

INTERIM REPORT II

CONTEXTUAL PLANNING FOR NASA:

A SECOND WORKBOOK OF
ALTERNATIVE FUTURE ENVIRONMENTS
FOR MISSION ANALYSIS

VOLUME ONE

by

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Prepared for:
Advanced Concepts and Mission Division
Office of Advanced Research and Technology
National Aeronautics and Space Administration
Ames Research Center, Moffett Field, California

Contract NAS2-5431
HI-1272/3-1B
April 30, 1971



FACILITY FORM 602

N71-29331

(ACCESSION NUMBER)

223

(THRU)

G-3

(PAGES)

CR-114336

(NASA CR OR TMX OR AD NUMBER)

(CODE)

30

(CATEGORY)

HUDSON INSTITUTE

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HUDSON INSTITUTE, INC.
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Croton-on-Hudson
New York 10520

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ACKNOWLEDGMENTS

This study was under the direction of Anthony J. Wiener and the report was compiled in collaboration with B. Bruce-Briggs. We quoted and abstracted extensively from working papers prepared by Frank E. Ambruster, Raymond D. Gastil, A. George Schillinger, Ivan Schidlof, Max Singer, Barry Smernoff, and Arthur Springer, and from other Hudson Institute work by Herman Kahn, William Pfaff, and Paul Collins, as indicated in footnotes. John Phelps, Steven Rosen, William Schneider, and Gus Weiss, Jr. participated in the early discussions and in the work of the previous year that helped lay the foundations for the current report.

HI-1272/3-RR

CHAPTER ONE

INTRODUCTION

1. INTRODUCTION

A. METHODS AND PURPOSES

We prepared this report for the use of the Advanced Concepts and Missions Division (ACMD; formerly the Missions Analysis Division) of the office of Advanced Research and Technology (OART) of NASA. In order to bolster AMCD's capability for making preliminary selections among alternative space program objectives, we undertook to look into possibilities for making improvements in the following areas:

1. Projecting alternative future contexts, in terms of technological, economic, political, and social factors, in which such programs might operate and in which their values would have to be assessed;
2. Evaluating and comparing the long-term consequences, both immediate and second-order, both beneficial and costly, of program alternatives;
3. Exploring systematically means of generating, defining, collecting, and keeping alive additional program alternatives;
4. Developing additional methods for making explicit and systematic, insofar as these are both desirable and feasible, criteria for assessment and selection of alternative program objectives.

It is noteworthy that these tasks would have been unnecessary a few years ago, when NASA's priorities were set by the Apollo program. Now the question arises, "What should be done for an encore?" The very magnitude of NASA's achievements makes the next set of choices much more troublesome.

In attempting to provide some materials to help with these choices, we have attempted to relate projections of future environments to current choices by doing the following:

1. Proposing a comprehensive list of possible policy goals at a high level of abstraction.
2. Evaluating space programs in relation to these goals.
3. Estimating the likely attitudes of society and of groups within society toward space goals and programs.
4. Projecting scenarios of the future social and political environment in which NASA will operate.
5. Providing some illustrative applications of the method to decisions currently facing NASA.
6. Attempting to demonstrate how NASA could benefit by taking alternative futures into consideration so that alternate programs together with plausible estimates of their effect on the public and on political leadership could be made available to NASA decision makers.

In so doing, we have limited ourselves to certain broad, general approaches to planning that are the appropriate concern and responsibility of those with an outside perspective. We have entered into detail occasionally, chiefly for illustrative purposes. We have assumed that responsibility for detailed implementation of any approach to planning rests necessarily with those who know the agency's problems best--its own staff--in collaboration with outside consultants on, as much as possible, specific and real planning decisions.

A contextual planning process would ideally include the following elements:

1. An explicit statement about policy goals of any proposed program;
2. An analysis of past and present attitudes of key groups in relation to NASA--and, if feasible, to the specific project--to determine whether and what degree of public support is critical;
3. Future-oriented estimates addressed to issues such as the following:
 - a. How are national policy goals likely to change significantly for the duration of a particular program or in relation to closely-linked, synergistic efforts?
 - b. Are attitudes of key groups likely to change? Could such changes be critical to NASA's efforts? Can such changes benefit or hurt NASA, or be safely ignored?
 - c. What are the prospects for successful completion of a given program in the context of different general and agency-specific alternate futures and scenarios? How much of a risk is involved in launching new programs or making fresh and substantial commitments to old ones?

In this report we have tried to err on the side of inclusiveness and diversity in order to accomplish one purpose: to reinforce a sense of the

richness and complexity of variables that are always present in policy planning, but are most often not explicit. We have tried to counter the seductive idea that there are techniques of planning that can somehow substitute automatic and mechanical--or even rigorous and explicit--"methodologies" for comprehensive and thoughtful decisions about subtle and elusive matters.

To gain reasonably reliable perspectives on NASA's future economic, social, and political environments, planning analysts must consciously and rationally apply their main efforts to describing the "most likely" future environment while giving due consideration to more "positive" or "negative" visions.

It is easy to be skeptical about usefulness of projections of the environment by overemphasis of the role of the incalculable. Nevertheless, attempts to analyze the past and present, to identify, define and clarify recurring patterns and enduring trends have been rewarding. Not only have they been helpful in creating necessary frameworks for the construction and consideration of plausible images and alternatives, but these attempts have contributed to the process of establishing a working intellectual communication based on commonly held assumptions couched in commonly accepted language. Moreover, man's capacity to "predict" the future is also affected by the current great interest in studying and shaping the future--since the future may be as much influenced by our expectations as by our action-oriented commitments. Indeed, influential images of the future can generate both self-fulfilling and, more often, self-defeating prophecies, in which warnings are followed by preventive action.

We have used two approaches common in the study of political-military and other kinds of public policy problems--the scenario and the systematic context, or "alternative future." These methodological devices are especially valuable in the study and evaluation of the interaction of complex and/or uncertain factors. Scenarios are hypothetical sequences of events constructed for the purpose of focusing attention on causal processes and decision-points. They answer two kinds of questions: (1) Precisely how might some hypothetical situation come about, step by step? and (2) What alternatives exist, for each actor, at each step, for preventing, diverting, or facilitating the process?

Alternative futures focus on the situation reached at the end of the process described in the scenario. They furnish a context in which particular elements can be appraised. They can be used for generating additional scenarios, for setting forth and discussing criteria, for the systematic comparison of various alternative policies (or alternative combinations of assumptions and objectives), or for the analysis and examination of specific issues. They are also of interest in making assumptions and contexts explicit, as should be done, for example, in any analysis of directions and destinations.

Clearly, the distinction between scenario and alternative future is one of degree; typically, they are used together. With a set of alternative futures and scenarios that lead to them by alternative routes, one may see better what is to be avoided or facilitated, and one may also gain a useful perspective on the kinds of decisions that may be necessary, and the points in time after which various branching-points will have been passed.

We have found it useful to construct a range of future contexts that include not only some of the main expectations (both hopes and fears) of policy planners, but also other cases of interest. By constructing a "concrete" series of named futures and treating all the factors involved in an internally consistent fashion, we hope to be better able to understand not only the separate factors and their interactions, but important consequences of these that are often overlooked in general or abstract analyses and discussions. By making potential directions and destinations clearer, the construction of these contexts can also lead to better understanding of the significance of current emphases, of the major alternatives and of how different these may be.

A fuller discussion of methodological aspects of long-range planning and future studies would be relevant at this point. However, we have discussed many aspects of the method followed here in previous work, and the interested reader might simply refer to Herman Kahn and Anthony J. Wiener, The Year 2000: A Framework for Speculation (New York: The Macmillan Company, 1967), esp. pp. 1-39, 66-70, 262-264, 386-409. Of particular interest for present purposes in that volume is the discussion of the "Standard World," or minimum-surprise projection, which furnishes a starting point for the consideration of alternatives (see pp. 7-8 and the additional references in the index on pp. 427-8).

This project was conceived as "an experimental study of alternative methodologies for dealing with NASA's special long-range planning issues," and the "dominant purpose" of Hudson's work was "to provide context, education, and training for NASA Advanced Concepts and Missions personnel so as to facilitate their own preliminary analysis of the long-range planning problems of NASA." For this purpose, emphasis was put on "visits, conferences, memoranda, and informal documents." This report is the second "workbook" of materials produced under Contract NAS2-5431. The contract did not call for a "final" report, and this report is quite clearly "experimental" rather than "final."

In the course of our work, we took into consideration a number of alternative economic, social, and political prospects. We developed these in order to construct scenarios designed to focus attention on alternative contexts in which alternative NASA programs might be evaluated. As originally intended, we attempted to focus this material, in collaboration with ACMD personnel, on case studies of decisions of particular interest to NASA. However, it came to seem desirable, in order to facilitate subsequent work, to gather together a comprehensive "workbook" of scenario material and related methodological comments. This report is a second edition of that workbook, written in part as though it were an early draft of portions of a report on long-range planning that might be produced by subsequent work. Thus, for example, we have even prepared a "conclusion" which draws lessons from the scenarios for NASA's long-range plan. As we point out, our work has not reached the point where such conclusions can be fully justified. Nevertheless, we believe, a "workbook" should suggest the form such conclusions might ultimately

take and indicate how they might be derived from the alternative futures themselves.

We have found it necessary, at some points, to repeat essential material from our previous report, so that this report can be reasonably complete and self-contained. At other points we have cut last year's discussion, occasionally adding a reference to material which we are no longer including, but to which the especially interested reader might wish to refer. We have rewritten and elaborated throughout, and in two areas have added extended new discussions: the analysis of U.S. attitudes, by Frank Armbruster, which constitutes a detailed Appendix, and the consideration of scenarios involving the impact of international relations on NASA. We have also revised and extended our conclusions.

B. A BASIC PERSPECTIVE ON NASA'S FUTURE

At this time NASA must make decisions with respect to alternative missions which will not come to fruition for ten-to twenty years. In the time that will pass between decisions and outcome of the decisions, the criteria which shape the original decisions will inevitably shift. For example, the factors affecting the 1961 decision to initiate the Apollo program to reach the Moon within the decade would obviously not have the same weight in the mind of a President who had to decide whether to begin the program today. Is there any way in which NASA can anticipate these shifts?

Obviously there is no way of studying the future directly, since it does not yet exist. Many of the events that will occur are not specifically predictable; but there are many trends under way which can be examined, and scenarios can be constructed to investigate factors which

will cause shifts in these trends in the future. By such means one's expectations about the milieu in which the programs will come to fruition can be examined and this may shed some light on the current decisions. In order to anticipate how the public might value a NASA program, such as an unmanned Mars probe or an orbiting space laboratory, as compared with other alternatives such as spending less on NASA or putting more emphasis on earth applications, one must begin with an examination of the current state of mind of the American public about alternative NASA programs or better alternative objectives of NASA programs. For this purpose we have conducted an intensive analysis of American public opinion with emphasis on those attitudes of the American public which tend to be neglected by many analysts and commentators, particularly by the mass media and by most of the academic experts, whose views are more likely to come to the attention of NASA. Of course, NASA itself is not in the business of public opinion polling.

This analysis may be particularly valuable to NASA because the attitudes toward NASA programs shared by NASA personnel and by other scientists and engineers with whom they are likely to have conversations, turn out on investigation to be quite different from those of the great majority of the American people. The only views differing from their own which NASA people are likely to hear are those of "humanist left" intellectuals which are even more different than those of the great majority of the American people, and it is not so much the criticisms of the literary intellectuals which need to be taken into account as those of the great mass of the public.

It is one thing to describe the current state of opinion; it is another to anticipate what it will be in another ten or fifteen years:

In order to do this we must ask what are the forces which are likely to cause shifts in these opinions; and this means in effect that we must construct some scenarios for NASA programs and for other social and political events which will impinge on public attitudes and for underlying trends, particularly economic, which will alter the socio-economic composition of the American public in the next fifteen years.

Having done this for domestic factors, we must then ask about another class of variables which can impinge upon the current situation as the years go by and cause possibly dramatic alterations in the dominant opinions with respect to NASA. For example, one need remember only the importance of the Sputnik in changing attitudes toward what the U.S. commitment toward a space program ought to be. Therefore one part of our study has been an attempt to identify some events which might be comparable to Sputnik in their consequences and to anticipate in some detail what these consequences might be. In our previous report our conclusions dealt with the need on the part of NASA to operate within low budgets for the foreseeable future, while at the same time continuing to produce achievements which will appear to the public and to Congress to justify even those budgets. This is a difficult dilemma to negotiate, but apparently a necessary one for quite some time.

From our analysis of alternate future environments for NASA, we must regretfully come to the conclusion that in the short run, during the decade of the 1970's, a pessimistic, restrained environment is more likely than an optimistic one. Not only is a straight line, "standard world" for society and NASA likely to be seriously restricted, but also, the range of possible alternative environments would appear to include more plausible pessimistic than optimistic variations.

However, in the longer-term future, toward the end of this century, we believe that the most likely projection will once again be potentially very favorable to NASA.

The biggest question concerns the middle-range future, that is the decade of the 1980's. Unfortunately, this is the very period for which NASA must plan today. This could be a period of great possibilities, and great risk for the agency. For this reason we feel that NASA might concentrate a good deal of attention upon establishing a firm mobilization base to provide for potential opportunities in the 1980's and 1990's.

We feel that the question of surviving the 70's is crucial for NASA, because the end of the century is likely to be a more favorable period for ambitious space ventures.

At the present time, we believe it unlikely that there will be changes in the domestic or international environments during the 1970's sufficient to cause large deviations from current NASA budget levels, as a percentage of GNP. The basic structure of the international system seems likely to continue: essentially bipolar but polycentric; characterized by conventional crises dampened by the superpowers. However, as the decade continues, the mostly bipolar world seems likely to evolve to some extent in the direction of a balance-of-power situation in which Communist China, Western Europe, and Japan also play great-power roles-- though not yet superpower. Domestic politics may be characterized by an increase in Middle-American influence and demand for direct economic benefits from their tax dollars. At the same time, there is likely to be an increase in New Left dissent and an even greater reaction against such dissent.

In this context there are several areas that should be monitored for their potential impact on NASA. These include:

1. attitudes of Middle-America toward Federal spending, especially increased resistance to possible unsuccessful large-scale educational and welfare programs;
2. hostility of some students, intellectuals; the Humanist Left generally toward technology seems likely to intensify and spread as ecological problems become more obvious and as the arms race continues (even at a moderated pace);
3. increasing numbers of college-educated people, who have traditionally been NASA's strongest base of public support, may offset (1) and (2) to some extent;
4. prospects for significant Soviet space challenges and resulting revival of support from Middle-America;
5. emergence of significant Nth-country space programs, notably European and Japanese, with some resulting increase in public support as these powers are increasingly perceived as competitive toward the end of the decade;
6. emergence of more visible benefits of space programs, such as in satellite broadcasting, weather forecasting, air traffic control, and earth resource programs.

In general, on the basis of studies of changing American values, international cooperation with non-Communist nations seems likely to continue to receive moderate public support, provided such programs do not cost much. But cooperation with the Soviet Union seems likely to result in diminishing public support, while heightened competition with the

Soviet Union seems likely to remain the most important element in maintaining public support for NASA.

NASA's critical policy goal for the 1970's seems likely to be institutional survival as a base for the space missions of the 1980-2000, when several factors--including the resolution of many currently pressing social problems and increasing GNP--may permit more ambitious space programs.

It seems to us, then, that NASA's priorities for the 70's should therefore emphasize programs on which major long-range missions can be built, as well as programs likely to produce clearly defined, real economic and social benefits for the nation as a whole.

Many of us regard our space effort as, on balance, a national necessity, an essential program to extend the frontiers of discovery and understanding and to support new sciences and new technologies that will ultimately be of immense value to mankind.

Still, controversy in which these relatively long-run benefits are weighed against relatively short-term priorities is serious. At one extreme, there are those who view the space program as a mere luxury--a program promising only long-deferred and quite uncertain benefits, yet one which absorbs substantial funds and technical skills which could be better used to improve man's day-to-day life more directly.

At the other extreme there are those who consider the current fact of international competition for technological prowess sufficient justification for ambitious aerospace programs, regardless of current economic or social benefits; or there are those quite different people who feel that the exploration of space is an ultimate adventure, a triumph of man's

expanding courage, intelligence, and will to achieve, that should not be cramped by crass and parsimonious concerns.

But responsible support of any long-term program requires that the full range of benefits of all kinds be weighed against both current and future costs. The lead-times of space programs are such that we are currently planning missions that will not come to fruition until the 1980's, or later, and the decisions we make today will have important consequences for everyday life in the 21st century.

Currently, there is increasing concern about the often unintended and occasionally harmful social effects of new technology--effects which can occur in surprising ways even though the technology has been developed, successfully, for the sake of its benefits. As the President's National Goals Research Staff reported last year,

The Nation's infatuation with technology is at a turning point as profound as that of its relationship to the environment. Historically, we have tended to do that -- which was technically possible, if it were economically advantageous, on the simple ground that this represented "progress." However, as technology has increased with great rapidity, it has forced on us increasing unplanned social change and environmental problems we did not anticipate and do not want. At the same time, our notions of the complexity of social and environmental problems have made us increasingly cautious with respect to the actions we plan to take. Our level of affluence has given us a longer time perspective within which to assess the consequences of our actions. As with so many other of the debates with which we have been concerned, the technology assessment movement--which embodies this new attitude toward technology--asks us to judge our actions by a wider range of criteria than we have used in the past.

Raymond A. Bauer et al., Toward Balanced Growth: Quantity with Quality: Report of the President's National Goals Research Staff, July 4, 1970, pp. 133-4.

The wide range of criteria described extensively in the White House report includes benefits as well as costs or harms. The growth of the space program must be in "balance" with other national goals. Over the long run, there are good reasons to think that this balance can be achieved, and that the divergent bases for support of the space program which animate the current controversy--practical social applications, international competition, scientific curiosity, technological development, and historic adventure, to name only a few--can find much common ground.

By the year 2000 we can anticipate three major developments that will affect our thinking about the goals of the space program.*

1. Reduction of Social Problems. First, as economic growth continues, the benefits of affluence will be increased and more equitably shared by all groups in American society. While some groups will still have more than others--particularly in areas of private consumption--basic public services at a high level of quality should be available to all Americans. In education, employment, housing, health, transportation, most of the basic needs we see today will probably have been met--not only for those Americans who will still consider themselves poor even though they may be rich by today's

*Prospects for future social changes are being treated systematically by increasing numbers of scholars and political and economic analysts; standard works include the Report of the President's National Goals Research Staff, cited above; work sponsored by the Commission on the Year 2000 of the Academy of Arts and Sciences, comprehensive reports made available by the long-range planning departments of several major corporations, and studies produced by research institutes such as the RAND Corporation, the Hudson Institute, the Institute for the Future, the National Industrial Conference Board, the Research Institute of America, and others.

standards--but also for the perhaps 80 million additional Americans who will be added to the population over the next 30 years.

With a population of 250-300 million sharing a gross national product in excess of \$3 trillion, per-capita consumption will be 2 to 3.5 times higher than it is today. Potentially, life will be extremely good for the overwhelming majority of the American people. Poverty, racial conflict, and student unrest can be substantially reduced, in part because of intelligent and well-run reforms by government. The spectacular decrease in the economic and social inequality affecting some minority groups will also reduce illegal or unreasonable acts by destructive and extremist protest groups. There will be, of course, some hard-core problems and much alienation among the remnants of the poor, unassimilated minority groups, and some "drop-outs," but these problems will be regarded as soluble and the protests mainly "rhetorical." In addition, there will have been a burst of creativity among Negroes which will show up in almost all aspects of culture and many areas of political, business, commercial, technical and governmental life. This will give black Americans self-confidence and a feeling of pride and participation in "the system."

Before the end of the century, America can deliver on its promises of freedom and prosperity for the common man.

To be sure, America will not become a Utopia. And many new problems we may not anticipate today may plague us. But the inequalities, deprivations and injustices that disturb us today should be substantially alleviated.

2. Changing Life-Styles. Second, increased national wealth and the absence of serious economic deprivation will permit generally

more relaxed styles of life. People will have much more leisure time. The more relaxed society will be more inclined to finance science and technology. The dispute between those who view science as a luxury and those who see it as a necessity, will be resolved by the realities of abundance. Some feel that boredom could become our chief national problem. But leisure will permit men to express and satisfy their curiosity. At the personal level, more people will spend time--on and off the job--learning, satisfying their curiosity, perhaps "practicing" science as a "hobby." In fact, we may expect a fading of our traditional distinction between "work" and "play."

The new "Renaissance Man" may become a recognized social type. Millions of men and women will aspire to be poets or scientists, cultivating a relaxed and casual, but highly competent and sophisticated style in the manner of the humanist gentlemen of the Renaissance or the enlightened aristocrats of the 18th Century.

Many people will feel free to address themselves to the universal problems of physics, mathematics, literature and philosophy.

The elites of all the industrialized countries may become increasingly similar in their life-styles, values, and goals. They will form an international community of technicians and managers. Having little local or family loyalty, the new renaissance man will be internationally mobile. He will be in contact with his peers throughout the world through sophisticated communications systems and in person via high-speed intercontinental transportation.

Government and economic leadership will be in the hands of cultivated men measured more by their personal qualities than by standards of performance. Performance standards will be stated in terms of being

a "good citizen" and participating in community life as a patron of the arts, science, culture and as an innovator in various areas.

This picture represents the culmination of a trend toward subjective values such as non-economic achievement, curiosity, and art and knowledge for their own sakes. An aggressive space program can represent the national expression of that trend. All of us will be as curious about the new knowledge gained from space exploration as we are today about the more dramatic elements of our current efforts: liftoffs, moon walks, and splashdowns.

3. Successes of Space Technology. In another generation, space exploration will become an established part of human experience and an accepted government activity. Space projects far more important than the historic achievements of the past decade will have been accomplished. The technology required for daring and complex space missions will have been perfected and these conventional missions will have become a matter of routine. Only "far-out" missions will excite the increasingly sophisticated and blase public.

At the same time, space exploration itself will become cheaper, more efficient, and safer, as today's primitive and expensive propulsion, maneuvering, life support, and data processing systems are replaced by simpler and more reliable equipment. Moreover, major new discoveries and technological breakthroughs will probably occur in the space sciences and many of the technologies developed for space missions will be incorporated in production technology and in consumer goods. These breakthroughs and applications will, over the next three decades, more than justify the resources we have invested in space. And the space program will be

able to take credit for a substantial contribution toward achieving the economy of wealth and the society of affluence and ease projected for the 21st Century.

Of course, one can easily list a number of relatively unlikely or catastrophic events, such as a worldwide economic depression, that would fundamentally alter or slow down movement toward the promising future outlined above. But one could just as easily suggest developments that would accelerate movement toward an even more hopeful future than we might otherwise expect. A great imponderable is international relations. New agreements with the Soviet Union could create a new climate for international cooperation, opening many new opportunities for joint or cooperative space efforts. The space programs of other nations--notably Japan, China, France, and no doubt many others--are also likely to be significant, whether for competition or cooperation, as in world-wide communications, weather, and geographic satellite systems.

4. Getting from Here to There. This view of American society in 2000 A.D., and the variety of space projects that will be technically, economically and politically feasible at that time, has implications for the kind of preparations NASA must make now if it is to realize future potentials.

Examination of budget data suggests that it would cost about \$2 billion a year merely to maintain a NASA stand-by capability and planning operation that carries out few actual missions, if any. If at some point the NASA budget were to approach this moth ball or standby-minimum status, the amount in excess of the maintenance level would not permit any significant operational activity, and therefore,

there would be few visible current benefits to justify continuation of the program. Various contingencies--such as a significant international crisis in which there might be general agreement that the U.S. should play a major (and expensive) role, through aid or troop commitments--or Soviet downgrading or abandoning of their own space program, might bring NASA close to the static--and politically unviable--mobilization base.

Therefore the Agency must function as an operating agency in the 70's and try to retain the level of skilled manpower that will be critical in the 1980's as NASA enters a period of new growth.)

NASA work for the 70's must give prominence to those programs and emphases and assumptions that are not only worthwhile in themselves but also consistent with other national priorities: What programs enable NASA to make its most significant contribution to environmental management, economic growth, education, and other objectives that are currently given great emphasis?

If NASA's role in the 70's is to be an active--not a static--mobilization base for the space programs of the 1980 to 2000 period, and if NASA is to remain active and relevant, NASA must place increased emphasis on work that offers immediate tangible benefits and realistic promises of tangible benefits to a society that is keenly aware of problems here on earth.

What are some of these programs?

Aeronautics:

Projects consistent with trends toward increased value on safety, economy, and responsible technology.

Illustrative: air traffic control
 fractional orbit transportation system
 use of advanced propulsion systems in SST
 to eliminate sonic boom
 quiet air transport
 VSTOL

Government cooperation with private industry:

Projects consistent with GNP growth goals, full employment, and return on investment for publically financed innovations developed into profitable products by private industry.

Illustrative: SST return on investment planning
 encouragement of industry-financed space R&D
 and more
 applications "piggybacks" on remaining Apollo missions

Basic environmental research

Projects consistent with trend toward increased value on ending environmental pollution.

Predicting natural disasters, averting man-made environmental catastrophes, and harnessing the environment for constructive ends.

