carter's position concerning the future of the space program in the United States.

Does the nominee concur with the apparent consensus of the American people that the money used for space research and exploration would be better spent for welfare purposes?

Does Mr. Carter intend to pursue space exploration for militaristic purposes, such as orbiting weaponry?

In his administration, will there be enough of a space program so that there can be employed by that agency a large number of employees- such as aerospace engineers who have spent a great deal of money and time in school to earn their degrees in order to participate in the space program. Will these and others expert in rocketry and engineering be forced to find other jobs completely unrelated to aerospace?

For myself, I would hope that the nominee, and soon to be President Carter will not allow those who have spent a lifetime in preparation for their chosen career find that career closed to them simply in the name of better health care for the people.

If Mr. Carter intends on starting the process of the Government becoming more responsive and palatable to the people as he says, there can surely be made some room for these dedicated people who can find new technological greatness for America in a reduced bureaucracy. Surely there is a happy medium between more money for welfare and the advancement of human intelligence- through, if I may point out, a science which in itself can bring about new breakthroughs that improve medical technology and thusly the welfare of the people.

I am a supporter of Mr. Carter, and am sure that he will be an excellent President. Might I have sent to me some campaign buttons and other political paraphernalia to demonstrate my support? Perhaps two buttons, one of Carter and another of he and our next Vice- President, Mr. Mondale.

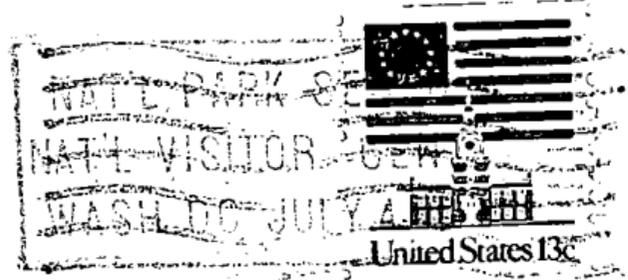
And to Mr. Carter, himself may I say, congratulations from a fellow Georgian and Democrat. Therefore: Congratulations to our thirty-ninth President in our two hundredth year!

Sincerely yours,


Ken Denney

Ken Denney
Route #3
Carrollton, Ga. 30117

DS 5455



Jimmy Carter Presidential Campaign
P.O. Box 1976
Atlanta Georgia, 30301

**System
Development
Corporation**

2500 COLORADO AVENUE · SANTA MONICA, CALIFORNIA 90406
TELEPHONE (213) 829-7511

September 10, 1976

Mr. Newell Starrett
Assistant Issues Director
National Campaign Headquarters
P. O. Box 1976
Atlanta, Georgia 30301

Dear Mr. Starrett:

I recently wrote to your headquarters regarding Governor Carter's position with regard to libraries and information science, but I didn't know to whom the inquiry should be addressed. I have just talked with Mr. Lou Lerner who tells me that you are the person who will be able to answer my inquiry.

Enclosed is a copy of my previous letter to Governor Carter. I would greatly appreciate a prompt reply since I need to address the American Society of Information Science on October 4.

Sincerely,



Launor F. Carter, Ph.D.
Vice President
Studies & Evaluation

LFC:dd

Enc.

Phoned MS

**System
Development
Corporation**

2500 COLORADO AVENUE · SANTA MONICA, CALIFORNIA 90406
TELEPHONE (213) 529-7511

September 2, 1976

Honorable Jimmy Carter
National Campaign Headquarters
P. O. Box 1976
Atlanta, Georgia 30301

Dear Governor Carter:

The American Association for Information Sciences is holding its national convention in San Francisco during the week of October 4. A symposium is being organized in which senior members of the information sciences will discuss what they believe would be the nature of federal support for the information sciences under a Carter administration and under a Ford administration. I have agreed to give my perceptions of the position the Carter administration would take. It would be most helpful if you could indicate what your position is with regard to federal support to the information sciences area.

To help focus your thoughts it might be helpful if I described the area covered by the information sciences. Generally, the information sciences includes libraries and library services, information dissemination programs, and research in information needs and methods of filling these needs. For example, the federal government has been supporting a national library program under the Library Services and Construction Act passed in 1964. The Nixon-Ford administration budgets have either been zero or extremely modest in recommended funding of this Act. However, each year Congress has appropriated approximately \$50,000,000. Would a Carter administration support the Library Services and Construction Act with similar or larger appropriations? For activities like library services, would a Carter administration favor categorical support or support through general revenue sharing?

Another area covers the major information exchanges and clearing-houses. These range from programs like the Educational Resources Information Center (ERIC) to highly technical information services regarding materials, energy programs, and so forth. Probably the best known of these centers is MEDLARS of the National Library of Medicine, which is a national computer-based on-line information system covering the medical and biological literature. Would the Carter administration increase or decrease support of such activities? Does it have any plans for integration of the presently widely dispersed information centers?