Illustrative: Necessary to the understanding of the composition of and dynamics of our own atmosphere is knowledge of the atmospheres of our neighboring planets. Mars and Venus both have atmospheres different from that of our earth. Mars, in particular, may have an atmospheric composition similar to ours of several millenia ago. Investigation of alien planets will aid us in understanding the basic laws of atmospheres, necessary to our successful coping with potential worldwide atmospheric pollution. Our knowledge of the physics of extraterrestrial atmospheres can be augmented by unmanned or manned probes and by space-mounted telescopes, as well as by near space satellite observation of our own atmosphere.

For the next decade NASA will best perform its public function by addressing itself to "down-to-earth" problems with programs that offer the promise of tangible short-and medium-term benefits to

society. By giving increased priorities to these aspects of the space program, it can contribute to society now as well as maintain an active mobilization base for the more optimistic future which NASA's current activities will help to create. If current trends continue, the year 2000 will bring conditions conducive to greatly enhanced pride in our space program. Re-directed, balanced, vigorous and cumulative economic growth will probably come close to eliminating the major problems of poverty, discrimination, and pollution; and at the same time, increased affluence and education will change values and life styles so as to enhance appreciation of the Renaissance virtues inherent in the space program: the pride in intellect and competence, the sense of adventure and striving, the vision of man as transcending his past, overcoming his limitations step by step, and growing in skills, knowledge, prowess, and wisdom. This is the future social climate in which the space program can be most productive; it is also a culture which the space program can now do its part to create.

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CHAPTER TWO

NASA'S POLICY GOALS

II. NASA'S POLICY GOALS

WHY STUDY POLICY GOALS?

One central thesis of this study is that NASA's planning effort should be directly related to the broad goals* the space program serves. Thus, we begin with an enumeration of plausible and distinct space goals grouped by categories. This enumeration will attempt to provide:

1. an over-all framework for this discussion;
2. a basis for attempts to answer specific questions about NASA's past, present and future goals;
3. a guide for re-orienting emphasis should projected future developments warrant such re-definition.

We suggest that identifying basic criteria, coupled with an analysis of the degree to which individual programs meet these criteria should facilitate AMCD's choices of future program alternatives for study, and should aid planning for the short-run, medium-run and long-range future. In short, more rigorous goal definition may greatly facilitate planning efforts.

What are NASA's goals?

What have they been in the past? What are they now? What should they be in the future?

What goals have been dominant or insufficiently emphasized? ambiguous or clear? mutually related and supportive or mutually exclusive and divisive? Who defines these goals?

*The intended meaning of the term "goals" in this report becomes clear by reference to Table I, p. 2-9.

SOME INTRODUCTORY REMARKS ON GOALS

NASA in Retrospect: Expectations and Achievements

The formative stages of NASA's history were "characterized more by expectation than by accomplishment."^{*} In the report of the American Assembly's 1961 conference on outer space, Assembly President Dr. Henry Wriston stated "Space technology promises to bring about revolutionary changes in man's life on earth."

The effort to bring about that revolution and to translate expectations into accomplishments has absorbed an extraordinary amount of manpower and resources. In the first decade of its effort, NASA's research and development work force totalled over 400,000 people. In 1968, 10,000 scientists, engineers, teachers and students were working under NASA funding at some 200 universities.

This level of effort helped accomplish NASA's primary mission. There is little doubt that centuries from now the year 1969 will be identified, like 1492, primarily with a voyage of exploration and discovery. But what current national purposes have been advanced? What has the nation gained, economically, politically, militarily, socially, psychologically, from the effort expended to land men on the moon? Do we, as a result, have more prestige and morale than we otherwise would have had? Is there still merit in Dr. Wriston's 1961 assertion that our national space program is "an intrinsically valid enterprise"? These questions will become more acute after Apollo's success makes obsolete the priorities of the 1960's.

^{*}Lincoln P. Bloomfield, Outer Space: Prospects for Man and Society (New York: Frederick A. Praeger, 1968), p. vii.

According to James E. Webb "We can now call on a well-established and versatile national capability in aeronautical and space-related science, engineering and administration." But, having built the capacity for space exploration, have we in the process exhausted many of the original rationales for its use? Does NASA now represent a capability in search of a mission? Is that necessarily an inappropriate reason for existence?

Finally, is the style of commitment reflected in the Apollo program appropriate for the future? Assuming renewed clarity concerning goals and programs, and assuming different socio-political contexts, what public stance should NASA itself adopt: assertive, moderate/neutral, or defensive?

In public debate, space program advocates have tended to adopt, to some degree, a defensive posture that may be inimical to NASA's own best interests and to the most positive aspects of man's venture away from the earth.

They may do so because of what appears to be an Apollo "hangover." President Kennedy's commitment to land Americans on the moon in the 1960's created many positive attitudes. But the priority assigned to the effort and the momentum it achieved also resulted in some negative internal attitudes: the assumption that NASA was above criticism, that its critics were fundamentally benighted and/or irrelevant, and that missionary zeal was an appropriate response that would overwhelm any doubts concerning the space program.

C. P. Snow's concept of the conflict between the "two cultures" of science and the humanities has been used most effectively by some of NASA's supporters to challenge critics of the space program. As if to

express some fundamental self-defeating instinct, NASA's critics have all too often appeared to fulfill the stereotyped role projected on them. They have seemed to be against science, progress, adventure, risk, boldness and a commitment to expanding the frontiers of man's experience.

Efforts to clarify goals may permit NASA planners to achieve such new syntheses more acceptable within and outside the space agency, and less likely to add to the trend toward the highly polarized discussion of public issues. New planning emphases can contribute to defining and legitimizing NASA's continuing role in its second decade; to removing NASA from its present position as one focus of acrimonious public controversy; and to dealing more seriously with the ideas of NASA's critics.

The Routinization of Mystery

Originally conceived as a response to the Soviet sputnik, then charged with the charismatic mission to land men on the moon, NASA has fulfilled many of its short-term goals and may have exhausted its glamor and psychological capital with the American public.

The space program seems to have lost much of its mystery. We have completed the first great projects and found the results disappointing. There does not appear to be other life between the Sun and Mars and from what we know of Mercury, Venus, the Moon and Mars they lack the conditions that would support human life without complex artificial environments that men from earth would have to bring there.

Thus, the really critical surprise--the most tantalizing and literally farfetched of possibilities--has not occurred for the time being: we are still alone in the universe.

But the basic point is that our space efforts and NASA's achievements have lost their mystique. Even the second of the televised lunar landings had a routine quality that will increase in landings from now on. Network television coverage intensified routinization. The style of TV coverage makes a lunar landing and a political convention indistinguishable: the same tired anchor men, interminable waiting, panel discussions by experts, remote pickups of human-interest tangents, the same predictable results reported instantly to remove any shred of suspense, curiosity or fear. Of course, we may prefer such routine to the excitement and near-disaster of Apollo 13.

Rationalizing NASA

NASA needs to engage in a conscious review of its goals in the broadest sense. To illustrate the importance of such analysis, let us consider two themes that characterize much of the literature about NASA: analogies with previous major advances in man's technological development and the concept of unlimited challenge. Both themes appear to be supportive, yet in fact may be detrimental to the space program.

a. Previous Technological Advances

One essay provides a typical example of the argument from analogy.* The authors assert that "there is a striking parallel between the history of the airplane and the history of space flight to date." They sketch the development of the concept of powered flight and the growth of early technology. They point out that basic research scientists "generally ignored the field or discounted it."

*H. Guyford Stevers and Ralph G. Schmitt, "The Technical Prospects," in Lincoln P. Bloomfield (ed.) Outer Space: Prospects for Man and Society (New York: Frederick A. Praeger, 1968, pp. 11-36.

The airplane analogy stresses the vision of those involved in airplane development, the contrast between early predictions of speed, range and cost and the realities today, and the commercial benefits of air transportation.

In some respects, the analogy is inappropriate and misses the point. Some of NASA's critical problems result from the contrasts between air and space development, not the similarities.

First of all, the airplane really came into its own in World War II, and associations with it as an instrument of war run deep in our collective experience. Second, despite the growth of commercial air travel, air travel is irrelevant to most Americans. The vast majority of Americans rarely or never use airplanes. The use of airplanes as a symbol of progress simply exacerbate the contrast between poverty and privilege in America. If NASA wishes to present itself as a symbol of luxury, the airplane analogy is an effective device. If NASA needs support outside of upper-middle and upper class America, the analogy should be revised radically or abandoned.

Further, in contrast to the media available when the airplane was developed, modern communications have increased the number of people who are aware of space development, and are, however indirectly, involved in political decisions about space programs. The democratizing force of a national press, radio and television make technological development more visible today and therefore more vulnerable to criticism and public opinion "plebiscites."

b. Unlimited Challenge

The concept of unlimited challenge is effectively stated by Dr. Homer Newell:

A new generation of researchers who, during their formative years watched the Space Age unfold, are entering the scene. They are caught up in the excitement that space represents. They will undoubtedly bring their enthusiasm to bear not only upon space, but also upon the great challenges of today here on our planet earth, such as the problems of oceanography, earth resources, the cities, transportation, population, pollution, and food. They are likely to oppose efforts to delay or sidestep any of these challenges.*

In contrast to Dr. Newell's expectations, it has now become plausible to suggest that under certain conditions the Vietnam war may produce a long-term change in American values: a tendency to place conscious limits on expectations; a questioning of the tendency to do anything that presents itself, as an end in itself, without regard to costs or consequences. Americans may become more interested in limited and realistic challenges and suspicious of unlimited commitments. Consequently, a new generation and some influential groups in American society may reject Newell's optimistic characterization of research objectives.

Both themes may be counter-productive. At minimum, we wish to suggest that unanalyzed assertions about goals may harm our space program and that seemingly self evident statements of space objectives may--in fact--frustrate those very objectives.

DEFINING NASA'S POLICY GOALS

Policy decisions of the National Aeronautics and Space Administration can be divided into three general categories:

Objectives or Goals (Why is NASA doing what it is doing?)

Operations or Missions (What should NASA do?)

Technology (How should NASA do it?)

*Quoted by Lincoln P. Bloomfield, Outer Space: Prospects for Man and Society (New York: Frederick A. Praeger, 1968), p. viii.

This part of the discussion concerns itself principally with "objectives" with some relationship to "operations."

Most of the time and manpower of NASA is devoted to making technology decisions, and it is clear to decision-makers that finding technological solutions is a means of achieving operations goals. However, the similar relationship of operations goals to more general aeronautics and space policy goals may not always be clearly perceived.

This leads us to a fundamental question of NASA planning: What are the purposes of the space program? What is NASA for? The National Aeronautics and Space Act of 1958 gives us strong guidance on this point. NASA is to:

1. Expand human knowledge
2. Advance aeronautics and space technology
3. Develop and operate space vehicles
4. Carry out long-range studies of potential benefits of aeronautics and space activities
5. Preserve U.S. space technology lead
6. Provide useful information to the military
7. Promote international cooperation
8. Study the utilization of space activities for peaceful and scientific purposes

Such is NASA's legal, formal mandate. Nevertheless, many other informal objectives for the space program have been suggested by NASA officials, politicians, scientists, journalists, and critics. Table I attempts to list at a high level of abstraction all the objectives of the space program, both formal and informal, explicit and implied. (Note that the list excludes all operations goals, such as the development of space vehicles.)

TABLE I

NASA'S GOALS

A. ABSTRACT	1. achievement <u>per se</u> 2. fulfilling commitment <u>per se</u>
B. COSMOPOLITAN	3. man's conquest of space 4. international cooperation 5. moral equivalent of war--redirection of U.S.-U.S.S.R. rivalry to peaceful competition
C. NATIONALIST	6. increasing or maintaining American prestige 7. winning or not losing U.S.-S.U. prestige competition 8. winning or not losing U.S.-S.U. military competition 9. winning or not losing U.S.-S.U. economic and territorial competition
D. SCIENCE & TECHNOLOGY	10. satisfying curiosity (of some men, science, nation, world) 11. Scientific advance 12. technological advance
E. MOBILIZATION BASE	13. mobilization base for achieving other items
F. ECONOMIC BENEFITS	14. potential economic benefits from space operations or technology developments ("spin-off") 15. economic benefits from stimulation of the national economy
G. ATTENTION-GETTING DEVICES	16. entertainment of public 17. redirecting attention of society, world, etc.
H. NARROW SPACE POLITICS	18. advancing personal careers or status 19. maintaining or advancing personal or corporate organizational interests (sometimes called "empire-building") 20. maintaining current or prospective funding, i.e., re-directing federal funds from other programs.

Many classifications of alternative goals for NASA would be possible. Necessarily many goals are closely interrelated. Some obvious goals are regularly mentioned in the press while others are not. With these qualifications in mind, we suggest the following classification as one upon which we can begin to clarify the issues for NASA planning requirements.

Abstract--"achievement per se," "fulfilling commitment per se." Part of our space effort is based on a desire for pure achievement similar to that which directs mountain climbers to climb mountains or sailors to cross the Atlantic alone.

NASA's efforts are also the result of a commitment by President Kennedy to land men on the moon by 1970. Commitments can keep a program going that would otherwise falter. Once committed, a nation is dishonored by not fulfilling the commitment. To some extent, more program continuity and momentum may be achieved through a Presidential commitment than through rational program development. Commitment may also lead to rigidity, waste, and the narrow focusing of programs on what may eventually be seen to be blind alleys.

Cosmopolitan--"man's conquest of space," "international cooperation," "moral equivalent of war--redirection of U.S.-U.S.S.R. rivalry to peaceful competition." Cosmopolitan goals are those that explicitly benefit all mankind rather than the U.S. alone. The conquest of space as a worthy end in itself is an avowed goal of NASA officials and astronauts, not to mention some substantial portions of the public. Often the goal is expressed in terms of the glorification of man combined with words like "destiny" and "inevitability."

"International cooperation" is a goal required by the Space Act.

The last item in this category is more subtle. It derives from the belief that great power rivalry, conflict and competition is based on an irrational compulsion. Thus, the space race is seen as a relatively harmless, sublimated and therefore desirable, form of rivalry.

Nationalist--"increasing or maintaining American prestige," "winning or not losing U.S.-S.U. prestige competition," "winning or not losing U.S.-S.U. military competition," "winning or not losing U.S.-S.U. economic and geographical competition." Nationalist goals dominate the thinking of many of those who support NASA programs." The history of our space effort suggests that if nationalist goals were not present there might be no significant space program. NASA occasionally appears to de-emphasize or to ignore nationalist goals, perhaps for public relations reasons, or perhaps because of the attitudes of some NASA scientists. Some NASA publications suggest that Science and Technology, Mobilization Base, and Economic Benefits are NASA's most important goals, but Dr. Paine suggested in his speech of November 20, 1968 that the competitive position of the country vis-a-vis the Soviet Union, and the general prestige and attitude of the nation (Nationalist and Attention-Getting Devices) are at least equally important.

We have added to the obvious items under Nationalist goals an Item 9 that is not often mentioned (Economic and Territorial Competition). If we were England competing with France and Spain for the New World, it would be obvious that economic and geographical competition was basic. However, America's national leaders apparently don't really believe enough in the economic value of the moon and planets, or are so enamored

with internationalist hopes, that they seldom speak of planting the flag in a possessive sense. On the other hand, the United States is in fact spending the money and providing the show. If there are going to be economic returns and colonies worth having, many will argue--as we indicate below--that they should be ours. Our undersea effort has analogous anomalies. Insofar as economic returns are predictable, one way to make these new areas "ours" without the nationalist flavor this might produce would be to turn government programs into private programs at a very early date. Private industry seems to be in a position to make claims "for us" that we cannot or do not wish to make as a nation.

However we do it, many more people would see the point of space activities if NASA were, in effect, planting the flag--for this would be a more concrete activity that goes quite beyond foreseeable economic returns. Increasing national property is generally seen as a legitimate national goal in itself.

The significance of U.S. space efforts for national prestige should not be underrated, with or without the specific U.S.-U.S.S.R. competitive aspects. People trust and are more attracted to competent nations. Students are excited by space exploits, even in underdeveloped countries. Consumers are apt to believe people who go around the moon can make reliable refrigerators. None of these effects may be large in itself, but their cumulative value could be considerable. At the same time it is important to point out that some evidence, in the form of surveys by USIA, indicates that worldwide attitudes toward the U.S. and the U.S.S.R. are not significantly altered by their space achievements. People may be impressed by Soviet accomplishments at the same time that they retain a basically

negative view of the U.S.S.R. Conversely, people favorable to the U.S. will remain so, despite marginal shifts resulting from specific U.S. space achievements or disasters.

Science and Technology--"satisfying curiosity," "scientific advance," "technological advance." Science and Technology goals may have been over-emphasized, except insofar as we are satisfying simple curiosity. Scientists and technologists have considerable power in NASA, and they want to see their work as valuable in terms of their specialties. However, are basic scientific laws likely to be changed as a result of interplanetary or lunar activities? It will be useful to know more of the moon and other planets, but their histories will be so specific, and the sample of extraterrestrial bodies will be so small, that the program is unlikely to achieve more than the general expanding of detailed knowledge. The question is not whether there will be some scientific and technological return, but rather whether more could not be accomplished on earth for less cost. The answer is probably that NASA is an expensive way to do basic research. This argument applies less to technology, and, of course, not at all to research for atmospheric transportation.

Mobilization Base--"mobilization base for achieving other items." The goal of developing a mobilization base for space activities might be emphasized more than it is. NASA is developing a capability to do things in space for a variety of purposes among which it is at present hard to establish priorities. There may or may not be a serious competition of one or another sort. There may or may not be really significant scientific or economic payoffs. We cannot tell now. But it is quite likely that one or another of these goals will seem crucial in the next twenty

years, and NASA will have developed the base--on "insurance" programs the nation can use to achieve the goals of that time.

Economic Benefits--"potential economic benefits from space operations or technology development," "economic benefits from stimulation of the national economy." In discussing short-term economic benefits a clear distinction should be made between those activities (a) in the atmosphere and in earth orbital space that may have direct economic benefit and those activities (b) in lunar or interplanetary space or preparatory to entering these spheres. As suggested above, if we or the Soviets really believed in the economic significance of lunar or interplanetary space activities, there would be more of a flag-planting effort. Talking of these activities in economic terms seems strained and remote, and detracts the focus of the argument from the really significant short-term economic programs for communication, weather prediction, and research and development for aviation, even down to airports. The role of NASA in helping to solve current transportation problems is probably the most poorly known aspect of the whole effort. Popularly, NASA is seen as responsible for space and little else. This image must be reversed if the short-term economic argument is to be made.

Item 15 is an objective seen by some economists and politicians. The space program is viewed by them as a pump-priming public works project or a new pork barrel.

Attention-Getting Devices--"entertainment of public," "redirecting attention of society, world, etc." Attention-Getting Goals involve us in some very subjective issues. Certainly space exploits are a part of the national entertainment budget--perhaps a good deal of NASA's budget

could be justified on this basis. Space spectaculars may be no more elevating than the average TV fare, but they are certainly more unusual. There is a question as to whether the attractive factor is what is seen, collected, photographed, etc., or whether it is the presence of men doing these things. (One possibility is that improving communications and glamorizing robots will be the eventual directions of the effort, because of the distances, times and environmental conditions involved. On the other hand, it is interesting that while much of science fiction was an early form of space entertainment, we know of no story in which entertaining the folks back home was seen as an important part of the space adventure.)

Redirecting the attention of people could be seen as just another form of opium; or as a new frontier in a more positive sense. Just what this means for the average citizen participating vicariously and through his taxes in space efforts is a little hard to grasp. The other "age of exploration" affected the literature and world view of some people, and introduced potatoes and tobacco, but what it accomplished in itself is harder to gather. The internal religious struggles in Europe were launched independently after the beginning of that age, and ended bloodily and independently toward its end (though supported by Spanish gold from the Americas). The significant scientific discoveries of the age had little to do with the exploration. Both were manifestations of the questioning spirit of the Renaissance. Today the more significant scientific challenges may be laboratory challenges rather than the challenges of understanding large, uncontrollable systems, and the more significant political challenges may be on earth--not in space.

Narrow Space Politics--"advancing personal careers or status," "maintaining or advancing personal or corporate organizational interests (sometimes called "empire building")," and "maintaining current or prospective funding, i.e. redirecting federal funds from other programs." These criteria are a great unknown. This is the area of goals that many suspect exist but few discuss. It is certainly important to acknowledge that such goals play some limited role in all organizations, in order to understand the particular pressures behind specific programs, although cynical overestimations of the role of "politics" are also widespread.

The very last item on the list--"maintaining current or prospective funding"--is vitally important, for this represents the so-called "priorities" issue. Typically, funding is gained in competition with other Federal programs drawing on a relatively fixed tax base, rather than in addition to other programs. To many vocal elements in our society NASA operations achieve a goal which they see as pernicious--the diversion of funds from their own favored projects. However, the issue as ordinarily stated can be turned around. Some rightists believe the alternate social programs are pernicious or worthless, so the diversion of funds to space could be a positive benefit.

Of course, it is possible to interpret all "priorities" issues in terms of self-interest. A cynic could claim that current disputes represent: physical scientists vs social scientists, the rural (military) lower classes vs the urban (welfare) lower classes, Huntsville, Houston, and Coca Beach vs Gary, Newark, and New Haven. It would be presumptuous to speculate about the motives of politicians and journalists.

NASA goals (or criteria for evaluation of NASA programs) could be broken down in many different ways. Our list seems reasonably exhaustive and convenient for present purposes. Conceivably other goals will become apparent in the future. Note that we make no attempt to indicate which are the goals NASA should have, or what our own priorities among them might be. On a practical level, it would be impossible to reach agreement.

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CHAPTER THREE

EVALUATING PROGRAMS IN RELATION TO GOALS

III: EVALUATING PROGRAMS IN RELATION TO GOALS

INTRODUCTION

Having made the point that goals are not necessarily self-evident and self-justifying, the same may be said of specific programs--particularly in any large, modern bureaucratized government organization.

We emphasize the relationship between programs and goals not simply for the sake of efficient management. Rather, it is the idea of "accountability" that is important--particularly in NASA. To the extent that NASA programs do not forward goals generally acknowledged to be in the national interest, or desired by a sufficiently larger influential and vocal group, NASA becomes a focus of dispute.

Americans from many different groups within society share a common skepticism about Federal government bureaucracy. Federal agencies are particularly subject to outside scrutiny and vulnerable to charges of waste, inefficiency or irresponsibility. But NASA is more vulnerable to public scrutiny and skepticism than many other Federal agencies. It is large. Its activities are highly visible. It is a symbol of an extreme in American culture and technology and therefore likely to provoke strong emotions among the public.

The principle of public accountability--rather than public relations--is critical for NASA, and should be a major factor in its planning efforts. The success of the Space Agency's efforts depends on the degree to which its programs are linked to clear goals that reflect widely shared public understandings concerning the national interest and social goals.

The purposes of this report preclude an extensive and detailed analysis of NASA's programs. In an effort to clarify the general relationships between goals and programs, however, let us examine some aspects of NASA programs in relation to the specific list of goals discussed in Section II of this report.

GENERAL COMMENTS ON GOALS, PROGRAMS AND PLANNING METHODOLOGY

Once NASA's goals have been defined--if not agreed upon--then one can evaluate programs in terms of goals.

First the planner must assemble a catalogue of projects the space agency can, could, or might undertake--a so-called "wish list." The May 1969 Long-Range Plan is a good example of a catalogue of project objectives, and the reports of the Planning Panels to the PSG were "wish lists" of more specific projects. A wish list might be collected from all the divisions of the agency, from contractors, consultants, and the press. Most of the project proposals may be made by persons of a technical bent, who deal mostly with purely technical problems. But operations goals will be mixed into or be implicit in the technical proposals. At this stage in planning, the technological proposals are not useful in deciding what should be done, but are a good indication of what might be done.

The next step is to group the operations goals according to general types. There is no set method of doing this. In most organizations a certain pattern has already evolved, and is reflected in (or set by) the structure of the organization. (In NASA, for example, there are separate divisions for applications and for various space missions.) Great care should be taken, however, not to permit administrative arrangements made for operational purposes to set harmful limits on the scope of planning ideas and to distort the setting of priorities.

Programs can be grouped by function, by geographic target or by method of operation. For example, three programs--Venus unmanned orbiter, Venus unmanned landing, and Venus manned expedition--might have similar equipment; so that they might be grouped together for many R&D purposes. Since they also have a similar physical objective, Venus, the public would associate them. The combined interests of technicians and the public might therefore lead NASA to establish a Venus Task Force. In spite of this grouping, however, for the purposes of AMCD, it may be useful to analyze the Venus programs in relation to the policy goals each one advances. One Venus project might increase national prestige, another would stimulate scientific advance, etc., and it is these considerations that might eventually take priority over other criteria. Through grouping, the analyst can reorganize a "wish list" and reduce the alternatives to a workable number.

Next, the mission analyst must evaluate each operation or type of operation according to space objectives. He can construct a mission-oriented table or a goals-oriented table. A table of this type is necessarily crude, but it has the advantage of putting the necessary material before the analyst.

Table II on the next page is an example of a combined mission-oriented and goal-oriented table for past programs. It evaluates four past operations programs: the manned moon mission (the most spectacular of NASA's achievements), and the communications satellite program (selected as typical of an unmanned program with immediate on-earth benefits and relatively low cost compared with Apollo. The "spy-in-the sky" satellite (DoD, not NASA) is picked as an example of a strictly military venture.

TABLE II
SAMPLE EVALUATION OF PAST PROGRAMS

		Comsat	Spy Satellite	Apollo 11	Apollo 14
A.	1. Achievement <u>per se</u>	+	+	++	+
	2. Meeting commitment <u>per se</u>	0	0	++	0
B.	3. Man's conquest of space	0	0	++	+
	4. International cooperation	++	--	-	-
	5. Moral equivalent of war	0	--	++	++
C.	6. Increasing U.S. prestige	+	0	++	++
	7. Succeeding in U.S.-U.S.S.R. prestige competition	+	0	++	+
	8. Succeeding in U.S.-U.S.S.R. military competition	0	++	0	0
	9. Succeeding in U.S.-U.S.S.R. economic and geographic competition	+	0	++	++
D.	10. Satisfying curiosity	0	0	++	+
	11. Scientific advance	0	0	0	0
	12. Technological advance	+	+	+	0
E.	13. Mobilization base for achieving other items	0	+	++	+
F.	14. Potential economic benefits from space technology	+	0	-0	0
	15. Short-term economic benefits from stimulation of national economy	0	0	0	0
G.	16. Entertainment of public	0	0	++	+
	17. Redirecting attention of society	0	0	+	+
H.	18. Advancing personal careers	0	0	++	++
	19. Advancing organizational interests	+	?	++	++
	20. Maintaining funding	0	0	++	+

++ strongly achieves this objective
+ achieves this objective
0 trivial, mixed, or no effect
- obstructs achievement of this objective
-- strongly obstructs the achievement of this objective

We have entered Apollo 11 and Apollo 14 separately to illustrate the great differences possible between missions that are technically similar. The eighteen months between the two moon expeditions have changed the effect. More important, of course, is that Apollo 11 was first--as a further iteration, Apollo 14 necessarily had less impact, although this impact was increased by the failure of Apollo 13.

The vertical columns of the table ask the question--what space objectives will this mission achieve? Will it increase national prestige? Will it advance science, etc.? Each mission is evaluated separately and the results are then compared.

The objective-oriented horizontal lines reverse the question. They ask--which missions will achieve this space objective? How can we stimulate international cooperation? How can we promote national charisma?

Some measure of the degree to which a program achieves a goal is also desirable. One program might modestly achieve a goal while another would make a major contribution toward that goal. It is a temptation, particularly among persons with a scientific education, to attempt to convert subjective values to objective precise measurements. One could conjure up a system by which each space goal is weighted in some manner, and each space program is measured according to some scale in the degree to which it meets a space goal. The two items could then be combined into a formula that would produce a scale reading presumed to represent the objective "goal value" of each mission.* Unfortunately, it is

*Such a system is attempted in G.R. Woodcock's, "The Problem of Space Flight Worth Analysis," NASA TM X-53174, which is ingenious, but not convincing. The difficulty of assigning quantitative values to essentially subjective goals is the principal criticism that can be made of "relevance-tree" methods of analysis.

necessary to resist this temptation. There is no way to assign commensurable values to prestige, scientific advance, fame, etc. Table II employs a simple five-value scale, based on purely subjective evaluation. Such a rating system can be useful, so long as it is remembered that the more precise the rating appears to be, the more misleading it can be. Assigning ratings, however rough and dubious, forces the analyst to consider seriously how much payoff in "goals" he will get out of each program.

By checking his proposals or groups of proposals against the goals list, the analyst can reject many proposals on the grounds that they are of little or no utility compared with other programs. If, for example, technological gains as such are a high-priority goal, then a project requiring new systems might be preferred to the reuse or modification of existing hardware.

However, the analyst must take care not to be naive in the assigning of goals to programs. Frequently programs will be touted as achieving goals which they actually thwart. To extend our illustrative discussion, let us consider a relatively simple and clear NASA program.

COMMUNICATION SATELLITES*

A widely-held notion is that it should be possible to use satellite communication technology for nurturing goodwill, building cultural bridges, and building potential alliances by providing access to American culture over broad regions of the globe. The unintentional success of American movies in accomplishing this aim during the 1930's may be an unwarranted and inappropriate analogy today. Further, broadcasting is

*This portion is drawn from work in progress by Dr. A. George Schillinger.

not the inverse of data collection via satellites. While the technical processes may be analogous, the political issues posed are quite different.

Those who believe that the communications satellite program forwards, the goal of increased international cooperation may be excessively influenced by the old pacifist assumption that communication promotes mutual understanding that inevitably creates goodwill and cooperation. In fact, communication satellites might promote conflict and hostility and the impression that Americans are aggressively simplistic.

First of all large international satellite networks for communication, commerce, education and entertainment may be considerably less practicable in the foreseeable future than their national counterparts.

In the foreseeable future no enforceable world-wide copyright agreements are in prospect. As an increasing number of earth stations are able to receive satellite signals, piracy may become a problem. Already the attitude prevails that once a program has been transmitted via satellite, copyright protection is in effect lost. The premium demanded by producers in return is pricing many events out of the market.

At present, in order to protect their government-owned land lines, Europeans are reluctant to reduce rates for television transmission via satellites. This attitude may change as land facilities become saturated and expansion becomes necessary. Economic considerations will then dictate the use of satellites.

But, even then direct broadcasts to individual sets or cluster of sets are unlikely for both technical and political reasons. The political control of communication will become an issue. Nations will insist on retaining control over what is being beamed at their population. Even

though satellites radiating at sufficiently high power levels to be picked up by small receivers may be developed during the next decade, they are not likely to be used, for they would provide communications access to the population by other nations. Programs will therefore enter countries through one or more nationally controlled ground distribution centers on a commercial basis--not directly from internationally operated satellites.

Developing countries, in the absence of major land facilities, should welcome the prospect of communication satellite networks. Nations with vast or impassable terrain, such as Brazil and Indonesia, cannot hope to develop wide-ranging communication facilities except through satellites. Even more than in the developed countries, control over access to the population will undoubtedly reside in the technological scheme adopted rather than in international agreements. Sources of transmission and points of terrestrial distribution will surely stay within national control.

While it may be seen as desirable to attract developing countries into the U.S. sphere of cultural influence, this should not be an explicit aim when establishing communications nets. The massive impact American television has had on contemporary British culture is visible both in England and in America. In light of the vast differences between modern western culture and the cultures of the developing nations in Asia and Africa, such cultural "confrontation" does not seem to be desirable for anyone. Even governments friendly to the United States would want to guard against a severe cultural shock.

Satellite nets may be more effective for purposes of U.S. foreign policy if they were looked upon as technical aid, not unlike agricultural

equipment. While such systems are among the most advanced forms of modern technology, from the point of view of internal development they would respond to local subsistence needs. By far the largest part of such systems consists of ground stations. Equipping large regions with American modular communication installations would have long-term economic, political and military advantages for the U.S., apart from those that unavoidable cultural contacts would bring.

In any event, it is not at all clear that international satellites automatically promise a new era of international cooperation.

CONCLUSION

The analyst requires some preliminary criteria for assessing a very large number of competing possibilities. This requires abstracting from specific program goals, grouping together similar options, eliminating proposals of lesser effectiveness, and attempting to clarify seemingly self-evident relationships among programs and goals. For this purpose, a checklist of goals or abstract criteria may be useful, provided it is not applied too rigorously. (Like any other tool, it is a good servant but a bad master.) The next steps are to consider how the relative importance of the criteria may vary with respect to segments of the population--and with respect to time.

HI-1272/3-RR

CHAPTER FOUR

ANALYZING PRESENT GOALS OF GROUPS IN AMERICAN SOCIETY
AND EVALUATING PROGRAMS IN TERMS OF THESE GOALS

IV. ANALYZING PRESENT GOALS OF GROUPS IN AMERICAN SOCIETY
AND EVALUATING PROGRAMS IN TERMS OF THESE GOALS

AMERICAN ATTITUDES TOWARD THE SPACE PROGRAM AND NASA

Up to this point, we have attempted to clarify NASA's goals and then to suggest a fresh emphasis on relating proposed NASA programs to these goals. These are the first two stages in an integrated planning process.

At this point, one important step in the logical series connecting the proposed planning scheme must be developed: the connection between NASA's goals and programs and the goals and attitudes of influential groups in American society. The last sections of this study will then describe and analyze alternate futures and scenarios and indicate how this methodology can be applied to NASA decision-making processes.

As we indicated in Chapter 3, because the United States is a democracy, and NASA is a government agency, funded by taxation and ultimately accountable to the electorate, NASA's projects should in some reasonable way reflect the legitimate objectives of various groups in American society and should have considerable support from significant elements of the public. Obviously, this may be difficult to achieve because some objectives conflict with others.

We have already asked these questions:

What are NASA's over-all goals?

What goals do particular NASA programs achieve?

We now ask:

What are the goals of groups in American society?

Can we analyze their present goals to provide a base for analyzing changes in goals and values under varying conditions in the future?

Ultimately, any study of public attitudes toward space programs and NASA has these aims:

- 1) to remind planners of the political constraints that exist in a democratic society;
- 2) to consider how new definitions of the national interest might influence NASA's stated goals;
- 3) to consider whether important national interests are not understood by various sectors of the public who may be imposing pressures that are contrary to their own best interests and the nation's in the long run;
- 4) to serve as a preliminary analytic exercise leading up to the more basic questions of whether or not NASA's proposals and programs are consistent with its goals.

What we have done is:

- 1) to select groups that are particularly relevant to NASA; after reviewing their values and goals to provide a base line, to suggest that these values and goals may change, and that values shift from one group to another over a period of time.
- 2) to illustrate the fact that different groups within this society have different attitudes toward the space program at any given time; establishing this general understanding is more important than achieving precise accuracy in all details.

Since America is a democracy, the space program must represent the interests and values of substantial groups within our society. As we have stressed, this is not a matter of public relations but a basic principle of American government; the Soviet space planners have a much simpler problem

at present, though even their government is moving toward greater accountability. But interests and values of groups in American society are likely to change in time. It is in NASA's long-term interest and in the public interest to attempt to anticipate these changes in order to carry out its role.

DETERMINING AMERICAN ATTITUDES TOWARD SPACE AND NASA:
SOME METHODOLOGICAL COMMENTS

Before discussing specific groupings in American society, we must ask: how does one obtain a reasonably accurate picture of public attitudes on public issues? Although the answer may seem obvious to some, it is important to elaborate it since so much of the effort to describe the future depends on the degree to which one is reasonably accurate about the present.

The judicious use of opinion polls and attitude surveys is a basic tool for planners. The following must be kept in mind:

- a. Present attitudes are hard to chart accurately. Greater accuracy is possible in regard to opinions held two or more years ago.
- b. While polls are useful, planners must be aware of some built-in shortcomings due to personal attitudes of researchers, improper sampling, incorrect hypotheses, improper questions, and public attitudes toward polls as such.
- c. Several academic data banks are rich sources of information: the National Opinion Research Center, at the University of Chicago; the Survey Research Center at the University of Michigan; and the Bureau of Applied Social Research at Columbia University are only the best-known of many institutes housing large opinion data files.

- d. A private research firm, the Simulmatics Group, is a comparatively expensive source used by some political candidates-- including the 1960 Kennedy Presidential campaign. Simulmatics has developed a computerized model of 480 groups within American society and the basic attitudes (in the form of propositions) held by these groups. Their model permits study of the way new messages travel through the public and the effects of these messages on attitudes.
- e. As an example of the shortcomings suggested above in item b, it is known that in determining public attitudes toward space and NASA it is most important to determine attitudes toward a number of different programs that cost money, and not simply to "survey attitudes" in the most general sense. General attitudes change once the public is confronted with clear choices among programs that have different costs.

Although the planner must take care to identify the real goals of space programs, he must also realize that substantial groups within society may favor a program for the "wrong" reasons. Group N may believe that program X will achieve goals Y and Z. The planner may be convinced they are mistaken, because X will not contribute to Y or Z. Nevertheless, if a substantial group believes X is a route to some goal, the belief may be self-validating, unless the belief is subject to change. Making judgments about both the existence and the stability of such beliefs requires that public opinion polls be not only consulted, but analyzed and interpreted.

Given the time lag in poll accuracy, the limited number of major sources of relatively reliable data, the built-in problems and poll techniques,

and the high cost of the best available polling services, the planner obviously cannot rely completely on polls. He must supplement them with more qualitative methods of studying social trends, e.g., the use of representative periodicals; the identification of key spokesmen, etc. Here knowledgeability, breadth of experience, and a rather elusive and frequently unpersuasive capacity for "insight" may be crucial.

KEY SOCIAL-POLITICAL GROUPS IN AMERICA

General Characteristics

Our list of space goals ranges from the idealist or abstract at the top of Table I (page 2-9, above) to the mundane or base at the bottom. Clearly various groups and interests will have different ideas about what items on this list are or are not desirable goals. Some NASA staff and contractors might be interested in maintaining or advancing personal or corporate organizational interests--whether because of dedication to particular programs or loyalty to groups or personal ambition. Conversely, all of humankind might value the cosmopolitan goals in Category A.

NASA itself states its goals to be Categories B, C, D, and sometimes F--the internationalist, nationalist, scientific, and economic potential goals; and most spokesmen would vigorously deny being influenced by Categories G and H--the goals attributed to it by some critics. Like all of us, NASA officials probably assume that their values are widely held. This is not the case. Various groups within our society have widely diverging views regarding space goals. For our purposes we will divide society into social groups--each with characteristic life styles and corresponding attitudes towards the space program.*

*These categories are drawn from work in progress at Hudson Institute by various researchers, notably Frank Armbruster and Herman Kahn.

The "correct" method of sub-dividing society for the purpose of social and political analysis has been under discussion among scholars, sociologists, and political commentators since the days of the ancient Greeks. How one divides society for the purpose of analysis usually depends upon how one views that society personally, and where one stands in its social and political structure.

SOCIETY AND POLITY--THE CONVENTIONAL WISDOM

Any discussion of the structure of our society and political system must begin with consideration of the most widely held views of both--the so-called "conventional wisdom," as commonly expressed in journalism and in our every day speech. Although we claim that America is a "democracy" with persons theoretically equal and presumably having equal opportunities to achieve the material and status awards that our society offers, we also recognize that those rewards are unequally distributed. Most of us would agree that they should be unequally distributed, as prizes for superior performance.

Compared with Europe, particularly feudal Europe, America is an egalitarian society. Foreign observers, accustomed to a hierarchal society based on a rigid class structure, are frequently misled into believing that Americans have achieved their goal of social and political equality. However, in our own lives we recognize that there are differences between Americans, and that these differences are often based upon the family to which an individual was born, and are reflected in values, customs, and political behavior.

Over the last few generations the techniques of systematic sociological analysis have been applied to American society and have produced a widely accepted view of the class structure of America. Recognizing that American class lines are not rigid as those of a caste society such as India, nevertheless sociologists have found it useful to depict what are in essence ideal types of social classes. Perhaps the most commonly accepted is the organization of the sociologist W. Lloyd Warner and his associates, which is based upon studies of various sized cities in the American Mid-West, New England, and the South. Warner and his associates have found that these cities have a class structure within them which is generally recognized by the inhabitants. Warner sees an upper class or elite of wealth, power and status. Just below them is an upper-middle class of professional people of high income, rather than wealth, and substantial status. Next on the ladder is the lower-middle class of shopkeepers, white collar workers, etc., who are the largest class. These are followed by the upper-lower or working class, who are "respectable" manual laborers. At the bottom is the lower-lower class of persons of erratic income, distasteful personal habits, and who are held in contempt by the rest of society. Sometimes the upper class is divided into upper-upper and lower-upper; the latter being the new rich; the former, old established money. In studies of a small Midwestern city and an old New England seaport city, Warner found the following class distributions.

	<u>CLASS DISTRIBUTION</u>	
	<u>"Jonesville"</u>	<u>"Yankee City"</u>
Upper	3%	3%
Upper-middle	11%	10%
Lower-middle	31%	28%
Upper-lower	41%	33%
Lower-lower	14%	25%

W.L. WARNER ET. AL.
DEMOCRACY IN JONESTOWN
 NEW YORK, 1949 p. 24.

These studies were conducted just before and during the Second World War. A similar survey done today would likely show that there was a general shift in favor of the middle classes away from the lower classes. In both cities, Warner found that the upper and upper-middle classes were almost absolutely dominant. They had both political and social power vastly exceeding their numerical importance. They were the leaders, the others were the followers.

The second piece of our conventional wisdom regarding the organization of society and politics is that there is a relationship between class and political opinion. More prosperous people generally vote Republican and less prosperous vote Democratic.* The Democratic party (and "liberal" programs) are more likely to be supported by working people, particularly trade union members, ethnic minorities, Irish, Italian, and Slavic Catholics, Jews, and Negroes. The Republican party is perceived as the party of "conservative" principles, of business men large and small, and of

*L.A. Free and H. Cantril, The Political Beliefs of Americans, (New Brunswick, New Jersey, 1968).

farmers. Regional distinctions between the parties, once very important, are seen to be on the wane--even the one-time solid South can no longer be counted surely in the Democratic column. However, there remains an urban--rural split--the cities being seen as Democratic, rural areas as Republican. The suburb, the chosen residential area of executive and white collar workers, is conventionally seen as Republican territory.

As noted before, this picture is very familiar to us. This picture was probably highly accurate as late as perhaps 1960, and has great validity today. However, what are we to make of certain social and political phenomena; such as very wealthy "silk stocking" areas voting for very liberal Democrats; millionaire candidates offering themselves as supporters of the interests of the very poor, blue collar workers, including trade union members, supporting "conservative" candidates; big business men supporting the Democratic candidate for president in 1964; and construction workers bearing signs "we love the establishment" and beating up college students, who are presumably the children of the establishment. Strange things are happening in American society. Many of the old rules no longer apply and many commentators and observers of the American scene have leapt into the breach to attempt to explain what is happening, and what implications these events have for the future of the nation, and for future policy making.

RECENT ANALYSES

The Emerging Republican Majority

A recent, very extraordinary analysis of the U.S. public which has generated wide discussion is Kevin P. Phillips' The Emerging Republican Majority, (New Rochelle, 1969). Phillips, a sometime Republican campaign

strategist and aide to Attorney General Mitchell, takes the position that U.S. voter patterns are most easily understood by considering the ethnic composition of the electorate. According to Phillips, a voter's ethnic and class status and his attitude toward other groups principally predetermines his voting pattern. Moreover, he believes that these ethnic patterns can be traced far back into our nation's past, and that today's voting was largely established by the conditions under which the country was settled. For example, those areas settled by New Englanders will have the same political tendencies as rural New England.

Phillips believes that the politics of the New Deal have broken down and the time is ripe for a new coalition of forces which will inaugurate a "new era" of American politics comparable to that of the New Deal; Phillips' new era will be dominated by the Republican party--a conservative Republican party. Phillips sees America as mosaic of ethnic groups, interacting in a complex pattern, but the key elements are shown in the table below:

Liberal Establishment (i.e., upper-middle class and upper class WASPs and Jews)	White middle-class suburbanites White Southerners
Negroes	Ethnic (i.e., Italian, Irish, Slavic, urban working men)
Other non-white minority groups	

Obviously, the right side of the table is the winning side and, in Phillips' view, only the Republican party can unite these elements into one force. Phillips is less candid about what will unite this disparate group who have historical conflicts of economic interests. In fact, the

down-grading of economic interests is one of the most fascinating aspects of Phillips' analysis. It is clear that Phillips expects the majority to be not so much united for anything as united against the left group, the liberals and non-whites. Phillips' Republican majority relies upon polarization as a permanent factor in American life. He expects the great mass of Americans will recoil from "the research directors, associate professors, social workers, educational consultants, urbanologists, development planners, journalists, brotherhood executives, foundation staffers, communications specialists, culture vendors, pornography merchants, poverty theorists and so forth...the propagators of environmentalism (as beneficiaries of resultant social remedial spending) and architects of the Permissive Society" who "benefiting from the expenditures and activities of big government, propagated an ideology which promoted big government." The non-white minorities are perceived as the clients of the "Liberal Establishment."

To win a majority in the future, Phillips believes the Republicans must assemble the forces which supported Nixon and Wallace in 1968. Together these will give a clear majority. The Republican majority would be made up of the Midwestern and Plains states and the South (hence, the so-called "Southern Strategy") and the suburbs of the Far Western, Midwestern and Middle Atlantic states. Phillips advises Republicans to write off New England, New York, and Michigan. He points out that the old, traditionally Democratic North Eastern, urban strongholds of the Democratic party are declining--economically and in population--and that the wave of the future is in the suburbs, particularly the suburbs of the South and South West, and that these areas are conservative and Republican. Phillips

does not advocate a "right wing" strategy but he does clearly imply that should the Republicans find it necessary to bolster their moderate position with either "left" or "right" support, they should pick the right.

Administrative spokesmen have publicly denied that Phillips' concept of social and political structure has had any effect upon their strategy. However, in the congressional campaign of 1970, it is clear that the Republican party had sought to emphasize the "social" issues to the exclusion of economic issues and by making a major play for "silent majority" unity on the issues of "law and order" and permissiveness, sought to unite the elements of Phillips' projected coalition.

The Metroamericans

The historian, Eric Goldman, a White House staffer during the Administration of President Johnson, attempted to explain the decline and fall of the Johnson Administration in his The Tragedy of Lyndon Johnson, (New York, 1969). According to Goldman, the failure of Johnson to mobilize the country behind his program was caused by Johnson's lack of rapport with the group of people that Goldman calls "the Metroamericans." Goldman describes the Metroamerican as "youthful, educated, affluent, more likely to have some minority blood in his veins. His mind had been shaped by an environment which had been good to him. It was no less formed by an American scene of aggravating big organizations, brassy media and grinding social dislocations, and by a world situation of wars and threats of still worse wars. His thinking and his attitudes were a tangle of ambivalence. The Metroamerican was avidly on the make, economically and socially, but he shied away from the appearance of sheer money-making or sheer caste and preferred the manner of public-spiritedness and cultivation. He had ideals, but was skeptical

of other people's--and even, à bit, of his own.. He was liberal but without ideology; tolerant, but intolerant of do-goodism; flexible, pragmatic, and a devotee of the ironic edge."

According to Goldman, Johnson failed to appeal to these people because of his provincial, Texas, vulgar style. The Metroamericans turned on him and succeeded in eroding his credibility. Goldman does not claim that Metroamericans are anything like a majority of the American people, but they were "abundantly numerous, articulate, and powerful, and they were especially important in determining national attitudes because of their dominance in the world of books, magazines, radio and television."

Goldman, himself educated at Johns Hopkins and a professor of history at Princeton University, understandably places great importance on what he perceives to be the deprived nature of Lyndon Johnson's education. A large part of the blame of Johnson's misreading of the dominant intellectual Metroamerican element presumably could be attributed to his attending South-west Texas State Teachers' College.

Goldman's "Metroamerican" clearly is practically identical to the conservative concept of the "liberal establishment," of upper class, educated Eastern dominant social and political elements. The recent attacks by Vice President Spiro Agnew on the "Eastern liberal press" were an attack on "Metroamerica," perhaps intending to destroy its own credibility before it could destroy Nixon as it did Johnson. We may conjecture that Goldman would disapprove of such a strategy. The political implication of Goldman's thesis is that no national administration can succeed unless it has the confidence and support of "Metroamerica" as John Kennedy did.

It is most interesting to note that Goldman defines Metroamerica, not in terms of economic interest, nor in ethnic origin, but in terms of education and world outlook. His Metroamericans are cosmopolitan, liberal, pragmatic, and more clearly perceive what are the "real needs" of the nation. The bulk of the country that is outside of Metroamerica presumably suffers from a lack of education. Goldman clearly identifies with Metroamerica, although he was shocked by its crude snobbery and vicious invective against his former boss. According to Goldman, this division between Metroamerica and the rest of the nation caused the tragedy of Lyndon Johnson.

The New Populism

A comprehensive liberal Democratic answer to Phillips has not yet been produced; however, the elements of such an approach appear in Fred R. Harris's "The Making of a Majority," (Harper's, May, 1970).^{*} Senator Harris, a former Chairman of the Democratic National Committee, denies that the country is going conservative; rather, he believes that the bulk of the population remains predominantly "liberal." Harris does not believe that the Republicans can add the Wallace vote to their base strength to produce a conservative majority. He perceives the Wallace voter as a "populist"--of low income, anti-establishment and susceptible to an appeal to his economic interests. In effect, Harris believes that the traditional politics of the New Deal era will still work in America, that the Democrats can win with a constituency of the young, black, the poor, and the white working classes (presumably together with the liberals, although Harris does not mention this in his article). Harris's populist coalition would be arrayed against the privileged elements in our society, which Harris perceives as being predominantly Republican.

^{*}Since this was written, Harris has published a book on the subject.