Jimmy Carter

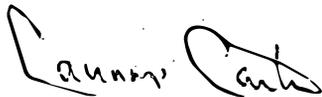
Page 2

9/2/76

A third area has to do with research and development in the information sciences. Most of the basic work in the area is supported by the National Science Foundation, but other organizations such as NASA and the National Institute of Education have also been instrumental in studying user requirements and methods of satisfying them. What would be the position of the Carter administration with respect to supporting basic research and development in the information sciences and, more broadly, with respect to the support of research and development in the broad field of science and engineering?

I am sure you will appreciate that a prompt answer to this letter would help me portray an accurate picture of your position and would certainly be more informative than my largely untutored speculations. Do I have your permission to quote from your reply?

Sincerely,



Launor F. Carter, Ph.D.
Vice President
Studies & Evaluation

LFC:dd

Ael-y-Bryn
1540 Hermitage Court
Durham, N. C. 27707

The Bevans

September 15, 1976

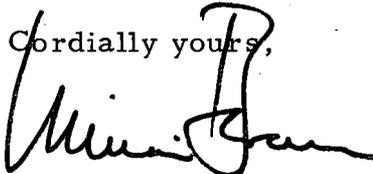
Mr. Harry K. Schwartz
National Task Force Director
Jimmy Carter Presidential Campaign
2000 P Street, N. W.
Washington, D. C. 20036

Noel: would
best look into
this, Bevan is
a task force
member
CW

Dear Mr. Schwartz:

Attached is a letter from Dr. Launor F. Carter, Vice President of the System Development Corporation. I'd be most grateful if you would see that it got to the right person for action in the Campaign organization.

Many thanks for your help in this matter.

Cordially yours,

William Bevan

WB:vr

cc: Dr. Launor F. Carter
Dr. Lewis Branscomb

Attachment

**System
Development
Corporation**

2500 COLORADO AVENUE · SANTA MONICA, CALIFORNIA 90408
TELEPHONE (213) 829-7511

September 2, 1976

Honorable Jimmy Carter
National Campaign Headquarters
P. O. Box 1976
Atlanta, Georgia 30301

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Jimmy Carter

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9/2/76

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Sincerely,



Launor F. Carter, Ph.D.
Vice President
Studies & Evaluation

LFC:dd



THE INSTITUTE OF
ELECTRICAL AND
ELECTRONICS
ENGINEERS, INC.

John

WASHINGTON, D.C., OFFICE

2029 K Street N.W. Washington, D.C. 20006 (202) 785-0017

July 30, 1976

QUESTIONS ON ISSUES OF CONCERN
TO IEEE/USAB FOR PRESIDENTIAL
CANDIDATES

This is the only question reflected in print society survey

1. The engineering and scientific societies worked actively for the reestablishment of the position of Science Advisor to the President. This was accomplished in PL 94-282, the National Science, Engineering and Technology Policy and Priorities Act.

Will you instruct your Science Advisor to actively seek the input of the engineering and scientific societies on national policy questions where an engineering and scientific input would enhance the decisionmaking process?
2. Reduction in the Nation's research and development efforts in recent years has threatened our historic position of world leadership. Total R & D funding fell to 2.3% of GNP in 1974, while the reduction in Federal support of R & D has dropped from 2% of GNP in 1964 to 1.2% in 1974. Would your administration support increased Federal support ~~_____~~ to strengthen this country's position in research and development?
3. Engineers believe that corrective actions and positive programs are required now to avert a second and more severe energy crisis. As a method of avoiding such a crisis, will your administration support the establishment of a comprehensive and coordinated national energy program designed to reduce the Nation's dependence on foreign sources of fuel?
4. Would your administration support the amendment of the Service Contract Act of 1965 to cover professional employees who have suffered under the current wage ~~_____~~ tactics of NASA contractors?

*ENERGY
FEDERAL R & D
PENSION & TAX REFORM (most ARE NEVER WITH AN ORGANIZATION LONG ENOUGH TO VEST)*

5. Employed engineers and scientists who invent are generally required to convey all patent rights to their employers - usually without any significant participation in the financial return from the invention. Would your administration support an amendment to current Patent Law (Title 35, U.S. Code) that would improve the financial benefits to the employed inventor whose employer realizes a substantial saving as a result of the invention?

6. Under the Age Discrimination Act of 1967 the burden of proof of discrimination is placed on the individual. This in turn forces him to bear the legal fees as well as possible reprisals from the employer such as the threat of losing his job. Would your administration support the establishment through Executive Order of affirmative action programs that would protect the older employee working for Government or under Government contract?

Very truly yours,

Vincent S. Boyer

Vincent S. Boyer, President
American Nuclear Society

William P. Chapman

William P. Chapman, President
American Society of Heating, Refrigerating and Air-Conditioning Engineers

David Standley

David Standley, President
Air Pollution Control Association

Charles H. Brokaw

Charles H. Brokaw, Chairman of Board
American Society for Quality Control

Grant Hansen

Grant Hansen, Past-President
American Institute of Aeronautics
and Astronautics

Frank B. Lanham

Frank B. Lanham, President
American Society of Agricultural
Engineers

K. F. Timmerhaus

K.F. Timmerhaus, President
American Institute of Chemical Engineers

Arthur J. Fox Jr.