The Real Majority

A more recent study of political behavior is Richard C. Scammon and Ben J. Wattenberg's The Real Majority, which although purporting to be a neutral analysis, has been widely heralded as a Democratic answer to Phillips. (The authors were office holders under Johnson.) The authors argue that the real majority in America is those voters who are "liberal" on bread and butter economic issues (federal aid, medicare, etc.) but "conservative" on social issues (anti-crime, rioting, pornography, etc.). Liberal Democrats can win if they pay sufficient attention to the deep concerns of the electorate on social issues. To Scammon and Wattenberg the winning position on the political spectrum is neither right nor left, but center.

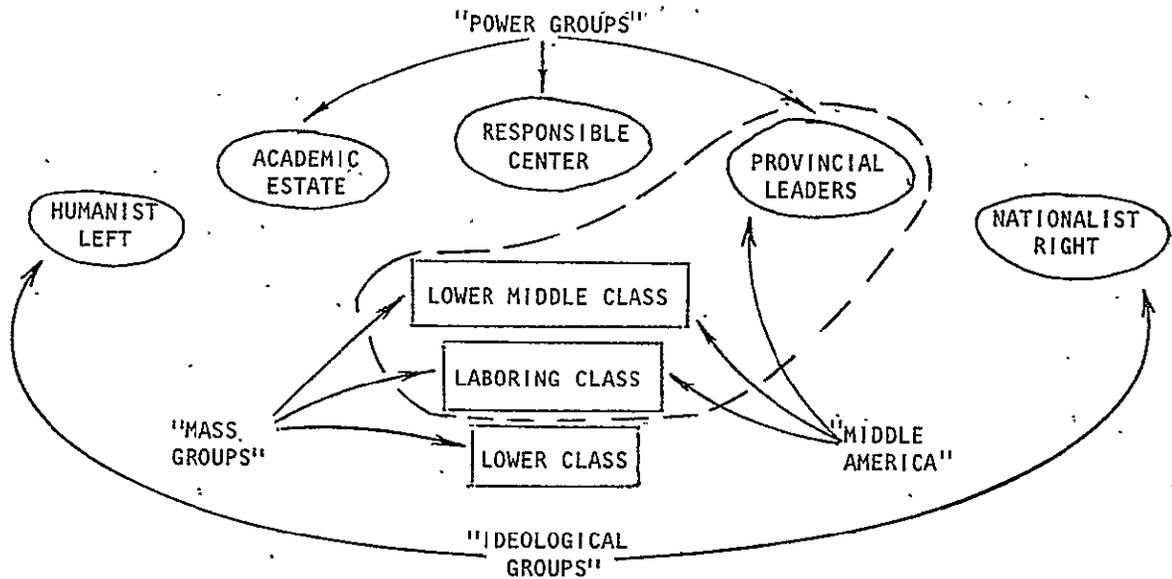
In reaching this conclusion the authors scrutinized a vast array of voting data, public opinion sampling, and demographic material. In contrast to Phillips, they attribute less importance to ethnic or social factors. Indeed, they believe that on social issues "the striking fact is how similarly Americans feel about these issues regardless of age, region, sex, education, occupation, religion, politics, unions, community size, or almost any other cross-index one might come up with." They do address themselves to the subject of ethnicity, but believe that the ethnic groups are receding in importance as immigrant groups are absorbed in the melting pot. However, in discussing local politics, they bring in ethnic matters more frequently. It would appear that Scammon and Wattenberg are slaves of their data. National public opinion sampling does not divide the population ethnically (except black and white) but analysis of local ethnic voting patterns is common.

Directly refuting Phillips' so-called "Southern Strategy", Scammon and Wattenberg point out that the real seat of electoral power in the United States is "Quadcali"--the quadrangle encompassing Massachusetts, Washington, D.C., Illinois, and Wisconsin, plus California. If a presidential candidate can win in this area, the rest of the country doesn't matter. This area, of course, is the most highly urbanized part of the United States. In contrast to Phillips, Scammon and Wattenberg explicitly deny that the New Deal coalition is breaking up. They point out that people have been saying it has been breaking up for generations and still it remains substantially intact--except for the defection of the South. They point out that the major shifts in American political behavior are really expressed only in a few percentage points, and that things really have not changed so much. They are in substantial agreement with Phillips in that they recognize that the Democrats have permitted themselves to be perceived as "soft" on social issues, and they recommend as a strategy for Democrats that they make clear that they share the concern of the electorate on these issues; having done this, the social issue will be defused and then elections can be fought out on the established basis of economic interests, under which terms of conflict the Democrats will probably win. This book has been widely read by Democratic politicians, and it would seem that judging from the public statements of many of them in the elections of 1970, they have taken it to heart.

A PARADIGM OF AMERICAN SOCIETY

We attempt here to organize American society, circa 1971, in such a way as to be useful to persons engaged in policy formulation. We have

not broken down society by economic, age, occupation, geographic, sex or religious categories at this point, though such variables are included in the discussions that follow. Rather, for present purposes we have chosen to distinguish groups in society primarily in terms of values, without exposing here, except marginally, the origins and correlates of these values in terms of age, sex, social and economic roles, religions, educational, geographic, and ethnic differences, etc. Further, we have not attempted to achieve precise accuracy on all issues even within the groups we are discussing, since this is meant to be an illustrative and suggestive exercise. Still, we feel that it is extremely useful to the understanding of how our society and polity works to sub-divide the entire nation into the eight primary groups shown on the following chart. These groups will be described separately below but since they are to a certain extent defined in relation to each other, we will begin by a brief discussion of all of them.



To reduce the scheme to its bare bones, we see America divided into three groups defined in terms of the power they have in our society; three mass groups comprising the bulk of the population; and two extreme ideological positions who define themselves in terms of their values. We have attempted to give them value-free names, hoping by this means to limit partisan dispute regarding the nature and composition of the various groups, and the validity or relative merit of their views. The groups we choose to identify are these:

Three Power Groups:

Responsible Center
Intellectual Estate
Provincial Leaders

Three Mass Groups:

Lower Middle Class
Laboring Class
Lower Class

Two Ideological Groups:

Humanist Left
Nationalist Right

To guide the discussion, we present the table on the following page which relates the overall reactions of the above groups to the objectives of the space program. Note the category, "Middle America"--we believe that for NASA policy planning purposes it is best to consider the provincial leaders, the lower middle class, and the laboring class together because their differences are not as significant to NASA as their common values, although those differences can be very important in shaping the entire national environment in which NASA must function in the future.

TABLE III
SPACE OBJECTIVES OF AMERICAN SOCIAL-POLITICAL GROUPS, 1969

		Responsible Center	Intellectual Estate	Humanist Left	Middle America	Lower Class	Nationalist Right
A	1. Achievement per se	++	+	0	-	0	+
	2. Meeting commitment per se	++	+	0	+	0	0
B	3. Man's conquest of space	++	0	+	0	0	+
	4. International cooperation	0	++	++	++	0	--
	5. Moral equivalent of war	0	++	0	--	0	--
C	6. Increasing U.S. prestige	++	--	--	++	?	++
	7. Succeeding in U.S.-U.S.S.R. prestige competition	++	--	--	++	?	++
	8. Succeeding in U.S.-U.S.S.R. military competition	++	-	--	++	?	++
	9. Succeeding in U.S.S.R. economic and geographic competition	+	--	--	++	0	++
D	10. Satisfying curiosity	-	-	-	0	0	0
	11. Scientific advance	++	++	--	0	0	0
	12. Technological advance	++	+	--	+	0	0
E	13. Mobilization base for achieving other items	++	+	-	+	0	+
F	14. Potential economic benefits from space technology	0	0	0	++	0	0
	15. Short-term economic benefits from stimulation of national economy	++	0	0	++	0	0
G	16. Entertainment of public	0	--	0	0	0	0
	17. Redirecting attention of society	?	--	--	-	--	++
H	18. Advancing personal careers	+	-	--	0	0	0
	19. Advancing organizational interests	+	-	--	0	0	0
	20. Maintaining funding	0	-	--	-	--	++

++ strongly supports this objective
 + supports this objective
 0 unaware, indifferent, or ambivalent
 - opposes this objective
 -- strongly opposes this objective

THREE POWER GROUPS

"One way to look at American democracy is to see it not so much a democracy at all, but rather a society with an unprecedentedly large and varied assortment of elites."

Daniel Patrick Moynihan

In our paradigm of American society, we see at the top three competing groups each of which has economic, social and political power far out of proportion to its numbers. Although these groups together comprise only a few million families, in many ways they dominate the whole life of our country. We do not say that they rule America, because they can maintain their position only through the tacit approval of the masses, and they are at odds with one another, vying for power and for support from below.

The Responsible Center

Appropriately, at the top and center of our chart we find the Responsible Center--that is, those men who control and manage the great institutions of America. We include in this group corporation executives, high military and government officials, and many administrators of other non-profit organizations, such as university presidents, church leaders, and union officials. The Responsible Center is often called "the establishment;"* however, as we shall see, we have several establishments in America, of which the Responsible Center is one, although certainly the most important and powerful. The Responsible Center constitutes a ruling group, but certainly not a ruling class. Unlike most of the elites of the past, the Responsible Center is not a hereditary elite, that is, its power does not come through birth to upper class families. Nor does the power of the Responsible Center come from its possession of personally owned private property.

*C. Wright Mill's "Power Elite" is close to our concept of the "Responsible Center." See The Power Elite, (New York, 1956)

Though many of its members are very rich, their wealth comes not so much from the possession of property as from the possession of high position, and therefore high income. To be sure, it is useful to be born into the right family in order to gain access to the Responsible Center and it is also useful to have family-owned property, but these attributes only give a person an advantage in gaining admission to the group. They have little to do with the individual's ability to rise to the top.

The Responsible Center does not consist only of the high officials listed above. It also includes all those persons who aspire to achieve those positions, as well as the people who serve those at the top. The Responsible Center is perhaps best seen as a pyramid--in the military, for example, the pyramid comprises all members of the officer class from the chief of staff down to the West Point Cadet. Positions at the top are earned by the junior members after a long period of struggle. Personal sacrifices made by individuals to achieve positions at the top are often incomprehensible to persons outside of the Responsible Center. The financial rewards are certainly large, but would not appear to be worth the sacrifice of family life, leisure time, individuality, and sometimes personal self-respect. It would seem that members of the Responsible Center do not primarily want money, or even fame (how many people can name the heads of great corporations or military branches?), they seek power, they want to be on top.

Because the leaders of the Responsible Center are a tiny group selected from competition among a much larger group, and because the nature of the environment in which they compete and the men they compete with imposes a standard upon the entire group, the type of man found at the top of the

Responsible Center is remarkably uniform in his personal character and values. Success in infighting in large organizations requires a high degree of expertise in the more subtle forms of diplomacy. It requires a great degree of self-control, it requires men to be able to swallow their pride on occasion, it requires men who will accept the standards of the organization and not rock the boat. To gain admission to a self-perpetuating oligarchy, the candidate must rigidly adhere to the standards of that oligarchy. Very little deviation is tolerated. The individual member of the Responsible Center is extremely sceptical of deviant behavior of all types, even deviant dress. Deviant ideas are considered to be "crackpot" and unworthy of consideration. The factors that are looked for in the Responsible Center are balance, moderation, and ability to postpone immediate gratifications for long-term gains, respect for authority, respect for existing institutions, loyalty, and the ability to perceive the big picture. Little men addicted to details cannot manage the vast bureaucracies which control the economic and social life of the United States.

The Responsible Center is a meritocracy, drawn from a large body of the population, but not the entire population. Members of the Responsible Center are recruited almost entirely from three groups--from the children of the Responsible Center, from the children of the provincial elites, and from the lower middle class. Almost all members of the Responsible Center are college graduates, particularly from schools of business administration and engineering. There are many liberal arts graduates among them but few of them were very good students in the humanities. Although members of the Responsible Center feel the need from time to time to give lip service to

the importance of the humanities and fine arts, in truth, they are not much interested in them. Responsible Center people respect hard data and the ability to make tough decisions. Vagueness and/or indecision are anathema to them. Ideas are valuable only insofar as they are useful.

The Responsible Center has been with us for a good long time; however, it was first identified as a major power group during the nineteen-thirties when authors such as Berle and Burnham (and later Galbraith) pointed out that American capitalism was no longer controlled by capitalists but by the managers of the corporations. And that these managers were remarkably similar in their style and values to the persons who controlled the theoretically socialist and fascist Russian and German systems. It became clear that constitutional, ideological and economic theories were not as important as organization and control. James Burnham, in particular, claimed that the managers were the wave of the future and that soon they would dominate all aspects of life. This prediction has not been borne out, but over the past generation the Responsible Center has extended its power relative to that of the provincial elite. On the other hand it can no longer absolutely rely on the support of the Intellectual Estate.

Members of the Responsible Center are usually college graduates--often with post-graduate degrees. Their backgrounds include engineering, business administration, law, the physical sciences and economics.

They value expertise, planning, practical accommodation, innovation, success, power, prestige, social stability, continuity, and long-term investments that produce a reasonable number of periodic payoffs--either material or non-material. They see themselves as responsible for keeping the country going, handling its day to day affairs, and "sustaining the

enterprise" whatever else may happen in domestic or international affairs. Their great sense of responsibility and duty is heightened by a receptivity to subjective and "atmospheric" goals.

The Responsible Center is strong for the space goals in Categories A, B, C and D and is particularly inspired by item #3--Man's Conquest of Space. The responsible centrists fancy themselves to be hard-headed pragmatists, but they are the group most "turned on" by abstract goals--Man's Conquest, American prestige, and scientific advance.

The Intellectual Estate

The second most important power group in the United States is that body of persons in institutions we call the Intellectual Estate.* This group comprises the great bulk of college professors, administrators, upper-class journalists, non-profit professionals of various types, as well as a considerable body of protestant clergymen (particularly in the Eastern states) and school teachers together with a large block of the government bureaucracy. Actually, the institutions where members of the Intellectual Estate work are less important than they are for the Responsible Center. A member of the Intellectual Estate derives his influence not so much from the position he occupies as from his possession of education. Most members of the Intellectual Estate own very little personal or productive property (indeed, professors with independent incomes commonly are "conservatives", that is, they identify with the provincial elites described below). In some respects the Intellectual Estate performs the same role in our society that the clergy performed for Medieval Christian Europe. Like their medieval counterparts, the Intellectual Estate controls the expertise necessary to operate the bureaucracies of

*Our concept of the Intellectual Estate is very close to what J.K. Galbraith called "The Educational and Scientific Estate" in The New Industrial State, (Boston, 1967)

secular government, as well as having the spiritual power (such as it is) in our society. Members of the Intellectual Estate see themselves as responsible for the public and national conscience, for the ideas that make it possible for the Responsible Center to keep the country going, for the analysis and criticism that make it possible to understand "what is really happening" and to guide, assist, and perhaps eventually replace the often misguided Responsible Center.

Frequently members of the Intellectual Estate are the children of the Responsible Center. Because the high positions in our society cannot be inherited, members of the Responsible Center can only give their sons a leg up in society by purchasing huge amounts of education for them, which turns the children into members of the Intellectual Estate.

Needless to say, they are almost without exception college graduates with post-graduate degrees--frequently from elite universities. Their backgrounds include the liberal arts, the physical and social sciences, and the law. Politically, almost all members of the Intellectual Estate would identify themselves as "liberals". They value intelligence, education, moderation and individualism. They disclaim or oppose personal and national glory, honor, and prestige; oppose differentiation by birth, race, sex, and anything other than education or intelligence; they minimize the importance of physical courage and strength as positive values. The view of the opponents and critics of the Intellectual Estate is characterized by George Wallace's famous attack on "pointy-headed professors" who are seeking to take over the country as some sort of new ruling elite. Whether justified or not, there is certainly a good deal of deep distrust of the Intellectual Estate among the public at large. For the most part, members of the Intellectual Estate

travel only in their own circles and are generally unaware of the widespread hostility to them, and if aware of it, attribute it to ignorance.

The Intellectual Estate is relatively small--perhaps a few hundred thousand families--but its importance transcends its numbers. The Intellectual Estate controls most of the universities and colleges of the United States, particularly the most prestigious and influential ones. The Intellectual Estate also mans the middle and upper levels of federal, state, and local welfare, education, and public health bureaucracy. Perhaps most important of all, the Intellectual Estate staffs almost all of our central national media--television, the New York media establishment, the national press, publishing, advertising, "educational television", as well as governmental and scholarly journals of all kinds. It is not too much of an exaggeration to say that the Intellectual Estate not only identifies the issues in our society, but defines the terms for debating those issues. This gives it immense national power.

The Intellectual Estate is strong on Categories B (with an important exception) and D, very weak on Category C, and strongly opposed to Category G. This group's exception to Category B is its objection to the item which an astronaut would place at the top of his list--Man's Conquest of Space--which it sees as economically irresponsible. Hence, their vocal opposition to manned space flight.

Provincial Leaders

By this label we designate the people who dominate control of the localities in the United States. They are the important men in our counties and cities, the local bankers and businessmen, lawyers and politicians. The

key word in understanding their position is "local". Their importance is limited to a small area; but within that area they are very powerful. Outside of the locality they are individually inconsequential. Collectively they can be very important, if they can be organized.

The institutions they control are tiny compared with national organizations. But within their organization they have more individual power than their equivalents in the Responsible Center. The President of the Wabash Water Company has more power over his company than has the President of General Motors over his. Many of the Provincial Leaders are the owners of their businesses. This delineates them from the Responsible Center. They actually own productive property. They are capitalists in the pure sense. Naturally, the Provincial Leaders are great enthusiasts for private property, individual enterprise, and local autonomy. They are suspicious of the metropolis, recognizing that their authority can be eroded by scale. A lumber yard owner amounts to nothing in a large city, but can be important man in a rural township. The city challenges his status and threatens to proletarianize him.

Most of the provincial leaders are college graduates, but as might be expected, from local colleges. Compared with the other power groups, they have more non-college graduates. Most "new rich" belong to this group.

Continual recruitment from below helps to keep them in tune with the great mass of Americans. But even more important, the provincial elites live in small communities and are in constant contact with the masses. The Intellectual Estate and Responsible Center normally move in class ghettos--corporations, universities and bureaucracies --and often get out

of touch with the broader society. The Provincial Elites tend to share the standards and values of most Americans and they have excelled at these standards, so they are recognized as very much like the "natural aristocrats" that Jefferson hoped would rule the nation. Most of them would describe themselves as "Jeffersonians."

Provincial leaders expect and generally receive the respect and continuation of their values by their children. Unlike the other power groups, they have concrete property and position to transmit to their children. The family ranks high in their system of values. Genealogy flourishes in this group, accompanied by the more obvious forms of social snobbery (especially among the women). Their children at college form the backbone of campus conservative organizations. Certainly, this is understandable--these young people have something to conserve. They are somebody, and have little difficulty in establishing their identity.*

The country club is an excellent symbol of the social aspirations of the provincial leadership--exclusive, yet comprehending "anybody who is anybody". The Chambers of Commerce, the Rotary and other service clubs, the NAM, and the so-called "Right Wing" of the Republican Party are controlled by this group. (The "liberal republicans" are big business, that is, Responsible Center.)

The Provincial leaders are generally satisfied with their personal positions in their local communities, but are troubled by the direction in which the nation as a whole is headed. They deeply resent the Intellectual Estate meddling in their affairs via regulation "in the public

*Of course, some of them defect, fleeing the "narrowness" of small town life. Writers from this group have pilloried the type, as in the novels of Sinclair Lewis. John O'Hara gave them more sympathetic treatment.

interest". They are envious of the power of the Responsible Center. And they are fearful of social reforms or value changes that would threaten their exhalted position vis a vis the lower classes in their communities.

THREE MASS GROUPS

We now move to the consideration of the groups which make up the bulk of the population in our society. Perhaps 90% of the population should be considered in these groups and therefore, according to our democratic principles, they effectively are the nation. However, in terms of their ability to affect national policies and to establish national standards; despite their numbers, they must be in some sense considered as "minority groups."

The key difference between our mass groups and our power groups lies in the word "power." The mass groups lack individual power, and in normal times lack collective power. In our democratic society the limited power of the masses is expressed in two ways: first, in elections where they are from time to time permitted to make choices between political leaders and occasionally through referendums between programs. Of course, the candidates are normally from among the power groups and are usually selected by them; nevertheless, elected officials, even when their inclinations are toward the values and interests of the power groups are aware of the need to cater to the masses which elected them. In practice, those officials which are least answerable to the electorate--judges and senators--are more "independent," that is power-group oriented rather than mass-group oriented, than are officials elected regularly. The lower houses of our national and state legislatures more accurately reflect the values of the

masses, and, of course, are held in most contempt by power group journalists and commentators. The U.S. Constitution and most state constitutions have this combination of democracy and aristocracy deliberately built into them.

To designate our mass groups we will use the conventional labeling of sociologists--identifying these people as "the lower middle class," "the laboring class," and "the lower class." Of course, these labels are useful solely as a means of identifying very large aggregates of people; many persons would be difficult to classify under this system; however, many more could be easily categorized and for doubtful cases, it would merely be a matter of choosing between which of the two groups they belong to.

The Lower Middle Class

Occupationally, most of these people are white-collar workers, although they include many highly skilled blue collar workers, and even some professionals, such as school teachers and low-level bureaucrats who are not intellectually inclined. Today, most of the incomes of this group are between \$7,000-\$15,000 per year. Many of them may have substantial incomes, but they share the value system of the entire group. Educationally, the lower middle classes almost to a man, high school graduates. Many of them have gone to college, but typically the less fashionable and less intellectually demanding schools. However, whether they have gone to college or not, the parents in this group expect that their children will go to college.

The lower middle class is a stronghold of the traditional American virtues and values. They are patriotic and loyal to the symbols and

institutions of the American republic. They identify wholly with the nation. Similarly, they retain their allegiance to their traditional religious denominations--whether Protestant, Roman Catholic, or Jewish. They believe in and have respect for formal education. They support the free-enterprise system. They are suspicious of and opposed to what they consider to be deviant or radical behavior whether political or social.

In family upbringing, the lower middle classes are extremely child-centered. They consider the children to be the center of family life and it is expected that the parents will make the appropriate sacrifices for the children's benefit. The lower middle classes are the typical home owners in America, and their pattern of life is the standard for most of the new "ticky-tacky" (a patronizing, elite term) suburbs that have sprung up since the Second World War. The lower middle classes are heavily in debt, particularly for their home mortgages, but normally carefully budget their funds to maintain a respectable standard of living. They hope to be upward mobile and their ambition is to achieve entrance to one of the elite groups. To the classes above them they are respectful, to the classes below them they are contemptuous and fear the debasement of their standards from contact with the laboring and lower class. Many of the lower middle classes have recently climbed from the laboring classes and fear slipping back.

The Laboring Class

These are the blue collar workers, wage workers in mostly semi-skilled jobs, but also with many skilled jobs, some white collar jobs,

and a few unskilled jobs. Typical incomes are in the range of \$4,000-\$8,000. Most of the men in this group work in factories or shops; most of the women are in various white collar or service jobs such as typists or waitresses. Although formerly they dropped out of high school at the legal age, today young working people normally graduate high school. Many of them are unionized and this group is the backbone of the trade union movement in America. They are hourly wage workers and their jobs are often insecure. They are subject to lay-offs, cut-backs and only the unions save them from arbitrary action from the "bosses."

Like the lower middle classes, this group is intensely patriotic. It forms the backbone of the rank and file of our armed forces. However, compared to the lower middle class, the laboring classes is a somewhat less enthusiastic about the American way of life. Their typical attitude toward American institutions is a healthy scepticism--they are well aware that they do not occupy a favored position in our society, and that the groups above them are acting in their own interest, which clashes with that of the working people. The laboring class claims a physical and moral superiority over the upper classes--they look upon themselves as having more "heart," and believe that the role that they play in the economy and in society is indispensable, even though not properly recognized by the classes above them.

The laboring class family is patriarchal, and reflects the European tradition of the large recent immigrant population found in the working class. The man is expected to run the family. The women are expected to play traditional female roles, and the children are expected to adhere

rigidly to adult standards. The laboring class does not expect its children to go to college, nor in many cases does it desire the children to go to college, for fear they will learn upper class standards and reject the values of their parents. Working people normally rent their housing-- they normally lack the capital to purchase housing. If they own a house, it is normally a row house in an unfashionable part of town.

The laboring class is deathly afraid of the lower class as the next group down in the social ladder. Lower class life and standards are a constant threat to the working man. He knows full well that his economic survival and continued social position depends upon his maintaining strong standards of personal discipline, cleanliness, and reliability which he believes necessary for him to fulfill his role in the factory system. Should he lose these he will sink down to the depths.

The Lower Class

The lower class is the group at the very bottom of our society. These people work at the most unskilled and low paid jobs, such as domestic servants, manual laborers, and agriculture workers. Many of them are unemployed and unemployable. Their income ranges from nothing to about \$4,000 per annum. This is the class that lives on welfare, and is the recipient of most of the social welfare benefits that are offered by our society. Many of the lower class are criminals of various types, whether welfare chiselers, prostitutes, petty thieves, or drug addicts.

The typical member of the lower class got out of school as soon as he was legally able to do so. He does not expect his children to go to college, nor has he any favorable vision of the future, other than perhaps making a sudden killing through some chance skill as a musician or

athlete or a winning lottery ticket. Perhaps the most obvious characteristic of the lower class is its relative lack of any time sense, and therefore its inability to plan for the future, to hoard its resources, to postpone immediate gratifications for future gains.

Ethnically, the lower class is over represented among the non-white minority groups in the United States--Negroes, Puerto Ricans, Mexican-Americans, and Indians--although a majority of its members are "white trash" living in agricultural areas or recently arrived from them to urban slums. The lower class is generally indifferent to the wider society and in many ways unaware of its existence, except as a hostile, confusing, and oppressive milieu in which to live. The lower classes seldom vote, they pay little in taxes, they are for the most part ineligible for military service, they commit the most crime, they do not supervise their own children, and generally have a whole battery of cultural attributes that make them obnoxious to "middle class" standards of the rest of society.

The family life of the lower class is especially significant. Casual sexual arrangements are commonplace, sexual promiscuity is rampant, illegitimacy is high, and family dissolution is an everyday occurrence. Since the men come and go, the family is headed by the women, and is properly described as matriarchal. The young men of the lower class raised in a predominantly female family in which the absent or wandering male is an object of contempt, feel it necessary to express their personality by an excessive degree of physical masculinity. The lower class youths have a tendency toward sexual assault and physical violence of all kinds. They make slums very dangerous places to be in. Crime is an ordinary event among the lower class and our prison population is largely drawn from this group.

The lower class seldom vote. They rarely join any type of political organization and insofar as they are politically motivated at all, it is along purely economic lines. Recently, however, radical political groups have succeeded in making some recruits among the black segments of this class. Although the lower class apparently lacks the organizational ability and discipline to conduct any type of concerted political or paramilitary movement, it has great potential for individual acts of violence such as looting, burning, and even sniping.

To the lower class, cosmopolitan and scientific goals are absolutely alien. The reaction to nationalist goals is mixed, depending on the degree of patriotism in the sub-group. Insofar as this group is aware and articulate, the critical point is Item #20--priorities. They want the money for themselves directly, not for space adventures by privileged WASP astronauts, for technological benefits to the society as a whole, which they do not expect will filter down to them.

TWO IDEOLOGICAL GROUPS

So far we have classified American society in terms of groups defined by the amount and sort of power they hold and their economic positions. But we must recognize that there is a small but important group of people in our society who are not motivated so much by family background or personal or class interest as by ideology. In every society, there have been similar tiny groups of persons who are highly motivated by "idealistic" values. In the Middle Ages such persons could find an outlet by entering the Church. In foreign countries today they join revolutionary movements. We must recognize these people because, even

though they are a tiny minority, their passion for ideas makes them fanatic workers in the furtherance of their ideas. They are extremely active in all forms of propaganda, and they are, one might say, inevitably alienated from a society which consists of persons who couldn't care less about ideological purity. To better understand the ideological groups in our society, we shall examine the two extremes--which we call "the humanist left" and "the nationalist right." These two groups represent the extremes of our political spectrum. Although both are thoroughly alienated from the mainstream of American politics, they usually hate each other with a passion that exceeds their contempt for the center.

Of particular interest regarding both of these ideological groups is not their strength in themselves but the influence they will have upon larger society. Also important is that both of them offer a radical critique of what is wrong with America and promise solutions to cure the ills of the nation. Should America stumble, both sides are more than willing to step in to set things right again. In effect, both right and left offer alternate principles of society and systems of government which more and more Americans would find attractive if the existing system should fail to meet their needs or expectations. The appropriate historical analogy is that of the German Republic of the Weimar period, which being unable to deal with its economic and political problems lost the allegiance of more and more of its citizens both to the left--the Communists--and to the right--the Nazis--and was destroyed. Perhaps it is no exaggeration to note that both the humanist left and nationalist right would like to see a Weimar America with themselves in the role of the Nazis to pick up the pieces and to build a "new order."

The Humanist Left

What we call "the humanist left" is a group in our society which is presently getting a good deal of play in popular media. These are persons who are disaffected from our society from the "left position." They believe that America is a very bad place, that it is run by evil men who are doing evil things, with at least the tacit approval of the bulk of the population. While they disagree on many specifics of analysis and policy, they are in agreement on some fundamental points of belief: they are anti-nationalists and internationalists, believing that all men are brothers and that all barriers between men should be broken down in order to achieve a millenium of peace, harmony, and love throughout the world. Existing institutions are the barriers to be broken toward this end. The humanist left notes that many persons in the world are suffering from oppression, exploitation and injustices of all kinds; they see these conditions as evidence of the rottenness of "the system" which must be destroyed to redress all grievances and right all wrongs. Revolution is imperative--peaceful hopefully, but violent if necessary.

The humanist left rejects the traditional values that have been accumulated over the ages. History is merely a record of the inhumanity of man toward man; it must be ended, and a new future, a different future, a better future built upon the ruins of the old order. Naturally, the humanist left rejects most of the values of the past as irrelevant, stupid, or vicious. It is opposed to organized religion and traditional religious systems of thought and worship. All state forms it similarly rejects. Capitalism; which it sees as predicated upon conflict and exploitation, must be destroyed. Most of the humanist left would describe themselves

as "socialists" by which they mean they favor a system that would allocate resources without competition abundantly for everyone. In recent years the Humanist left has become increasingly skeptical of all that most Americans (and civilized people everywhere) describe as "progress", i.e., improved technology, economic advance, and efficient organization. The Humanist Left sees these as chains that bind men. "Liberation" is their catch word. In their contempt for the system as they see it, some members of the Humanist Left have been led to enthusiastic support for anti-systems, such as Castro's Cuba or Ho Chi Minh's North Vietnam.

Since we have defined the Humanist Left as an ideological position, perhaps it is irrelevant to discuss their occupational and social origins. However, in examining them from a sociological point of view, certain patterns are clear. Most of the members of the Humanist Left are drawn from the same social elements as the Intellectual Estate; indeed, many of the Humanist Leftists are the children of Intellectual Estate members. In a remarkably large number of cases it seems the parents themselves were in their youth, Humanist Leftists, but came to terms with the system and took jobs in the universities or bureaucracies and sublimated their real views in the interest of getting on in the world. But they passed their values on intact to their children. This accounts for the seemingly inconsistent fact that the most radical young people seem to be drawn from the most prosperous families. In our current milieu, Humanist Leftism is most widespread among those people who have the most secure sinecures-- that is, students, clergymen, graduate assistants, and low-grade bureaucrats in social welfare agencies. In many of these positions, the Humanist Left has influence that far outweighs its number--as graduate assistants

they affect the education of hundreds of thousands of students and as social workers they often attempt to mobilize the poor into a revolutionary force against the larger society.

Although sometimes it appears that the humanist left is principally an adolescent phenomenon with relatively few mature adult members, we must realize that many of the humanist leftist who come to terms with society do so with extreme misgivings and they surreptitiously attempt to promote their principles and programs from within whatever organization they join.

The Humanist Left should be differentiated from the scientific community. The Humanist Left is a very articulate and extremely visible element in society, with education and interests which are literary rather than scientific. The Humanist Left is remarkably pre-industrial in its outlook, and is indifferent, even hostile to technological "advance" (it would deny that it is advance).

The Humanist Left opposes many aspects of the space program. Like the Intellectual Estate they have a cosmopolitan orientation claiming allegiance to "mankind" or "humanity." The Humanist Left is anti-nationalist, even militantly anti-patriotic, so Category C goals are anathema to it. The group is engaged in or identifies with various "social programs" and is extremely sensitive to Category H, particularly item #20--the priorities issue. The Humanist Left wants space money for its own programs. Leftist elements on the fringe of the Humanist Left will go so far as to claim that the space program is wholly motivated by economic, attention-getting, and narrow space goals. Younger members of this group, called the "New Left," share the values of their elders, who are often their parents, being differentiated only by a more youthful vigor in opposition

to "militarism," "racism," "imperialism" and the "dehumanizing" effects of technology.

The Nationalist Right

At the other extreme of the political spectrum is the group we call "The Nationalist Right," sometimes called "The Radical Right," by its critics. In many ways the nationalist right is a mirror image of the humanist left: what the left likes, the right hates, and vice versa. Where the left is cosmopolitan, the right is intensely patriotic. Where the left believes in the brotherhood of man, the right emphasizes differences between nations, sexes, and sometimes the races. Like the left, the right is disaffected from the American system, but not because the American system is too rightist, but because it is too leftist. The right generally rejects the role of freedom and the ideal of social and personal harmony as a valued pattern for social affairs. A rightist believes that life is and should be conflict, that competition and even violence is natural and that only rigid social institutions and norms can prevent society from tearing itself asunder. The right respects and even glorifies its ideal of traditional institutions--it can be expected to respond vigorously to any real or imagined attacks on American institutions and symbols or religious institutions and symbols. Both are seen by the right as objects of loyalty, rather than as repositories of certain ethical values.

The right wing wishes to maintain its traditional relationships between sexes. They hold that men should be men and women women, emphasizing the traditional importance of the family and of the woman as wife and mother. Children, of course, should be rigorously controlled, through corporal punishment if necessary, and should be expected to adhere to adult standards

as soon as possible. The American right wing are great enthusiasts for what they believe to be the traditional economic system, that is, the free enterprise system. The nationalist right is normally opposed to anything which might mitigate an uninhibited economic struggle between individuals, that is, social welfare legislation, trade unions, and government regulations.

The right also supports the traditional relationship between groups in our society. Generally, most rightists would be willing to tolerate a classed society, as well as not to intervene to upset the traditional depressed condition of minority groups in our society--Indians and Negroes. Racism is an undercurrent in many right wing groups. Anti-Semitism is also rampant among the nationalist right, partially because of the traditional struggle between Jew and Christian, but also because the nationalist right sees in the liberated secular Jew the archetype of the promulgator of secular humanist values in this country, and therefore as a fundamentally corrupting force.

The nationalist right is drawn from a large strata of population. The nationalist right draws its strength from the white working and lower middle classes as well as from the children of the provincial elites. This last group is easy to understand in the nationalist right, because the right wing ideology of free enterprise and the maintenance of their traditional society tends to serve the interests of the provincial elites. The recruitment from the lower middle classes and working classes reflects the fact that the nationalist right ideologies represent an intensified version of the standard ideologies prevalent in those classes. The nationalist right can appeal to the patriotic and religious sentiments of the lower

middle class, and to the masculine and military sentiments of the laboring class. Some nationalist right groups, such as the Ku Klux Klan, are almost entirely drawn from workers.

Although the nationalist right may outnumber the Humanist Left, its national importance is probably less significant because the right is extremely fragmented and because its strength is drawn from areas far from national centers of power, urban working class neighborhoods and rural areas. The Nationalist Right cannot get a favorable hearing in the national press because that press is controlled by the Responsible Center and the Intellectual Estate who generally find their views more compatible with those of the Humanist Left. However, in areas under the control of the provincial elites, the Nationalist Right can find a more sympathetic ear. It is more respectable in Dallas than in Boston.

Needless to say, the Nationalist Right is very strong for patriotic and military space goals, and extremely hostile to pacific or cosmopolitan goals. On the question of scientific and technological advance, the Right is generally favorable because of a social Darwinist belief in "progress" as well as a desire for America to excel in all fields of endeavor. Unlike other groups, members of the Nationalist Right may be willing to support a space program if only to prevent the funds from being used for social programs which they perceive of as pernicious.

HOW LARGE ARE THESE GROUPS?

It is not possible to do a systematic analysis of the actual size of these groups in American society, but a rough estimate can be made

on the basis of such key indicators as occupation, income, ethnic background, voting patterns, education, and organizational membership. On the basis of these, we feel the following table gives a good sense of the relative size of these groups in our society.

INTELLECTUAL ESTATE	3×10^6
RESPONSIBLE CENTER	5×10^6
PROVINCIAL LEADERS	10×10^6
LOWER MIDDLE CLASS	50×10^6
WORKING CLASS	40×10^6
LOWER CLASS	20×10^6
HUMANIST LEFT	1×10^6
NATIONALIST RIGHT	1×10^6
	<hr/>
	130×10^6 (ADULTS)

However, the importance of these groups is not to be measured in terms of pure numbers. The elite groups have, through their positions in society, and the ideological groups have, through their continuous agitation, a great deal more strength than mere numbers would indicate. For example, what is most significant about the Humanist Left is not so much what it believes or accomplished as the extent to which its ideas are transmitted to the rest of society.

MIDDLE AMERICA

We believe that another very useful concept in understanding the American social and political scene is the term, "Middle America." Middle America is defined not in terms of social class groupings, but in values. The Middle American is in the middle of the country in three ways: First, he is often geographically in the middle, being concentrated most strongly in the Mid-West and Plains states. Nevertheless, he is found throughout the nation. Socially and economically he is also in the middle, between the very rich and powerful and the poor and deprived. In terms of values he is also in the middle, eschewing both the Left and the Right. The values are most important to the delineation of the Middle American, for he can be very rich or very poor and live on Cape Cod or a Waikiki beach.

Simply stated, the Middle American has the values of traditional American society. He values hard work, social mobility, patriotism, law and order, democracy, the family, the church, the flag, and the United States of America. He believes that social change should be directed toward the better achievement of his values and standards of society, and that social change should be promoted through constitutional, legal, and non-violent methods. He despises socialism, violent protest, blatant racism, pornography, promiscuity, sexual deviation, political violence, and foreign ideologies.

In our construction of groups in society, Middle America includes the Provincial Elite, the lower middle class, and large sections of the laboring class. Middle America despises the Humanist Left which returns the sentiment with equal venom. The Intellectual Estate is suspect, and returns the feeling. Middle America also despises the more pathological excesses of the

Nationalist Right. The lower class is held in very low regard by Middle America. It considers that these are people who lack character to hold Middle American values, and this lack of character explains their low position--their will-deserved low position (by traditional standards) in American Society, although the Middle American often is sympathetic to their plight if he perceives it as the result of misfortune.

The average American working man or small businessman has ambivalent attitudes toward the objectives of the space program. He is generally indifferent to cosmopolitan and scientific goals except for the appeal of the astronauts as heroes (a variety of super athletes) and his mild interest in technological gains. He believes himself to be a practical man. But he is enthusiastic about the nationalist goals of Category C, including the military item(#8) which NASA sometimes downgrades. Since the Middle American constitutes perhaps 70% of the electorate, his current and future attitudes are discussed in more detail later in this study.

HI-1272/3-RR

CHAPTER FIVE

FUTURES AND SCENARIOS

V. FUTURES AND SCENARIOS

WHY STUDY THE FUTURE?

In the struggle for public funds, a public agency must offer programs that achieve the goals of some group or groups in the polity. It must convince the legislature and the public that the goals it can achieve are more desirable than the goals offered by other agencies or that its potential to achieve a goal is greater than that of its competitors.

The success of any public agency in this competition will vary with the economic, social, and political milieu in which the agency is obliged to operate.

In a complex society like ours, this milieu is in constant flux. Any agency engaged in expensive, long-term projects must consider the future milieu. The agency must try to estimate what people will support in the future. This is one of the functions of futures studies.

Considerations of the future are also closely related to other aspects of planning. For example, goal #20 (the amount of funds diverted from other programs) can be assigned a numerical value, namely the estimated costs of the alternate programs. In the tables, we have given goals relative values, but NASA can also assign an estimated dollar cost to each program. When this is done, the planner is moving toward cost-effectiveness analysis, and is able to evaluate each program in terms of both cost and objective achievement.

But there are two snares: First, the other objectives are not similarly measurable. We can say that Program A costing N dollars will buy us some international cooperation and some national prestige, but how much?

And how can we compare that with Program B also costing us N dollars which will buy a lot of Man's Conquest of Space with a little entertainment.

The second snare is less obvious: the cost is not really measurable either. We can say Program B will cost N dollars, but we do not know how much N dollars is. This is not a question of the purchasing power of the dollar, but rather the political cost of the dollar. How much N dollars is worth in political terms depends upon how much that money is desired by other competitors for government money. This is the priorities issue, and it is because of this issue that we have described goals in item #20 as "diverting federal funds from other programs" rather than as "cost."

Most important for NASA's purposes is the extent to which the national priorities issue gains, loses or maintains roughly the same importance it has today. Changes in American values--often in response to domestic and international events that have no direct relation to the space program--will play an important role in the future weight of the priorities argument. The priorities issue is only one of many such subjective matters that can be explored usefully through studies of the future.

SOME ALTERNATIVE U.S. FUTURES RELEVANT TO 1975-1985

I. Introduction

We will now offer a number of alternative views of the future and scenarios based on varying assumptions about changes in values and in the international and domestic scene.

These views fall into three broad categories:

1. Five broad views or "prognoses" of American society between 1975-1985;
2. Three views of American society with special emphasis on Middle America;
3. A brief summary of current attitudes hostile to and favorable to science.

These broad views of the future and scenarios are presented in full at first.

Following that presentation is an analysis that selects critical "branch points" and certain key scenarios. Thus there is some deliberate repetition in the pages that follow. For the reader's benefit, this repetition occurs because we wish to accomplish two objectives:

1. To present rounded, full-context views of the future, as an illustrative device for NASA;
2. To extrapolate key issues and to analyze them in progressively more direct relation to specific NASA decisions.

In considering how the United States might develop from 1975-1985, a large range of possibilities must be taken into account. The standard case and some principal variations have been described in The Year 2000. Here we consider some additional possibilities.

One possibility, for example, a rather grim one, arises from an extrapolation of the accelerating tendencies of the last five years of violent civil dissent and demonstration. This was at a relatively low level in the mid-sixties but has rapidly built up by the end of the sixties to a quite high level, and as far as simple trend analysis is concerned could continue to build at an accelerating rate. If these trends did in fact continue into the future, with increasing numbers of Americans repudiating the democratic process itself, by 1975 the country might be for all practical purposes ungovernable. Even if these tendencies increased at the current rate, without acceleration, their intensity and scope might still reach a level which made governing exceedingly difficult. But this naive projection ignores both the countervailing trends in American society and the development of the issues which lie behind contemporary unrest. Many processes beginning to operate already suggest a topping-out phenomena, or even a reversal of these particular trends. In 1970-1, a reversal seems much more likely than in 1968-9. Taking this into account, we consider the alternatives below to be of particular interest in considering the range of possible U.S. futures.

- a. A neutral prognosis
- b. A modestly pessimistic prognosis
- c. A modestly optimistic prognosis

*We have selected in this section from a repertoire of scenarios under development at Hudson, notably by Herman Kahn, with contributions from William Pfaff, Paul Collins, Frank Armbruster, Anthony J. Wiener, and others.

- d. Vietnam debacle and vicious post mortem
 - 1) but "liberal-progressive" forces continue in ascendancy
 - 2) a conservative or "ideological renewal" group takes over
- e. A dynamic and competent responsible (or humanistic) center re-establishes itself.

2. The Neutral Prognosis

(1) Vietnam has been settled. The domestic effects were unfavorable, but not disastrous, and have largely vanished or been absorbed by 1975.

(2) A further extension of a "sensate"* technological and affluent society--perhaps with some development of what we call a "mosaic culture."**

(3) Partly as a result of a parallel development of a "late sensate"* society, vice, dissent, anarchism and nihilism become very visible but are concentrated among relatively small groups, but the growth of these tendencies is stopped or slowed, and they are considered a normal part of the political and cultural landscape and create little or no intense concern. But disaffected elements turn to "dropping out" or sullen conformity rather than radical activism. However, because these "late sensate" tendencies are concentrated in large metropolitan centers, some of the faculties of prestige universities, and various artistic and political movements, they have a visible and impact out of proportion to their numbers.

*The term "sensate" describes empirical, this-worldly, secular, humanistic, pragmatic, utilitarian, contractual, epicurean and/or hedonistic cultures. This means secular humanist criteria for innovation and social norms, as opposed to traditional or religiously absolute criteria. The term "late sensate" implies a breakdown of sensate values--see The Year 2000, pages 39-64 for further discussion.

**The term "mosaic culture" implies that there are a number of rather different life styles in the United States and that these different life styles are often expressed in a diversity of clothes, manners, values, etc., so that it is often relatively easy to distinguish an individual who has chosen one life style or another. This could be a creative diversity though it may have many schismatic, divisive, and anarchist tendencies.

(4) While life is extremely good for the overwhelming majority of American people by almost any of the classical materialistic, cultural, or political standards, and to some degree even from the moral and morale points of view, both the upper classes and the various kinds of dropouts place great emphasis on the defects of American civilization.

(5) Domestically, this 1975-1985 period sees the alleviation of many "great society" problems, particularly those which are susceptible to money and physical engineering.

(6) There is less success with the problems which correspond to "social engineering." Indeed there is regression as well as progress in this area. Nevertheless, by most objective standards, poverty, racism, etc., have been greatly reduced.

(7) Despite great technical advances, physics, mathematics and engineering steadily decline in prestige and charisma, but there is sufficient quality and quantity of technical manpower to man our system. On the other hand life sciences, psychology, and sociology flourish.

(8) Despite its enormous productivity and effective financial success, business also loses in prestige and charisma.

(9) Business attempts to recoup its prestige by trying to be a "good citizen" and participating much more fully in community life as a patron of the arts and culture and as a very serious innovator in various areas. But this does not enable it to recover fully the ground lost though it does prevent precipitous erosion.

(10) The GNP (in 1967 dollars) reaches 1.1 trillions by 1975, 1.6 trillions by 1985. Unemployment fluctuates between 3-5%. Most additional jobs are provided by government, particularly state government, or by private organizations with government contracts.

(11) Labor force participation rates by women continue to increase. By the late '70's, for the first time in history, more married women are working than are just housewives. Married women with grown children are the backbone of the suburban "white collar" labor force, but even women with minor children are more and more employed. Employers prefer to hire these women rather than their traditional urban source of single working girls who are increasingly from minority groups and increasingly less competent (of course, with millions of exceptions.)

(12) Continued moderate inflation, increasing real wages and standard of living.

(13) Gradual leveling of income and advancement opportunities between big cities, smaller cities and rural areas. Big city residence will remain necessity for top positions in certain industries--e.g., finance, advertising.

(14) Some erosion of work effort. Absenteeism, turn-over climb. Life is centered around weekends, vacations.

(15) "High culture" lags. Spectator sports and individual sports more important.

(16) Expanded government services are principally funded by the "fiscal dividend" created by increased productivity and inflation. At first, working people are angered by their increased taxes, but gradually accept middle class resignation.

(17) The spreading out of cities, particularly in the South and West, continues, together with population decline in older areas. The free-standing, owner-occupied single-family house remains the predominant American ideal, but small and growing minorities prefer rural or high-density urban residential styles.

(18) Continued social and economic gains by minority groups.

Prosperous Negroes move out to the suburbs, but there is little residential integration. Several large U.S. cities are Negro dominated and controlled.

(19) Despite the social and economic gains of most black Americans, there will remain a hard-core block of black urban poor, highly represented by fatherless families, which will be recognized as a major social problem.

(20) As it becomes clear that blacks are not especially interested in social and residential integration, white liberals press less for it. The large numbers of prosperous blacks relieve white guilt. Radicals, white and black, curse the "black bourgeoisie" which is more concerned with black crime than with white repression.

(21) Cops, courts, prosecutors, public opinion gets tougher on criminals within present legal framework. People accustomed to lower levels of security. Less toleration of extremists.

(22) Pollution control begins to pay off.

(23) Gradual extension of regulation of business, personal activity. Private property, individual freedom remain ideals.

(24) Pornography, promiscuity, drug abuse, continue to spread slowly, but public at large becomes more tolerant. Marijuana, homosexuality, fornication, blue laws rarely enforced. More contraception, abortion, divorce.

(25) Fewer children, but nuclear family remain dominant form.

(26) More recognition of variant life styles for youth, aged.

(27) Somewhat less sex, race segregation. More age, class segregation.

(28) More, but still limited concern is created by the growing mutual alienation between the U.S. and the rest of the world. On the one hand, the fund of good will which the U.S. built before, during, and after World War II is gradually exhausted and/or forgotten--in part because of a

relatively bad press plus many "necessary" and "unnecessary" U.S. actions which strike foreigners as in various ways irritating, immoral, unwarranted, and outrageous. Much foreign and domestic comment focuses on and emphasizes these acts and their actual and imputed consequences. Also, "puritan" Third World countries see the U.S. as a corrupt society. On the other hand, a growing frustration and indifference--even hostility--in the U.S. because of foreign ingratitude, envy, misinterpretations, intransigence, and seemingly generally unreasonable hostility as well as because of a failure (or at least seeming failure) of many made-in-America foreign aid and intervention programs, increase internal U.S. alienation from the world.

(29) The military establishment is supported adequately at about 6-7% of the GNP (or about 2/3 of the current rate and about half of the rate of the late fifties). This would be about 90 billion dollars in 1980 (in 1967 dollars). Despite cancellation of the draft, it also manages to find enough competent recruits for all ranks. However, it has only minimal political support among the intellectuals, "respectable press," universities, and even the upper middle class in general.

(30) NATO continues but with a continually decreasing esprit, élan and charisma. And it becomes relatively clear that the active, in being, defense of Europe against a land attack by the Soviets is basically furnished by a U.S.-West German working alliance (possibly with significant British participation) which is legally and politically imbedded in a loose cooperative effort of nations. However, various fringe activities of NATO, such as information exchanges, continue to be important. Participation in them is greatly prized by the smaller nations.