Arthur J. Fox, Jr., President
American Society of Civil Engineers

John F. Sweers

John F. Sweers, President
American Institute of Industrial
Engineers

Earle C. Miller

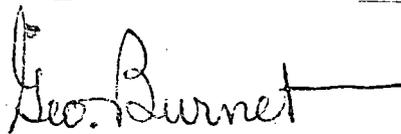
Earle C. Miller, President
American Society of Mechanical
Engineers

Julius J. Harwood

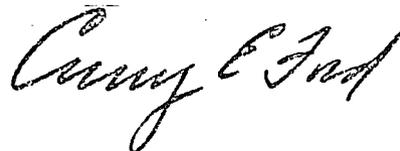
Julius J. Harwood, President
American Institute of Mining,
Metallurgical and Petroleum
Engineers

Warren E. Alberts

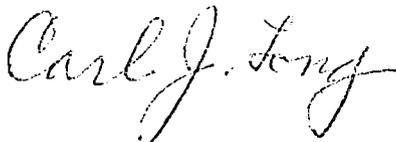
Warren E. Alberts, President
Engineers Joint Council



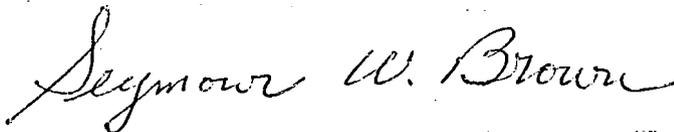
George Burnet, President
American Society for Engineering
Education



Curry E. Ford, President
Federation of Materials Societies



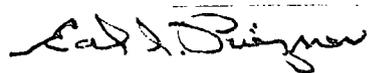
Carl J. Long, President
Illuminating Engineering Society



Seymour W. Brown, Director
Society of American Military Engineers



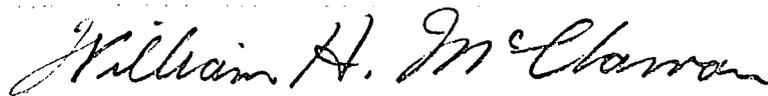
Joseph K. Dillard, President
Institute of Electrical and
Electronics Engineers



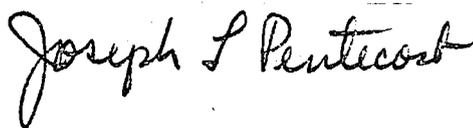
Earl I. Riegner, President
Society for Experimental Stress
Analysis



Harold Michael, Past-President
Institute of Transportation Engineers



William H. McClarran, President
Society of Fire Protection Engineers



Joseph L. Pentecost, President
National Institute of Ceramic
Engineers



Eugene M. Merchant, President
Society of Manufacturing Engineers



Ed. E. Slowter, President
National Society of Professional
Engineers



Arminta J. Harness, President
Society of Women Engineers

Send to
Nael Stennet

October 4, 1976

Ian Callum
620 South State
Ann Arbor, Michigan 48010

Governor Carter has asked me to respond to your letter and to thank you for sharing your views.

I enclose for you a packet of material on the issues that you will find helpful in answering many of the questions in your letter.

We hope you will continue to support Governor Carter and Senator Mondale. They offer the promise of outstanding leadership -- something the people of our country want and deserve.

Sincerely,

Noel J. Sterrett
National Policy and Issues

Enc.

Ian Callum
620 S. State
Ann Arbor, Mi.
48010

Dear Governor Carter,

Let me congratulate you for not being fuzzy on the issues. This obviously false charge does not stand up beside your record. I voted for you in Michigan because you were specific.

However, I do have several questions for you to which I very much desire answers:

1.) What is your opinion of Gerald O'Neill's (the Princeton physicist) plan for solar platforms and space industry? What are your recommendations for the space program?

2.) When will the U.S. decriminalize victimless crimes, and focus on violent and organized crime? What can be done?

3.) Could the prison system be altered to prevent crime? Can prisons be made productive and self-supporting?

4.) Is victim compensation as part of a punishment a viable idea?

5.) Is there any way to crack down on violent crime (a minimum sentence?)?

6.) What do you plan for DEA and CIA?

7.) When will our society treat drug abuse for what it really is: a sickness, like alcoholism; a metabolic imbalance rather than a malicious

crime against society? What federal programs do you favor in this area?

8.) When will U.S. alter its diplomatic position against growing marijuana, which causes peasants growing this cash crop to be fire-bombed in Mexico and Columbia?

9.) What form of the Humphrey-Hawkins bill do you support? What changes must be made before passage?

10.) Do you support revenue sharing? With what strings? Would revenue-sharing funds ear-marked for construction of new medical schools be a good idea?

For the #2 spot I urge you to give first choice to Sen. John Glenn. I believe he is the best man for the job (and would be a very good running mate). I am sure there could be no question of his fitness for high office, and as a newcomer to politics would not have political debts to interest groups.

I thank you for your time and patience. I eagerly await your reply.

Sincerely yours,
Sam Callum