(31) There is increased polycentrism and diversification in the international arena. The U.S. retains a position of leadership, but in part by

largely emphasizing a "responsible" low-keyed diplomacy (despite the irritations, etc., mentioned earlier)--even occasionally adopting a "low posture" that is perilously close to neo-isolationism. In effect, it preserves a veneer of hegemony by not trying to exercise it too often and too heavily. This "hegemony" is very loose and allows for much independence, dissent, and even outright opposition by its members.

(32) Gradually, the concept of "an area of responsibility" rather than "an area of influence" or "world policeman" becomes widely understood--both domestically and abroad. Under this concept the United States feels more or less obligated to defend nations which are in the area of responsibility from external attack, even if these nations are relatively hostile and unfriendly to the United States.

(33) Despite some modest reforms (such as creation of Special Drawing Rights), international monetary and internal inflationary problems continue but at a relatively low level. Thus no international monetary crisis occurs but many continue to think that there is one in the offing, and they may be right.

(34) U.S. gradually eroding productivity advantages over other industrial nations. Losing foreign (and some domestic) markets to competitors, particularly Japanese. Less favorable balance of payments condition partially relieved by reduction of overseas garrisons, but increasing agitation among affected industries, especially unions for more protectionism. Bitterly fought by finance community and international corporations. Hidden protectionism imposed by safety and pollution requirements for U.S. market.

(35) U.S. foreign aid rises over current absolute levels but is less than one-half per cent of the GNP or about 5 to 8 billion dollars per year

during the 1975-1985 period (as opposed to the one per cent attained during the late fifties). A good deal of this aid is given through multilateral bodies (especially U.N. regional and technical assistance agencies). While this aid is not successful in largely dissipating the demands of some of the "poor" nations, the fact remains that while the developed nations are no longer "listening guiltily" they are still listening. This does not, however, diminish the volume of criticism enough to keep down general feelings of guilt and alienation among most U.S. critics of the adequacy of the aid program. But there is no widespread food deficit and massive starvation, largely because of improved agricultural technology promoted by the U.S.

(36) The international north/south problem (rich versus poor or white versus colored) is gradually being perceived as far more serious than east-west tensions--but even this problem is seen without hysteria or intensity.

(37) A partial "failure of nerve" occurs, particularly among the philosophers, intellectuals, theologians, and so forth. This is very similar to the failure of nerve which occurred in Athens and Hellenistic Greece generally in the fourth and third centuries, B.C. Among these people, various "fin de siecle" ideologies such as anarchism, syndicalism, neo-racism, and crypto-facism proliferate.

(38) However, this failure of nerve does not affect the great mass of people who participate relatively fully and heartily in the three major "establishment" life styles which we label "neo-materialistic," "neo-epicurean," and "neo-gentleman." Another important and prominent life style from the point of view of the masses and the establishment is the

neo-stoic.* There are also many small groups which "drop out," or oppose the establishment (though sometimes only in a rather passive and pro-forma manner), i.e., become hippies, New Left "revolutionaries," investigators of "inner space," participants in esoteric religions, participants in various kinds of neo-classical religious movements, and the like.

(40) There is some loss of national vigor and a vague sense of malaise with the potential to respond to call to "get the country moving again".

3. A Modestly Optimistic Prognosis

(1) The neo-materialist, neo-epicurean, neo-gentleman and neo-stoic life styles prove to be unexpectedly attractive. Many more people participate enthusiastically in them than one would have expected in the neutral scenario, and the morale and self-confidence of these participants is high.

(2) In addition there is much less of an erosion of the traditional U.S. work-oriented, achievement-oriented, advancement-oriented values

*These terms are defined as follows: a neo-materialist is simply an individual who is very advancement-oriented because he is very interested in gaining and spending a rather large income. Alternatively, he might be an extremely consumption-oriented individual who uses his income to enjoy life in various ways. The neo-epicurean might bear some resemblance to the epicurean of Greek philosophy in that he is oriented towards home, towards family, towards friends, towards a decent and humane life, but he does not have the same kind of discipline and asceticism. In many ways the current Southern California barbecue culture exemplifies this neo-epicurean life style. The neo-stoic is quite similar to the stoics of imperial Rome who in fact tended to staff the civil service in the first two or three centuries. These again have American characteristics and possibly are somewhat more interested both in personal success and in success in their efforts than their classical prototypes. (The neo-stoic analogy might be more that of an ambitious soldier doing his duty rather than the actor in the play--the analogy of the Roman stoic.) A neo-gentleman would have a rather large number of diversified skills and pursuits, all of which would require great effort. On all of these he would achieve a very high level of performance, but none of these skills would be put to any economic use.

than is envisaged in the neutral prognosis, so that the American society and economy are more vital and dynamic than might have been expected. The society has little difficulty in withstanding the criticism and attacks of the cynics, the alienated, and other critics and "dropouts." Indeed, these American life styles are obviously fairly full and satisfying, and thus it is the morale and confidence of critics which have a tendency to erode.

(3) Poverty and student dissidence are substantially overcome, in part because of intelligent and well-run reforms by government which produce useful short-, medium-, and long-term impacts.

(4) In particular, various "reverse discrimination policies" prove quite successful. Tens of thousands of Negroes either get to the top levels of U.S. society or are clearly on their way up. Everywhere--in both personal contacts and in the media--there is visible proof to the Negro that he can "make it" (and even more visible proof to the white man). This spectacular increase in the status of "upper class" Negroes reduces tolerance, both within and without the Negro community, of illegal or unreasonable acts by destructive and extremist protest groups. In particular there is little or no implicit (much less explicit) encouragement of such demands or behavior. There are, of course, many hard-core problems and much alienation and revolt among the poor, the Negroes, the students and some of the other "drop-outs," but the problems are now regarded as soluble and the protests mainly "rhetorical." Increasingly, successful Negroes--despite their protestations of solidarity with Black Nationalist sentiments--are coopted into the "establishment" and suburbia and find that their major concerns, satisfactions and psychic income come from much

the same kind of rewards as those of the whites they work and live with. In addition, there is a burst of creativity among Negroes which shows up in almost all aspects of culture and many areas of political, business, commercial, technical and governmental life. This also gives Negroes self-confidence and a feeling of pride and participation in "the system." When combined with the fact that they do not feel forced into the system-- they all know they have the opportunity to opt out--their allegiance is to the liberal system.

(5) Non-white, non-black minorities also advance. Attempts to mobilize them, as well as the ethnics, for radical action fail.

(6) Community control agitation has the effect of making decision-makers, public and private, a great deal more sensitive to local public opinion in policy-making.

(7) Americans of recent European (and Asian) ancestry are more closely assimilated to conventional U.S. family and economic patterns, but many of them find satisfaction in maintaining various superficial "ethnic" customs, such as national holidays, foods, and traditional religious observances.

(8) There is something of a return to religion, but motivated by a need for continuity and values, rather than deepfelt religious faith. In Jewish terms, the revival is "conservative" rather than "orthodox" or "reform". "Orthodox" sects continue to lose communicants, but their rate of slippage slows. Some "reform" sects stand pat (e.g. Unitarians) and others continue to experiment with radical religious forms, but most of them, and particularly their "with it" clergy move toward "conservative."

(9) Upper-middle-class youth--white and black--also participate actively in society, regaining interest in governmental and private programs, particularly "action-oriented" social welfare programs. They therefore perceive a heavy stake both in society and in reforming it. In most cases, after a burst of energy into pursuing altruistic and/or public service objectives, they end up by putting most of their energy into living well and in succeeding in their careers (i.e., being "good citizens," "neo-epicureans," and "neo-gentlemen"). There are, moreover, sufficient competent and motivated leaders produced to sustain strong and innovative government.

(10) With GNP reaching 1.1 trillion (in 1967 dollars) before 1975 and 1.9 trillion by 1985, there is sufficient investment in new housing and urban redevelopment to maintain historical rates of improvement in housing quality and lowering of density. However, poverty pockets remain in old cities and rural areas, and municipal finances remain a problem, though the predominantly suburban electorate and legislatures are less sympathetic to them.

(11) Multi-channel cable television and cheap transmitting equipment permits a full spectrum of cultural, educational, political, and entertainment programs, mostly commercially sponsored. Public television continues to appeal to the "lowest common denominator" but competitive pressures push its rates and its number of commercials down. Children demand and get their own TV. The great variety of TV offerings will promote "mosaic" cultures and will gradually replace live performances. Live audiences at public events will be present primarily to improve the TV show.

(12) Excesses by environmentalists to provoke a "backlash" leading to a more balanced approach to pollution. Severe environmental contamination is well on its way to being cleaned up. Pollution control has become just another parameter in the design of systems.

(13) While the most important single recreational activity is the cheerful hedonism of lying near-naked on the beach, the overrunning of the shore by the lower classes drives the upper classes more and more to inland, more active leisure. Ski resorts proliferate wherever the climate permits, and artificial snow-making equipment drives that climate south. Ice skating and hockey may also spread south. (But restrictive regulations limit the use of snowmobiles.) Mountain climbing and hiking are also very important. Ditto camping--American campers are increasingly found as far afield as Alaska and Central America. Hunting remains for rural and small town people, but more and more urban people find it distasteful; in conflicts over the use of recreational areas, hunters begin to lose.

(14) The American presidency and the political and business decision-makers are largely in the 40-to-50 age bracket but with enough 30-year-olds so that one can argue it really is not a "middle aged system." The most prized political and business characteristics are: "style," pragmatism, optimism, moderation, innovation, expertise. The most successful politicians are, in effect, members of what can be called the Technocratic and/or Responsible Center.

4. A Modestly Pessimistic Prognosis

(1) We assume here a degree of stagnation within at least the non-technical and "square" sectors of intellectual life, and, in general, diminishing satisfactions and elan in most elite occupations. While

nominal participation in U.S. "square society" and its goals, aspirations, and activities is still high, there is diminished pride and non-monetary reward in such participation.

(2) The prestige of physics, mathematics, engineering, and the life sciences erodes more rapidly than was suggested in the neutral prognosis. Political activism by social scientists and psychologists has given them very low credibility among the public. The failures of economic theory to reflect the real economy has discredited economists. There is a widespread belief that science and reason have failed, and even educated people feel free to admitting to being "unreasonable" and advocating moral nihilism and/or raw dogma.

(3) Much of the population is suspicious of and hostile to the "military-industrial complex," "big business" and "big government." (In this scenario the military-industrial complex does in fact exist as an important and relatively unified political and economic pressure group, and plays an increasing role in American political life, though still not as much as has often been typical in continental Europe.) While the U.S. is, generally speaking, a low-morale country, many of its elites and pressure groups are, at least in some cases and on some issues, relatively touchy. Thus, while they lack confidence and assurance, they can still act resolutely on occasion, even provocatively. In particular, they may in many cases be unlikely to consider it important to observe the kind of constraints, precedents, and various unilateral limitations which now function in American society.

(4) The GNP fails to reach 1.1 trillion (in 1967 dollars) by 1975 and falls short of 1.6 trillion by 1985. Unemployment is at least 5% on the average.

(5) There are bitter fights over pollution vs. production and pollution vs. power.

(6) A striking feature of the society is the spread of a "gang" mentality wherein groups responsive to only their own self-interest, compete for economic and political advantage.

(7) Increasingly militant trade unions, particularly in government. Mostly in self-defense, white collar workers (perhaps even executives?) organize.

(8) Labor indiscipline makes it advantageous for employers to retain older workers. Forced retirement rules are relaxed. There is agitation to change social security employment regulations.

(9) Despite economic gains, Negroes remain alienated. Successful Negroes accept their rewards as partial payment for sins of whites. Militants move away from Marxist-Leninist and African Nationalist ideologies toward affinity with radical black movements in the West Indies.

(10) Increasing militancy among Indians, Mexicans. Early 1960's style activism by "the ethnics".

(11) Spread of black nationalism to the South. Confrontation with white militants. Klan revival. Three-party politics in South--Negroes and progressives--National Democrats; Urban traditionalist and business interests--Republicans; Rural traditionalist and lower whites--Wallace style demagogues.

(12) Nationally, polarization is seen as the prime issue. In the industrial states, three (and even four) party politics becomes the norm rather than the exception.

(13) The estrangement of America from the rest of the world, and most important, from the liberal democracies in Europe, is much greater than in

the neutral scenario. Increasingly America's actions are perceived as unilateral (or arbitrary) definitions of the international as well as the national interest, as unnecessary or provocative violence (or threats of violence), the U.S. condemns or threatens from a posture essentially that of a beleaguered "Fortress America." But America, justly or unjustly, is widely believed to have become a major destabilizing factor in international affairs, and perhaps a dangerously unpredictable one. Many Americans share this perception. This reinforces the American sense of isolation, contributing to the low morale of American elites and to the intensity of domestic political dissent.

(14) One would assume that existing American alliances, and certainly NATO and the Japanese alliance, would either have been ended or would have lost their significance; and probably there would have been a growth in economic protectionism, paralleling the breakdown of political cooperation in the Free World. There may be economic crisis and a severe drop in world trade. One would certainly assume some falling off of world economic growth and a realignment of trade patterns. If there were economic crisis, America's domestic problems well may have found echoes in other countries as well as being reinforced here. Or the crisis might produce a political reaction in the United States sharp enough to revise many or most of the tendencies we have been describing. But the stagnation scenario envisages a very important change in America's relationship to the world community. The general high regard for America in much of the world, historically a matter of respect for America's domestic political and economic accomplishments; will be in considerable measure supplanted by hostility or distrust, and this inevitably will be an important factor in the American popular self

image. Thus this prognosis envisages a continuation and predominance of tendencies of domestic division and controversy, of international isolationism as well as American isolationism, and possibly of arbitrary or authoritarian action by political elites within the United States.

5. A Vietnam 'Debacle'

Now let us turn to a specific version of the pessimistic prognosis, one of interest not only in itself but representative of a class of scenarios in which some major failure of foreign policy produces a harsh public reaction against the administration held responsible and also to some extent against the established apparatus of government--the political "establishment."

The obvious example is a Vietnam "debacle." We assume that the administration's present efforts to develop an honorable negotiated settlement and/or form of American disengagement take a dramatic and discrediting turn. A settlement is negotiated--perhaps over the objections of the Saigon authorities--which is overturned by the Communists as soon as American power is withdrawn. Extensive reprisals against non-Communists or a clearly terrorist program against the population ensues. Or Communist aggression in Thailand or Cambodia quickly and provocatively follows what was supposed to have been a neutralization of the area. The American government then is judged by the American public--and perhaps by many abroad, even including many who had been critical of the original American intervention--to be incompetent, and unreliable--even immoral. The alleged folly or crime of Vietnam intervention is seen as compounded by folly or failure in ending

that intervention. The generation of policy makers who have dominated the Republican as well as the Democratic administrations of the last twenty years--internationalists, generally liberal in terms of the American political spectrum--are then repudiated by an angry American voting population. The reaction could be to both left and right: on the left a condemnation of this leadership as immoral and incompetent even by its own standards, and on the right, either a rise in aggressively interventionist attitudes (possibly including a heightened willingness to make use of nuclear weapons) or a developing Fortress America outlook.

If the "liberal establishment" leadership nonetheless continues in office, it would function within wholly new constraints and in an atmosphere of radicalized controversy. If they were ousted, the successor administration might represent a coalition not only of politically conservative forces largely denied national office in recent years, but possibly of populist reactionary groups, or groups alienated by the cosmopolitanism and sensate qualities of much of modern culture and devoted to an "ideological renewal" of this country. One can obviously imagine these last forces assuming a politically repressive stance, although it may be less easy to see them overcoming the resistance of those major population groups which have been in the ascendance in American society (and in the Western nations generally) over recent decades.

Whether the reaction were to the left or to the right, one would expect an America which is reacting against a foreign policy debacle to be much more bitter in its divisions and inner struggles than at any period since the Civil War. The consequences for government and for the health of the social organism could be crippling.

6. A Dynamic and Competent Responsible (or Humanistic) Center Reestablishes Itself

The Neutral Prognosis assumes a continuing prominence in political leadership and influence of intellectuals and, more generally, of the highly educated upper middle classes. However, internal or external developments may operate to discredit the values and methods of this cultural stratum before or during the decade under consideration.

A "shameful" settlement in Vietnam could have this effect. So, too, could a protracted period of negotiations, during which American military casualties continued to mount. In the former case, popular discontent might be intensified by increased militancy and arrogance on the part of "New Left" students and black separatists, and also by the "Populist Right." In the latter, the malaise and unrest born of governmental ambivalence and vacillation could be fortified by the persistent problem of inflation.

Even a satisfactory settlement in Southeast Asia does not, however, preclude the possibility that "the middle Americans" will become an increasingly important and possibly decisive force in our politics and culture. Among the domestic factors making for instability in our present apportionment of political power and cultural influence are: (1) rising violent-crime rates; (2) rising tax rates, afflicting especially the urban middle class; (3) school-district problems, including soaring costs, crowding, integration issues, and curricular reforms; (4) campus violence; (5) the confusing and perturbing results of the anti-poverty programs; (6) the breakdown of traditional barriers regarding sexual behavior, dress, drug use, the arts, etc., and the erosion of "establishment" support for religion, patriotism, and private business; (7) the penchant of parts of

the liberal press for gratuitous denigration of the values and behavior of the "lower middle classes"; and (8) comparative governmental indifference to the middle American's "side" of the racial problem, as well as to such problems (including psychological ones) as are peculiar to him in a period of rapid change.

A prognosis which stresses the potential of these factors would entail rhetorical (and some legal) reassertion of "official" support for traditional religious, patriotic, sexual, and private-business values and practices. Among political candidates, and administrative appointees, practical men would have a clear edge over academicians. While governmental social welfare programs would be designed and administered with a different--possibly more effective--set of attitudes and approaches than today's fashions permit, it is not unlikely that programs specifically designed to reduce inequities of opportunity and to stimulate enterprise would be encouraged. Support for tax reforms and for meeting the nutritional, medical, and educational needs of the children of the poor could be stronger and more effective than today. Education in general, as our traditional means for class mobility--and class definition--could receive increased attention, although one would suppose that today's educational philosophy would undergo modification in the direction of stressing competition and (possible) vocational and moral training.

A reestablished responsible-center government would be compelled by the reasons for its ascent to power to devote considerable attention to the "law and order" issue both directly--monetary and advisory aid to police, expediting court procedures, prison and parole system reforms; and indirectly by the personal example its functionaries would be expected to set of commitment and resolution to protect the constitutional system

of orderly conflict and dissent; and by the conditions set for receipt of federal grants or loans by universities, anti-poverty groups, etc.

In foreign affairs, this type of government might tend toward interventionism or a fastidious (holier-than-thou) policy of disengagement, depending upon circumstances and the mood of its constituents. It might, of course, follow these "opposite" policies simultaneously, since both express the middle American's preference for unilateral actions--reducing international cooperation.

Variants on the theme of a responsible-center resurgence derive from the variable strength of its opponents. In addition, it is possible that what appears, from a present-day perspective, a "reestablishment" may seem something quite different in hindsight. One possibility is a prelude to authoritarianism. A second possibility is that emphasis on the middle Americans may serve to stimulate the development of a new and militant "populist" movement in much the way that attention to the American Negro has born unexpected fruit in the sixties. Such a movement of the "people" could play as seminal a role in restructuring our social philosophy responsibly to "post-industrial" conditions as the populism of the 1890's played in catalyzing public response to industrialization and urbanization.

One must, finally, take into account the vigor of existing American political leadership elites well within the established "center" of American politics. A satisfactory Vietnam outcome and new successes in domestic policy by the Nixon Administration could, for example, produce a reconstituted "establishment" of somewhat more conservative cast than in the recent past. Or the Democratic Party might bid successfully for the presidency on the basis of new domestic reform proposals and, with new leaders, again

within the "responsible center" range and drawing on the same "establishment" sectors of big business, the academic world, and the professions as the other administration of modern times. In either case the present alienation of significant minorities in American society from a leadership constrained by the imperatives of America's world position and the social demands of technocratic society would by definition be substantially reduced--possibly with a new degree of power decentralization, of "participation" through new political or economic mechanisms. With international stresses lessened through Vietnam settlement, and possibly by a general international trend toward "inward-looking" or neo-isolationist policies, domestic controversy could lose some of its present intensity and the major domestic issues of racial relations and poverty become more susceptible to remedy.

Certainly the most reasonable (and historically warranted) prognosis for America lies on this scale of moderate, incremental change, accompanied by intense creative controversy, rather than the starker alternatives discussed earlier. But the earlier prognoses must, at this point, be taken seriously as possibilities.

SOME RELEVANT SCENARIOS FOR MIDDLE AMERICA*

Earlier in this report, we discussed Middle America's view of NASA and reviewed public opinion surveys leading to the conclusion that public support for America's space program is decreasing and assuming a lower

*These are based on work by Frank Armbruster.

priority within the over-all hierarchy of Federal programs citizens are prepared to support. What changes may occur in this trend in the foreseeable future? What action could NASA take to improve its position or to respond to such changes as they occur?

As we noted earlier, the fact that public support for NASA spending is lower under a \$4 billion budget and an impressive record of success than it was under a \$7 billion NASA budget and little more than promises, indicates that other things besides NASA's performance are involved. We have outlined some of these factors, but there are many others that will be analyzed below in scenarios. One scenario is normally inadequate to give a broad enough coverage of political probabilities over the next two decades, but several scenarios can sometimes give a feeling for the "band" or "spectrum" of the political milieu in which one may have to function.

The big problem is that of predicting morale. As in the stock market, psychological factors can be dominant in technological programs, particularly those that depend on Congressional appropriations. For example, the drive currently under way in this country by many academicians, journalists, and some politicians to reduce the what they perceive to be "chauvinism" and "bellicosity" of this nation could have far-reaching effects. Just as those who supported the civil rights drive did not foresee the violence which would accompany it, current believers of the benefits to the United States of "getting a bloody nose" may not foresee the deeper problems this could bring.

The question of whether or not such counsel dominates our policy decisions in the future obviously is critical to any political scenario. Nor is this the only factor of significance to NASA, although it may be

the most critical one for the nation as a whole. Economic factors are also involved. Runaway inflation could change everything, creating, among other things, new labor problems. No scenario could completely cover all the possible combinations and permutations of these and many other critical inputs. The three following scenarios, therefore, are far from conclusive. But they do indicate the "surprise-free" spectrum of political milieux in which NASA must operate in the next two decades.

The Straight-Line Projection

The central scenario which NASA should consider is that, under the current program, the amount of public support for NASA does not increase. This could mean that planning groups at NASA will have to sharpen their pencils and increase efficiency so that their highest priority programs go forward under a stable or even a slightly decreasing budget.

The first big program choice--manned versus unmanned programs--comes up quickly, however. From a purely scientific point of view, one way to obtain most of the data for the program "on the cheap" is to use instrumented space vehicles instead of manned spacecraft. This may be likely, however, to reduce public support even further. One cannot send sensors and computers on good-will trips around the world, nor can the average television viewer empathize with the micro-miniaturized solid-state components of an unmanned vehicle. The question is whether this program, without its "live takeoff spectacles" and the "human side" of the news, will be reduced sufficiently in cost so that even with a further drop in popularity (and possibly reduced Congressional appropriations) there will be adequate funds to meet the minimal goals of the program.

On the other hand, assuming the straight-line projection scenario from today's political and budgetary environment, one can hedge against

the most obvious pitfalls. Let us assume that the manned solar system exploration program appears to be just too expensive, even under the most optimistic projections of future budgets. It might pay NASA to try to make some estimates as to what the trade-off will be between the loss of public interest and the saving on the unmanned program. There is another important choice to be made immediately after the above estimates have been made. This is the question of how "glamorous" the unmanned projects can be made. Let us assume for the moment that very clear television pictures can be made and samples returned from the most distant planets. The probability of any spectacular discovery is likely to be small. If all we get is some lava and confirmation of already "known" factors, people are likely to say: "So Mars is an uninhabited pile of rock--what else is new?; for that we paid X billion dollars?" But at least they won't say: "Wow! if we only had had a man on that trip--look what he could have learned from that obviously fascinating place!" NASA's approach in any case must be full coverage with much explanation.

Let us assume that we get exceptionally good pictures of Jupiter with some background as to why the things they show are important to the solar system and the earth. The average television viewer and newspaper reader in the United States is not stupid, but he has very little background on the reasons for the NASA program. Perhaps his interest can be turned a little in the direction of these NASA programs. This is a relatively low-probability effort and the payoff may be small, but it has to be tried if NASA goes the unmanned route. The unmanned program could also be used as a "forerunner" to determine which areas in the solar system are worth sending a man to, and it should be explained as such.

Of course, the unmanned shots which are directly related to earth uses--TV relays, communications satellites, navigational aids, etc.--will not need fanfare, but the amount of the NASA budget spent on them, under this scenario, would be clearly indicated as such. Normally, cis-lunar vehicles of all sorts may be easy to explain.

The manned space station might be an exception. In fact, if it were not for the already publicized Russian program in this area, it might be almost as hard to get public support for it as for the deeper, manned, space probes. Being that close to earth, the chances are that, under this scenario, many people will also see the platform as having significant military as well as scientific and perhaps economic benefits--no matter what NASA says about it. But under this scenario, the costs of this program may be considered to be prohibitive by the people and Congress, unless we seem to be in a "race with Russia."

The other leg of the program choice (emphasis on manned or unmanned space programs) could, under this scenario, be different from what one might expect it to be. It could, for example, emphasize a "mobilization base" for manned flight. This might be nothing more than a slowed down Apollo program with heavy emphasis on the instrumentation and training phases. This may not be feasible but, if NASA wishes to keep the option of going back into a manned program--because, for instance, of a change in direction of the Russian program--we must have some capability available. This change could also take place because of a change in emphasis in the opinions of the public or Congress. Perhaps some day they really will want to go to Mars. Also, if one were to push the space-platform program there would be obviously a good deal of experience and

training for manned flight involved. In this scenario, however, the probability of a large, continued, manned space program may be somewhat lower than other alternatives.

The alternative is, of course, to continue with the manned space program at its present rate until all the Apollo shots have been completed. There are many reasons which seem to indicate that this is not a wise path to follow, even under the straight-line projection scenario. The most obvious reason is that we cannot be sure that we will have a straight-line projection. It may change, and at that point we may need the manned capability to proceed in a new direction. Barring disastrous accidents, this program will of course produce more TV spectaculars than an instrumented program is likely to do. Because of its expense, however, the instrumented program will probably suffer disproportionately if this manned program is pushed under a reduced budget. Here again the trade-off between popular support, actual danger to human life, and the benefits of the programs will have to be considered. To get TV spectaculars and generate public support for the program is not a good enough reason to risk the lives of astronauts, even if they wish to go. There must be a functional reason for having a man on board. For example, when the LEM "Eagle" landed on the moon, there would have been danger of a crash or mission abort had there not been an astronaut aboard to take over manually in the last few seconds. All the issues must be considered in going in the direction of a large manned program, but if one hedges against the requirement to have a manned program later and slows down the Apollo program, it is conceivable that it might even mean more safety for the men on board and more data gathered when they do go into space. As mentioned above, the emphasis is on improved instrumentation and training.

Under this straight-line projection, the probability of NASA being able to branch out into other areas of research, oceanography, geology, etc. (except insofar as satellites are used for this purpose), would depend on how big the cuts in the budgets of the agencies already involved in such projects would be and whether the money thus saved would be transferred to NASA. The chances are that the cuts would be about the same across the board and no one's budget would be increased. This means that NASA could only take up these new fields (and hire personnel in them) by further reducing their own projects. The chances are that NASA would get only second-rate people if it depended on staffing its own programs by depending on the "attrition" of the other agencies. They will hold on to their better people at all costs. NASA could "raid" the other agencies and this would cause "political" trouble, but if NASA looked like "the wave of the future" in these new areas, "raiding" could be easier. Despite the manning and "political" problems, it might still be worth the trouble for NASA under this scenario. It is certainly easier to explain "exploitation of untapped resources" here on earth as the end goal of a program than to explain the professor's reason to go out into space looking at "chunks of barren rock." But breaking up teams and then reassembling parts of them under strange administrators to form a new team is not conducive to progress, especially in technical areas, as NASA well knows. Even if NASA as an agency profited, the nation would probably suffer.

An Optimistic Projection

A scenario for NASA on the optimistic or upper side of the spectrum from the "straight-line," central scenario might be assumed to be as follows: The U.S.S.R. might put up a sophisticated, manned space platform

with regular live TV shows beamed to the earth, or they may succeed spectacularly in some manned or unmanned deep space probes. Linked to this situation one must assume the return of American elan to a point where all segments of society have some sense of pride in our nation and are concerned when opponents surpass her. Under these circumstances, it would be natural to expect a significant American reaction to the Soviet success.

One could hardly expect the return of American morale in the 1970's and 1980's to that of the 1940's and 1950's. But with just a fraction of such feeling and our predicted gross national product and trained government and private industrial space teams, we would probably make great strides. Ten billion dollars is not very significant in light of well over a trillion dollar gross national product, and with a NASA budget of ten billion, many new opportunities might arise. A milieu in which such a budget would be voted by Congress would require some drastic changes in our government's policy and national outlook in other areas. This scenario assumes that the President or someone else of prominence stands up and speaks out in defense of the values which a large portion of the now anti-NASA "lower middle class" section of the population holds dear. Such a switch in tactics is assumed to put us back in the running in all areas, perhaps even providing the means to defeat aggressive Communist "wars of national liberation" in Southeast Asia and elsewhere.

A revival of national purpose (perhaps through a new President) should put the prestige of the United States higher on the list of priorities in all areas, including space exploration and exploitation. At this point, NASA planners should have a dossier of both short- and long-range programs ready to present to Congress. These programs would, however, have to be feasible and meaningful, for, in this mood, the nation

will be demanding results on all fronts. A key point about the nation in this scenario is that it will not readily accept excuses. (In the 1940's lame excuses were out. Results were demanded.) In this scenario, it is assumed that the nation has returned to a "can-do" mode in large part because it is fed up with excuses for failure. This means that heads will roll if things go wrong. Interestingly enough--as far as personal careers are concerned--this is a more dangerous milieu than the one in which all the "in" people are defeatist and docile.

It is difficult to conceive of such a situation today, but what we are assuming here is that the better newspapers and that group of intellectuals who are anti-NASA today will pitch in to support programs that bring the United States back into line as the leader in space and other ventures. NASA certainly should not shy away from this renewed interest but the plans that are put forward would have to be those in which the NASA people really had faith. The piecemeal approach to planning of some of the programs today would have to be reviewed very carefully under this scenario. It is quite likely that with this kind of pressure there might be a great deal more publicity about NASA than we now experience. The newspapers could get very interested and probe more deeply into NASA planning than they are doing at present. Here again, one would assume that the NASA people would be perfectly adequate to handle this kind of scrutiny and, indeed, should welcome it. With such publicity, the National Aeronautics and Space Agency might find it very easy to get key people. In fact, under these circumstances, NASA will probably be one of the most attractive places for scientists to work. There may be a bit of the "forced-draft" approach involved under these conditions, but there certainly would not be the money problems one experiences today. Under the

assumptions of this scenario, there should be a friendlier public attitude toward NASA and a better relationship with Congress.

As mentioned earlier, a budget of 10 billion constant dollars for NASA under this scenario does not seem outrageous. Of course, by this time period, because of changes in price structure, ten billion constant dollars will not buy as much in skilled manpower as it will today, but it may buy considerably more of some kinds of technological production, and one can assume that it will be, on balance, for NASA's purpose, at least the equivalent of 7.5 or 8 billion of the same dollars today. This is significantly more than the peak budgets of NASA a few years ago.

A Pessimistic Side of the Spectrum

In this scenario, one assumes that many of the trends which are apparent today continue. If this does occur there is a natural slope to the pessimistic side of the spectrum. The obvious drop in morale fostered by foreign policies which seem to be popular among the Humanist Left would tend to lead to isolationism. This again should cause a drop in morale among the Middle Americans, the very people who oppose the NASA program. If this group should become more selfish than it has been in the past, the demands will be for cuts all the way down the line. A bitter reaction by this vast bloc of voters could be one of the results of the general feeling of helplessness expressed by so many of the "in" people today. If, as mentioned earlier, the only successes we have are in NASA, perhaps these "in" people can transfer the attention of that vast center of the voting bloc to the successful NASA program and in this way divert attention from failures in foreign policy. But this reaction will more likely cause them to turn increasingly towards thinking about

local issues and their own economic well-being and steering away from federal government programs altogether. In this case, all federal programs might become suspect. It is extremely difficult to discredit one branch of the government involved in over-all "international" programs without discrediting others in the same general area.

Even in the domestic program area there will be problems. There may be a big cry for solving the air- or water-pollution problems, but the cry may be for these to be solved under local jurisdiction. Even if they are placed under federal jurisdiction, there is a good possibility that the average taxpayer will want federal help only in those areas that he specifies.

There is also the problem of the type of political personalities that may emerge in this country under the "defeatist" milieu of this scenario. These could be from those who would be seen as far left, anti-defense and isolationists, to populists who want to throw the rascals out in Washington and who very well may do so.

If the "low-morale," anti-defense isolationists achieve power, the resulting drop in morale and interest of the average man in "unselfish" programs may be somewhat analogous to that of the West Germans. Once the German government had convinced the average German that reunification of Germany and other such high-minded goals were impossible to achieve, except under Moscow's terms, he turned to more selfish things. He bought a car, a new suit, a house; he now frequently goes on vacation abroad. He lives it up and refuses to support his government in programs other than those that allow him to live it up more. He doesn't think much about East Germany and he won't even support unpleasant programs to defend his homeland. He will not raise the West German draft quota for a larger

army, but he expects the United States to keep a quarter of a million men there to protect him. He will not pay taxes to compete; he bitterly accepts the role of a second-class power; blames everyone else (including Bonn and Washington) for it; and at the encouragement of his government, becomes more and more obsessed with material welfare for himself. Something like this could occur in the United States. If so, NASA's budget would most likely be cut. A bitter, selfish American citizen would not be about to sacrifice any significant fraction of his own well-being for "one giant step for mankind."

If Congress should go populist to any large extent, or even if we get a President who feels and thinks this way, then we may have difficulty getting funds for NASA or anything else. Very much will depend on whether the President thinks he can again involve the federal government in big programs and demand foreign policies and make them work; or whether he feels that what he really ought to do is to take care of the local taxpayers and forget the big federal programs. This could even lead to further cuts in taxes, which could reduce the federal budget--one of the worst things that could happen to NASA.

If the federal budget goes down and there are demands for local improvements, then NASA could indeed be in trouble. All the points mentioned earlier (i.e., that lead to the conclusion that NASA would get money by default if other programs were failures) assumed a stable budget. If the budget goes down or remains level while inflation eats it up, then NASA may find itself with a relatively lower budget than it has today. This would mean cuts all along the line. Even if a populist president did not get in--or assuming that a left-wing president is elected--NASA's budget could also be in danger, because one would assume that the funds would

then be funneled into the welfare and poverty programs. And if the defense budget is cut significantly, it might be difficult for NASA to keep the budget it has today. Policies normally have a general thrust. If the thrust of the left-wing groups is to try to appeal to the large block of middle-class and lower-middle-class voters while at the same time counting the favor of the poor, the natural thing to do is to cut NASA, because this is where the opposition can be mollified and the welfare programs funded.

One can see that this pessimistic scenario actually has a branch point that might make it less pessimistic. As mentioned above, the attention of the public might be diverted to a successful NASA program because of an unsuccessful foreign policy and urban program. But it is not a highly likely branch. It is more likely that if there is a low-morale situation and a group of people in power who are interested in social legislation, NASA will be hurt rather than helped. For this reason, NASA should have a dossier of programs which fits a much reduced budget, and it should be ready to defend these programs in a language and mode that will be meaningful to the large, central bloc of voters. This is essentially the same problem that NASA has today, except that it will be considerably magnified.

CURRENT ATTITUDES TOWARD SCIENCE

Having examined some of the broadest public attitudes toward NASA, let us consider a more specific area where attitudes influence public policy: attitudes toward science and science policy investment.

Towards Anti-Science

Responsible public opinion against science has tended to follow and draw upon some of the following attitudes:

1. Science fuels and lubricates the military machine. It is part of the military-industrial complex, and therefore by assumption anti-human and evil.

2. Science and technology manipulate society, our personal lives, and can no longer be controlled.

3. Other projects and priorities are more important than the luxury of basic research, and/or enlarging research and development. Repairing the human environment, strengthening social welfare, reducing poverty, enriching our life, are needs deserving prominent roles in our structure.

4. Science seems to threaten the individual's command over his own life, perhaps making visible his own impotence.

5. The momentum of science and the enthusiasm of its advocates carries it toward its own abstract, non-humanistic goals.

6. Any increase in productivity due to science and technology comes at the cost of exhausting natural resources, contaminating our environment, causing social ills, and economic inequities such as the coexistence of a large GNP per capita with extreme poverty.

7. Synthetic desires are created rather than satisfied by increased productivity.

8. Even scientific priorities are inverted to the point where study and research in reducing infant mortality has slipped, but study and research on glamorous, high publicity projects, like heart transplants, has gained.

9. Science has lost its revolutionary flavor. In the Middle Ages, science was an underground, clandestine activity, engaged in surreptitiously by intellectual adventurers. Science is now "establishment," a target, not an agent, of revolution.

10. Science is not exciting any more for scientists, or students, who seek relevance elsewhere. The field is overcrowded, the "need for scientists has been exaggerated across the board,"* discoveries are very difficult and expensive to make. (There are few elegant, inexpensive, rewarding, and dramatic theories like relativity these days, awaiting our discovery--at least, so far as we know.)

11. The United States cannot afford to lead the world in every sphere of activity, and/or all fields of science and technology.

12. "Science illuminates part of our experience with such glaring intensity that the rest remains in even deeper darkness. The part in darkness has to do with the irrational and the affective in human behavior, the realm of the emotional, the instinctive world."**

Towards Science

Arguments favoring increased commitment for research and development constitute a list harder to draw up than the preceding one. And this is an important measure of the problem.

Arguments in support of science, basic and applied research and development are:

*Bryce Nelson, "A Surplus of Scientists? The Job Market is Tightening," Science 165, 31 October 1969, p. 592.

**Victor F. Weisskopf, "The Privilege of Being a Physicist," Physics Today, August 1969, p. 39.

1. Research and development assists productivity, economic growth and welfare.
2. Basic science, research and development provide a talent pool, a natural national resource of ideas and leaders, also thereby constituting a mobilization base and insurance for defense.
3. Science and research and development improve the mental, conceptual, philosophical climate of our times, as a side effect of the continuous accumulation and ordering of new knowledge.*
4. National morale and pride are at stake in the competition in the international arena of science and technology.
5. Research and development provides employment on a vast scale for scientists and engineers, whose skills might otherwise be unused or surplus.
6. "The U.S. is a major exporter of advanced technology products... Over half of U.S. exports are involved in industries which have a high technology component."** This helps the balance of trade, and the balance of payments.
7. The European technological gap is probably due in large part to its lag behind the U.S. in scientific research and development.
8. Research and development and pure science are the seed, technology and growth are the harvest, for the sustenance of future generations.
9. Research and development in pursuit of defense-oriented goals yields special side-benefits such as feeding commercial and technological advances, and "colonizing" areas of basic and pure scientific research by accelerating scientific activity in specialized areas.

*Economic Aspects of Research & Development are the subject of ongoing Hudson work by Dr. William Schneider, Jr.

**William J. Price and Lawrence W. Bass, "Scientific Research and the Innovative Process," Science 164, 16 May 1969, p. 802.

10. The defense community requires research and development to obtain and improve intelligence estimates, needed for example, for monitoring arms control agreements.

11. Accomplishing the extraordinary makes the difficult easy. It is much simpler to orbit a satellite, after developing the technology for a lunar landing, rather than before. Similarly, for a Mars landing and lunar landing.

12. Research, development, and technology actually improve personal, national, and global communications and potentially improve interpersonal exchange.

BRANCH POINTS

Within the context of the scenarios and alternate futures, we identify "branch points" or possible crucial events we know would profoundly affect those futures, even though we don't know precisely how those events would come about. A branch point that would affect the entire society would be a Vietnam debacle, which was described above. The branch point is a question mark located in time, or a fork in the road of history.

We can roughly categorize branch points under three headings:

1. domestic
2. foreign
3. NASA

As shall be demonstrated, the importance of any branch point depends upon the overall milieu in which the key event occurs. While we have incorporated discussion of key branch points in the above futures and scenarios, it is often useful to consider special cases of branch points

separately. From a substantive standpoint, some cases may best be viewed in detail if they are taken out of context of a particular scenario designed to develop one or two key assumptions effectively. Overloading a scenario may simply confuse the reader. From a methodological standpoint, no analyst can be expected to anticipate or understand the full range of important events that can have a significant influence on a particular period under study. Thus, we have abstracted the following series of branch points to expand the framework in which major scenarios are considered and to illustrate the importance of independent branch points as a methodological device.

DOMESTIC BRANCH POINTS

Great Society Outcome

The "Great Society" social programs initiated in the mid-1960's will eventually be judged to be successes or failures.

A negative Great Society outcome would give us a situation as described in the Modestly Pessimistic Prognosis. The Modestly Pessimistic Prognosis is very pessimistic for NASA. It could lead to the Middle America Revolt described below. The society depicted greatly resembles France before de Gaulle, with chronic disaffection on all sides. Obviously, a rejection of "square" values and hostility to the "military-industrial complex" would hurt the space program. Funds might be cut, or more likely not augmented and NASA could be seriously hurt. Morale might be adversely affected, and there could be a perceptible decay in the competence of administrators and scientists. Still, the nation should be able to recruit enough good men to man NASA and other technical agencies.

Under such conditions the Agency would be well advised to undertake only low-posture programs.

Depression

Another major event which would have massive impact on the entire society, as well as NASA, would be a severe economic depression. Given the values and expectations of our people, such an occurrence would likely have an impact far greater than the Great Depression of 1930-39. At the very least, there would be great direct government intervention in the economy. At first glance, one would think that a depression would vastly exasperbate the "priorities" issue, and might cripple or kill "luxury" ventures such as NASA. However, the converse is more likely to be true. The crucial characteristic of a severe depression is the spread of unemployment beyond unskilled and semi-skilled workers to technicians and professionals. Very likely there would be a demand to provide meaningful work for all sorts of highly skilled workers. Under such circumstances, NASA would be an ideal agency to stimulate employment among physical scientists, engineers, and technical workers--a sort of aerospace "WPA".

A more radical effect of widespread disaffection is described in the following scenario:

The New Class

Humanist, hedonist, and anti-science values spread from the Humanist Left and capture the youth of the Responsible Center and Intellectual Estate. In the humanities and social sciences the college curriculum is "unstructured" to the point of anarchy. The physical sciences and engineering departments

try to resist the trend, only to learn that students resist the discipline and organization necessary to master technological fields. Scientific recruitment sources dry up.

Needless to say, no one rejects the material products of industrial society, so the demand for technicians continues. Denied the university as a source, the great private and public organizations (including NASA) begin to expand their internal training facilities. Very soon they find themselves operating full-fledged technical institutes. For human material, they resort to the sons of Middle America. The curriculum is strictly vocational. A new breed comes to man America's technical and industrial apparatus. The new men greatly resemble the "new Soviet man" of the 1930's. He is technically competent, aggressive, loyal, and indifferent to culture. Faced with the sneers of the upper-class youth, the new men become hostile to the values of the established elites. They are arrogantly populist, nationalist, philistine, and class-conscious.

The new men displace aging establishment types, and take over leadership of the industrial complex. They view themselves as the creators of national wealth and fail to see why they should share that wealth with the degenerate college graduates who fill sinecures in the universities, the social welfare bureaucracies, and other non-productive organizations. The new men make common political cause with their kinsmen, Middle America, against the old elite groups. The new men come to power. National resources are redirected toward production, technology, and the physical sciences. NASA prospers. High prestige, high cost programs go forward.

New Liberalism

A reasonably successful outcome of the Great Society programs leads to a liberal revival, generally along the lines suggested by the Modestly Optimistic Prognosis. The impact on the space program would largely depend on whether the New Liberalism is more influenced by the cool, rational style of the Academic or the hot, turned-on values of the Humanist Left.

A New Liberalism along rationalist lines would lead America in the direction of the welfare state of the European social democracies. Social programs would proliferate, and the governing liberals would have little sympathy for "irrational" goals such as glory, prestige, entertainment. They would also be hostile to the "military-industrial complex," especially the aerospace industry. Massive government social welfare programs would leave little money for space adventures. Space exploration programs would be scrubbed. Other manned programs would be funded just sufficiently to keep them barely alive. Military programs would be throttled. Emphasis would be on unmanned scientific programs in support of "down-to-earth" objectives. The space budget would be cut to less than a billion dollars per annum. NASA officials would talk in terms of "America's contribution to the international space effort." The Russians would land on Mars, but parity being considered desirable, this would be accepted as compensation for the U.S. moon landing, and no one would be bothered.

The Transfiguration of NASA

An alternate outcome is that NASA successfully adapts to the new political milieu. As the country moves toward secular humanist values,

NASA places more and more emphasis on its down-to-earth programs, stressing direct practical benefits to mankind. Nevertheless, a major national debate occurs over the issue of the manned space program. Since it is clear that the manned program will be scrapped in any event, the Agency decides to quit without a fight, offering to use its expertise to the advantage of all mankind by presenting a comprehensive program for the application of science and technology to the world-wide material problems of man. NASA continues its aeronautical and near-space activities, but only when such programs can be justified on a cost-effectiveness basis compared with non-space means. The Agency and its contractors address themselves to problems of land transportation, power generation, environmental pollution, etc. NASA becomes the National Applied Sciences Administration and is magnificently funded by an enthusiastic Congress and Nation.

Tomorrow, the Stars

An alternate New Liberalism might see a substantial increase in the life styles now associated with the Humanist Left, as suggested in the following scenario:

The drift toward secular humanist values continues, but there is a shift from the improvement of necessities toward improving the quality of life. The sporting values of Middle America are assimilated to the concept of the gentleman-adventurer. NASA stimulates the trend by recruiting younger, flashier astronauts--Joe Namath in space. Social programs have been successful in alleviating most poverty and integrating minority groups. With its complaints blunted, the humanist left becomes irrelevant. It withers away, but not before transferring some of its vigor to the Intellectual Estate.

...U.S.-U.S.S.R. relations improve. As a gesture toward disarmament both countries agree to divert a certain percentage of military spending to peaceful space ventures. Russia remains a formidable adversary in space. NASA's budget creeps up to ten billion dollars per annum. Although a crew is lost, public mourning takes the form of a renewed dedication to the conquest of space. By 1990, the astronauts include a married couple who set up housekeeping, for a time, at the lunar base; but it is not until 2009 that a human child is born on the moon.

Middle America Revolt

A plausible result of a Vietnam debacle, a failure of the Great Society, or a depression might be a populist revolt, which could develop like this:

Repeated government failures have thoroughly discredited the establishment. Left and right opposition gets out of hand. Society becomes polarized. "The center cannot hold." Public violence becomes endemic. Terrorism spreads. Paramilitary organizations. Vigilantes. A populist President comes to power supported by Middle America and frightened elements of the responsible center. He is elected on a platform of nationalism, law-and-order, and the end of social engineering. The Administration institutes an aggressive foreign policy, repression of the left-wing, and savage cuts in spending for social programs. The economy falters. Looking for a public works program that will stimulate the economy, yet not offend his populist constituency, and also seeking a positive program that will divert, unify, and glorify the nation, the President concludes that only the space program is big enough and ambitious enough.

The new space program has purely populist and nationalist objectives. No words are wasted about international cooperation and scientific advance. The program is blatantly directed toward American prestige and national defense. The Mars project goes into high gear. The moon is claimed by the U.S. Manned, armed satellites are put into orbit. The Russians counter. Skirmishing in outer space. The space program becomes predominantly military. Believing the civilian leadership of NASA to be insufficiently aggressive and military minded, the President places the entire space program under the command of the U.S. Air Force.

A variant could be a "Jeffersonian" administration dedicated to limited government and to fiscal parsimony. This would eliminate the manned space program.

A Re-Establishment

Also conceivable is that the populist revolt would fail and a Responsible Center Revival would develop as described in the alternate futures. The establishment would be re-established with restored morale and power, assume a resurgence of establishment values of organization, power and prestige, together with a general acceptance (or toleration) of vast national projects. Since an establishmentarian revival would be based upon traditional American virtues, it is unlikely to be innovative. The government would be manned by technicians (in the broad sense) who would be sympathetic to the space program. An ambitious Mars expedition would be exploited as a symbol of national unity and achievement, very much like the political exploitation of the moon shot.

FOREIGN BRANCH POINTS

Vietnam Outcome

The outcome of the Vietnam war is such an important branch point that it was described in considerable detail above. A favorable outcome conceivably might favor NASA by alleviating the pressure for federal funds, but so many political debts have been left unpaid pending the end of the war, that the scramble for money is more likely to get worse.

A Vietnam debacle is almost dangerous prognosis for NASA, as well as for the nation at large. A near-revolutionary situation could develop. An enfeebled establishment government could only survive by making repeated concessions to opposition pressure. Any program which wasn't absolutely necessary for the establishment to retain power would be expendable. NASA might be among such programs. In such a political environment, a Middle American revolt is a distinct possibility.

Soviet Challenge

The space policies of the Soviet Union are the great imponderable to NASA. American space policy 1958-69 was in great measure a direct response to Russian Sputnik successes. Assuming there is no significant alleviation of the more general U.S.-U.S.S.R. rivalry, further U.S. responses to U.S.S.R. challenges may be expected (and vice versa). Three alternates are available: (1) continued Soviet challenge, (2) heightened Soviet challenge, (3) reduced Soviet challenge.

NASA has excellent historical precedents from which to estimate heightened and continued Soviet challenges. We know that the U.S. space program was ignited by a heightened challenge (Sputnik) and promoted by

a continued challenge (the race for the moon). The possible effects of a reduced challenge remain conjectural. In the following scenario we follow this path, and describe a possible NASA response.

Machiavelli in Space

The international cooperation values of the Intellectual Estate and Humanist Left become stronger and have more impact on the Responsible Center. But Middle America is untouched by this trend, remaining fiercely nationalist. The space race goes on with success after American success. The Russians appear to be falling hopelessly behind, and rumors circulate in Eastern European capitals that the Kremlin is contemplating abandoning their space program to prevent further humiliation.

Space administration leaders, recognizing that a Soviet default would eliminate the competitive and nationalist objectives of the space program and therefore imperil its very existence, declare a new policy of international cooperation in space. The cooperation policy consists of feeding information to the Russians, permitting them to skip over several necessary mobilization programs and achieve a series of space spectacles.

Public outcry. The "space gap" issue is revived. A new administration comes to power with a space superiority plank in its platform. The NASA Administrator is designated the scapegoat and discharged. The American space program forges ahead. Cooperation with the Russians continues surreptitiously. In the meantime, the Intellectual Estate has been temporarily placated.

Departing from Precedent

While heightened Soviet challenges in the past have spurred the space program, past precedents might not necessarily prevail in the future. At least two conditions might prompt a new U.S. response:

1. A new era of detente, reflected in strategic arms limitations and settlements in the Middle East and Central Europe;
2. In response to external events and in extension of existing domestic trends, the values of the Intellectual Estate and Humanist Left achieve increasing influence on the Responsible Center and on Middle America.

Under such conditions, unless a new Soviet space achievement was unmistakably one of primarily military value, the Intellectual Estate would not view it as cause for more vigorous American efforts to catch up. Rather, the Intellectual Estate would favor a response that was magnanimous, charitable, understanding, stoic ("we could have done it, but chose not to bother"), patronizing, consciously abnegating, and eschewing vulgarity. It might hail the Soviet actions as an advance for all mankind and as evidence that increased international cooperation would advance world-wide interests more quickly, more efficiently and more cheaply--since nationalistic duplication would presumably be reduced. Basically, the Intellectual Estate would not view the Soviet success in nationalistic or military terms. Middle America would be annoyed and disappointed at an American failure and irritated at those responsible for it. But it would not view the Soviet advances as a catastrophe. The Responsible Center would be amenable to a two- to five-year moratorium on space efforts specifically reactive to Soviet advances.

The original drama and dynamics of our space effort came in the wake of the sputnik shot. It was universally held by an overwhelming majority of Americans and, indeed, of the entire world that the United States had suffered a grievous political and scientific defeat, a loss of prestige and "face". It was a correct impression. The U.S. decision to go to the moon within the decade of the '60's had all the elements and intention of introducing a fierce competition between two highly and equally endowed opponents. This competition may very well disappear in the 1970's and substantial public interest and support for space activities may slacken.

Among the arguments against a recurrence of direct United States-Soviet competition in the decade of the '70's are the following:

- (a) Despite the Soviet invasion of Czechoslovakia, a state of detente seems likely to characterize bilateral relations between United States and the Soviet Union for the foreseeable future.
- (b) European security questions as advanced currently by the Soviet Union and East European powers have attracted some interest in Western Europe and although a relatively major irritant in bilateral U.S. Soviet relations, they do not seem to be destined to seriously affect these relations.
- (c) Detente will probably be reinforced by a resolution of the Vietnam War during the '70's.
- (d) Barring absolute intransigence on either side--which admittedly is a possibility--the SALT talks may very well achieve substantial results in the next decade. There are already agreements limiting the use of outer space for military purposes, although the superpowers are prepared to tolerate the use of outer space for reconnaissance purposes.

- (e) The United States is clearly leading the space competition. It stated its purpose, it stated its program, it declared the stages of implementation and it reached the moon, ahead, indeed far ahead, of the Soviet Union. The victory in the moon race was clear-cut. It removed the drama from the competition.
- (f) Thus, it would seem that as far as outer space is concerned, this sort of "potlatch" relationship between the Soviet Union and the United States will no longer be characteristic. On the contrary, there may be in the next five years and certainly toward the end of this decade, barring unpleasant surprises, some significant collaboration between the two powers as regards a scientifically desirable objective in space. The recent exchange of astronauts is merely indicative of the general trend:

Japanese or Nth Power Challenges

Here we try to anticipate the effects of a space challenge to the U.S. by some power other than the U.S.S.R. As far as one can now judge, on the basis of current capabilities in relevant fields, within the next fifteen years only the following nations are likely to have significant space capabilities:

- (1) Japan
- (2) Communist China
- (3) France
- (4) Britain
- (5) West Germany
- (6) Some combination of any of the above with each other and/or lesser powers

At the time of writing, we believe that Japan is the nation most likely to make a serious space effort. The Japanese are achieving and seem likely to continue an extraordinary rate of economic growth, which might bring them a GNP almost equal to that of the U.S. by 1985. This seems to be the result of an intense sense of national purpose. Japan wishes to succeed in its own eyes and in the eyes of the world. How might this affect NASA?

Having attained economic domination of the Pacific and Indian Ocean areas, and having achieved a large number of scientific and technological triumphs as evidenced by many Nobel and other prize winners and commercial penetration of significant industrial markets with superior, highly sophisticated devices of all types, by 1985 the Japanese seek new fields to conquer. The Japanese go for space. They begin with a large program of earth resources investigation to help exploit their economic domination of the East, and move inevitably toward a manned program.

The American reaction would depend on the road taken from one of the domestic branch points considered above. Assuming that the Middle America revolt fails to materialize or fizzles, perhaps because the Great Society programs are a reasonable success, then during the first phase of our proposed Japanese space effort--the earth resources program--critics of the NASA manned program can say, "While we are playing games in space, the Japanese are using space for really beneficial purposes." Under the conditions assumed, this might be just enough to kill the American manned space program. When the Japanese go on the manned program, America is unprepared to compete. Japanese space victories, together with their other national achievements, lead the Japanese, the world, and even the Americans to believe that Japan has truly replaced the U.S. as the number one power.

A variant scenario would presume that a lower Middle American revolt is dormant or under way. Japanese triumphs and assertions of independence have exasperated many Americans, particularly those thrown out of work by real or imagined Japanese competition, which is blamed increasingly for all forms of technological unemployment. Anti-Japanese remarks are widespread. The national government, seeking to prevent this sentiment from getting out of hand, promotes the manned space program. Thus the Japanese-American rivalry is diverted from economic and potentially military grounds to the harmless arena of space.

However, a challenge need not necessarily bring about a conflict; frequently a challenge can create opportunities for cooperation. In the following two extended scenarios* the interrelationships between domestic and foreign events and U.S.-Japanese cooperation are explored in depth.

U.S.-Japanese Manned Flight to Mars

Along the lines of a more or less "surprise-free", moderately optimistic projection, the international climate has remained relatively peaceful; some areas of friction such as the war in Vietnam, have cooled off, some areas remain tense--notably the Near East--but major outbreaks of military conflicts have been averted. There is a continued decrease in East-West tension in Europe--partly as a result of German-Soviet settlement of the Berlin question; as East-West trade in Europe has picked up, so issues relating to NATO and European defense have lost their urgency. Soviet satellites, while restive, have benefited from this European detente economically, and while they have been largely unsuccessful in emancipating themselves

*By Ivan Schidloff

from Soviet domination--especially in the area of foreign policy--their internal-political situation has become at least tolerable, along the current Hungarian model. There has been no Sino-Soviet settlement, but neither has the conflict intensified. China has stepped up its hostile propaganda vis-a-vis Japan, but has made no serious threatening moves.

Japan, after a long and hotly contested internal debate, has decided to postpone entry into the nuclear defense club while substantially bolstering its conventional forces. U.S. defense commitments in Asia as well as in Europe have decreased. Some bases in Japan have been closed down, and the U.S. NATO contingent has been further reduced in size. As a result of continued inflationary and protectionist trends in the U.S., Japan has diversified its foreign trade, mainly by massively increasing its European trade, and, to a lesser degree, trade with Communist countries. But the Japanese clearly understand that their increasing economic role in S.E. Asia is bound to run into Chinese opposition. Japan realizes, too, that the credibility of the U.S. nuclear guarantee on which it must continue to rely can only be maintained in a climate of continued, and highly visible, good relations with the U.S.

On the U.S.-U.S.S.R. front, the detente continues. The SALT teams have come to an "agreement in principle" on the limitation of ABM deployment. Having achieved what is perceived as parity with the U.S. in strategic capability, the Soviet Union's strategic build-up has slowed down noticeably, while the U.S. has made no major moves to upgrade its nuclear striking force. There exists a de facto state of strategic freeze, though it is very difficult to formulate specific agreements that would convert the freeze into an international treaty obligation. Difficulties with its

Arab clients have also made the S.U. more cautious in the Mediterranean, and less expansionist elsewhere. Europe, in the face of continuing detente, is more interested in solving Common Market problems that have arisen as a result of Britain's (and the Outer Seven's) entry into the club. In short, Europe enjoys its prosperity, and rests content with "tending her garden." The Concorde has entered trans-Atlantic service, but proves an economic failure. As a result, the Europeans have become wary of such prestige-oriented ventures, and are content in expanding and upgrading more practical areas of their technology; unlike the Japanese, who are now beginning to thirst for some prestigious technological feat to crown a half-decade of continued rapid economic growth and to demonstrate to the world that they have clearly become the world's "Number Three" nation. Increasingly, a space feat appears more and more attractive to them, especially since it would allow them, by implication, to demonstrate their ability to deter any future Chinese threat. As the world has become blasé about unmanned satellites and space probes of all kinds, and as some dormant remnants of the Samurai tradition have again been stirred, the Japanese are more interested in a manned space program. But they realize that they would have to start from scratch, and the cost of a manned space program that would have a real impact appears to them prohibitive. Having created their own NASA, they are now both in search of a mission as well as of some means that would allow them to rapidly expand their space capability.

With the gradual becalming of the war in Vietnam and the general decrease in international tension, the U.S. turns increasingly inward. The Vietnamization program having been largely successful, there is no

rankling sense of defeat, and with the decline in protests and student unrest, the so-called social issues have lost some of their edge. While many of the "Great Society" programs have proved, by most measurable criteria, to have been successful, a slowed-down rate of economic growth, combined with a continued high rate of unemployment and inflation have created a climate of caution and disillusionment with the national government. The priorities issue remains central in the mind of most Americans, and there is little inclination to embark on any high-risk venture, be it foreign or domestic, civilian or military. Protectionist tendencies have gained ascendancy, with resultant bad blood both vis-a-vis Japan and Europe. Attitudes toward science and technology, while not out and out hostile, are marked by a "withdrawal of affect" from both technology and, to a lesser extent, the entrepreneurial system in general. By 1975, there has been a decline in foreign trade, which is now recognized as one of the major causes of the general slow-down in the economy. Two Republican administrations have defused many divisive issues, but the country stands in great need of a lift in morale. The Soviet Union having adopted a low posture, there are few cold war issues of sufficient importance to arouse the population's anxiety or idealism. An unmanned Soviet probe to Mars creates a minimum of stir. Even the launching of a Soviet orbital manned space-platform has been greeted with a calm verging on indifference. Its military implications are discounted, and the high vulnerability of such a system in the event of war--even with existing ABM systems--keeps a competitive U.S. response grounded. 1975 is marked by a liberal revival of modest proportions, with a major emphasis on getting the economy into high gear. Democrats fully exploit issues

connected with the chronic mild recession, and are careful to avoid all issues which would make them vulnerable to the charge of being the "war party". Gradually, many of the fears associated with polluting the environment have been assuaged, and modern technology is no longer seen as the villain it was thought to be at the beginning of the decade. Foreign SSTs are in regular service and have proven the SST to be "just another airplane," only faster. This has somewhat discredited anti-technologists. The new Democratic administration is most anxious to reverse the protectionist tendencies, preferring to see America concentrate on high-technology input industries and on agriculture, areas in which America still retains a commanding lead.

R&D funds become more freely available, including funding for certain NASA activities associated with earth applications, as well as for the space shuttle. But, after the successful completion of the Apollo program--successful in the sense that the missions have gone as planned, without startling surprises but also without catastrophes--there appears little support for the continuation of the manned space program. The latest Soviet space probe to Mars has telemetered some interesting bits of evidence suggesting the presence of some life-forms, but the evidence is inconclusive, though tantalizing. There is a lively debate in the scientific community about these findings, and there is general agreement that nothing short of a manned expedition to Mars could settle many of the outstanding issues. But when a price-tag is put on the undertaking--of the order of 60 to 100 billion dollars--the issue of priorities invariably makes the Mars expedition take the back seat. Everybody is aware of the waste involved in having to abandon the Apollo capability, but it becomes extremely

difficult to justify expenditures of the order of 10 billion dollars a year over at least a decade to continue the manned program. At this point, the Japanese become very interested. Informal feelers are put out to ascertain whether the U.S. would be prepared to consider a joint venture, funded on a 1 to 1 basis. The new U.S. President orders the creation of a standing committee for a manned journey to Mars, and the Japanese quickly present a formal proposal offering to foot half the bill. A joint Task Force Mars is created, with all of NASA's manned space program assigned to it, and endowed with sufficient R&D funds to explore the technical and financial requirements of a Mars landing.

The President invites other European nations to join in, provided they are willing, jointly or singly, to finance one-third of the program. The European governments, while interested, are not prepared to make a financial sacrifice of that order of magnitude. But Japanese eagerness to participate makes it easier to justify a Mars landing in Congress, even though U.S. prestige would be diluted by Japanese participation. Anti-protectionist forces are rallied to the issue, as the Japanese make it clear that they would be willing to make many concessions to U.S. business interests in Japan in order to get the program underway. Besides, in the initial stages, the Japanese seem quite willing to take a back seat to the Americans, recognizing superior U.S. capabilities and technical know-how in space travel. By 1976, the Japanese Diet votes an initial appropriation of 3 billion dollars earmarked for Task Force Mars. The program goes into high gear, with a target date set for the late 1980's. By 1976, Japanese ground crews and astronauts train alongside their U.S. counterparts. The Japanese suggest many ingenious improvements in the life

systems, communications, and other hardware, and soon become near-equal partners on the Task Force. Spurred by continued Japanese enthusiasm and support, the Mars program becomes a high-morale cooperative program, with elements of healthy but friendly rivalry. In 1984, the first mixed crew circumnavigates Mars, and returns safely to Earth. Mars 4 finally achieves a safe landing on Mars, but on the return trip a meteorite shower punctures the space-craft, and the entire crew is lost. The fact that there were two Japanese and two Americans on the expedition, far from spelling the end of the program, gives it new impetus, and the next crew makes the round-trip safely and, after having staged a spectacular TV space-cast, they bring many valuable samples of Mars dust back to Earth. The Japanese-American program is hailed as a model of friendly international cooperation, and the program is widely supported to the conclusion of the planned series. The surface of Mars having been found to be less hostile than the Moon's, a permanent manned Mars base is being considered. A study group is created to explore the possibility of further manned exploration of the solar system.

In the above scenario, we have made what might be called a "best possible case" for international cooperation in space within the limits of plausibility. The scenario attempts, in the main, to provide an answer to the question "What can we do in space jointly, that we might not undertake singly?" It might be of interest to note that a space catastrophe on a joint project with mixed crews (so as to avoid recriminations of the sort "whose integrated circuit failed and killed our boys?") might not necessarily be fatal to the continuation of the program, whereas it is generally assumed that a similar catastrophe, should it occur in the Apollo series, would

almost certainly result in a cancellation of further manned space missions. We have also assumed that the dilution of U.S. prestige by the inclusion of Japan would not automatically undermine the support of Middle Americans, who are generally described as favoring unilateral, self-reliant action, and suspicious of foreign participation in programs that have real, or fancied, military significance. But it should be noted that while the scenario is a cooperative one, an element of rivalry is introduced so that a U.S. withdrawal from the program would involve a considerable "loss of face." A further conclusion might be drawn, namely, that whatever the merits of the continuation of a manned program might be, its clear advantage lies in making a more dramatic and less flexible commitment which, once it is made, does not allow for too much "shrinkage." In the following short scenarios, we will examine some less ambitious--and therefore perhaps more probable--space partnerships, based on essentially identical assumptions concerning the international and domestic projections (with some changes in emphasis, as noted below).

A Joint U.S.-Japanese-European Space-Station

The international and domestic context is essentially similar to the one described in the previous scenario, with the exception that our relations with the Soviet Union grow somewhat more tense than previously described. SALT is still ongoing, but no tangible progress is being made. Every proposal by one side is rejected, and is followed by an equally unacceptable counter-proposal. While the Soviet Union continues to adopt a low posture toward Europe in particular, and to some extent in the Near East, her strategic build-up continues, especially in the area of Yankee-class ballistic submarines and a new class of very modern hunter-killer

subs. The US-SU submarine fleets are playing cat-and-mouse games across the seven seas, but as there have been no reportable incidents of any consequence, defense-hostile Congressmen are under no great pressure to authorize substantial increases in the strategic budget. But increased R&D funds are available in the strategic field, including the authorization of two B-1 bomber prototypes and the continuation of the MIRVing program of the Minuteman 3-Poseidon type. By 1975, the Soviet Union remains active in space. Toward the end of the year, they begin assembling a manned space station in earth orbit, ostensibly for purely peaceful, scientific research purposes, but in the minds of many U.S. experts there are some clear possibilities of military applications. As there has been a slowdown in ABM advanced research and testing, and no deployment of an operational ABM system, the public--and Congress--become sensitized to potential threats from orbital satellites in general. Accordingly, when the new President takes office in 1976, he is more receptive to NASA proposals for both a U.S. space platform and a shuttle. The objection of defense-hostile members of Congress is stilled when the President suggests that the U.S. space platform be made available to our European allies and to Japan, provided they are willing to foot the bill for space shuttle launches carrying their crews and/or payloads to the platform for such scientific experiments as they would wish to carry out.

The Japanese, eager to upgrade their space-capabilities, are quick to authorize and to fund a series of space experiments designed to train their own space-crews, as well as for a variety of earth applications. The Europeans, reluctant at first, soon realize that they too wish to strengthen in some highly visible way their friendly ties with the U.S.,

even at the cost of arousing a measure of Soviet antagonism. Now that Britain is getting more thoroughly integrated into the Common Market, some of the problems that formerly stood in the way of any project involving joint financing and organization have been removed. A European Space Authority is created, and the Europeans agree on a joint series of experiments they wish to carry out in space taking advantage of the U.S. offer. Thus in the late seventies, despite some delays in getting the U.S. shuttle to meet its design specifications, an effective working partnership has been forged and the schedule of space experiments and missions assigned to the shuttle and the space platform assures a high rate of utilization--at an acceptable cost to the U.S. The Japanese not only stick to their commitments, but when the Europeans are slow in raising the funds for the launches to which they had committed themselves in principle, the Japanese offer to take up the slack. Not wishing to take the back seat to the Japanese, the European nations promptly resolve their differences and eventually meet their obligations on schedule. Thus the foundations are laid for continued allied cooperation in space, and future, more ambitious joint space missions are in the planning stage. By 1980, even though NASA's funding continues at a relatively low level of 4-5 billion dollars per annum, NASA is able, with the help of U.S. allies, to carry out a fairly ambitious space program, with additional uses being found for the space shuttle. As Soviet attitudes have taken a distinctly unfriendly cast toward European participation in particular, the Germans prevail on the U.S. and their other space partners to exchange medical and selected scientific space data with the U.S.S.R. This puts the Russians on the spot. They must either agree to cooperate, or by refusing,

underscore the essentially military nature of their own space program.

Our second scenario poses a distinctly more hostile international climate. In such circumstances, it might be argued, cooperation with other nations in space undertakings, especially with further dilution of U.S. prestige by the inclusion of a greater number of nations, might arouse greater antagonism toward NASA from middle Americans and defense-friendly legislators. On the other hand, if the defense-hostile (and priorities-conscious) Congressmen are faced with a purely national space shuttle-cum platform proposal with hidden military implications, they might effectively veto any expansion of the U.S. space program on the grounds that if the Soviet space challenge is perceived as being essentially military in nature, then this should be made explicit, and if substantiated, then the proper response would be an overt military one, not a covert one channeled through NASA. From the standpoint of U.S. interests, the form of international space cooperation outlined in the scenario would have several advantages: the same reversal of protectionish tendencies as in the Japanese scenario, but extending to Europe as well. The visible consolidation of alliances without the necessity of revitalizing NATO by increasing U.S. contingents stationed on the Continent. And last but not least, the opportunity of increasing U.S. space capabilities at relatively low levels of funding, thus finessing the priorities issue. For the Japanese, the advantages would be essentially the same, but less apparent, than in the previous scenario, but their share of the financial burden would be proportionately less. Thus they might still feel that they are getting a bargain. And the Europeans might find that the slight risk of increasing Soviet antagonism might be worth

taking, as they might feel decreasing confidence that the continued Soviet strategic build-up might not eventually throw the European detente into reverse. Moreover, it would allow the Europeans to keep abreast of modern technologies, and to blur the distinction between powers and super-powers (especially vis-a-vis Japan). We have not stressed space serendipities, the merits of science per se, or earth applications, as these constitute in this case a bonus, and are not absolutely essential to the unfolding of the scenario as outlined. Last, we would like to point out that the inter-allied space cooperation would not necessarily stand in the way of detente with the U.S.S.R., and might, under certain circumstances, even facilitate it (if the Soviet Union decides to accede to the proposal of information exchange).

NASA BRANCH POINTS

So far we have concentrated our attention on the influence of outside forces on NASA, because we see very few opportunities for NASA itself to have a direct influence on its own future, as opposed to reacting intelligently to outside influences. We see only two events that could occur within NASA itself which could have a decisive effect on NASA's own future.

Space Catastrophe

A corollary of the secular humanist values is a heightened sense of the value of human life. In contrast to romanticism, which extolled courage, sacrifice, le beau geste, it is held that since all other standards have been demolished, the maintenance of life is all that counts. Since life is the ultimate standard, no goal is worth the risk of life. In recent

years, this value has spread throughout society. Witness the anti-smoking crusade, anti-fireworks legislation, the auto safety campaign, and the anti-capital punishment agitation. Increasingly it is believed that society has the duty to protect the individual by prohibiting activities in which he might harm himself.

Let us assume a long-term expansion of this life-preserving value until some time in the distant future when the U.S. launches a new and risky manned mission. The expedition has been dispatched despite widespread expectations of disaster. The landing is unsuccessful. The spacecraft is damaged and cannot take off again. Communications are intact and mission control is in contact with the astronauts. They go about their business intending to perform their duties as long as their oxygen lasts. NASA high command, realizing the adverse effects on the public of this long-drawn-out farewell, has "technical difficulties" in making the astronauts' transmissions available to the media. But a British receiving station, controlled by persons hostile to the manned space program, picks up the interplanetary transmissions and makes them available to the TV audience (ironically, via communications satellite). The whole world watches and listens in horror as the astronauts prepare for the end. In a fit of understandable pique, one of the crew complains bitterly about the quality of the equipment and preparations for the expedition. After farewells to their families, their oxygen exhausted, the astronauts don their spacesuits and go out to die on the extra-terrestrial surface.

A wave of revulsion sweeps the world. Outcry in the media. Astronauts' widows weeping at the White House. Congressional investigations. Rumors of impending impeachments of NASA officials. The President appears

on television to announce the abolition of the manned space program and the breakup of NASA with the assignment of its residual functions to other agencies.

The Unanswered Question

Space advocates have long maintained that we don't know what potential opportunities are available in space. The most favorable circumstance would be for NASA to discover something in space that would raise some basic and fascinating question that only further space exploration could answer. The most striking example would be for the last Apollo expedition to find an artifact or some other suggestion of extra-terrestrial life on the moon. Obviously, such a find would arouse the public to great interest in space exploration.

The scientific community or some segment of it could be similarly stimulated by the discovery of some phenomenon that would suggest that a commonly accepted "universal" law of science is earth limited.

Clearly, NASA cannot count on opening an unanswered question. However, it must be recognized that the possibilities of an unexpected windfall have been basic to the ideology of the space program. The Agency should be prepared to exploit such an opportunity if it arises.

SUMMARY OF ALTERNATE FUTURES AND IMPORTANT SCENARIOS

The table following illustrates a summary of how we believe the relative importance of space objectives would be affected under selected future conditions, by comparing alternate futures and important outcomes of branch points with the current NASA situation. Needless to say, our evaluation is purely subjective. Most of the table is self explanatory;

however, a few comments might be made; in the neutral and pessimistic prognoses, we believe that a slackening of public moral and morality would generally devalue most space objectives, except those toward the bottom of the table which are somewhat self-seeking. To some extent under the neutral prognosis and to a large extent under the pessimistic prognosis we see somewhat of a falling off of public morality, and therefore, more cynical approach to space goals.

Under conditions of successful Middle-American revolt against the establishment we believe that it is reasonable to assume that Middle-American values on space objectives would be more favorably received by the society as a whole. A successful liberal revival, on the other hand, would more reflect the values of the Intellectual Estate. A cold war revival, of course, would lead to a increased valuation of the competitive aspects of the U.S. space program relative to the Soviet Union, and a commensurate devaluation of other objectives. But the objectives are not mutually exclusive, we must always be conscious of dialectal effects--for example, a heightened cold war would also lead society to more value international cooperation, if only to gain allies, as well as an increased sense of the need for a moral equivalent to war. This cautions us to be subtle in our analysis of the effects of future events upon the values of society.

RELATIVE IMPORTANCE OF SPACE OBJECTIVES IN
SELECTED ALTERNATE FUTURES

		Modestly Optimistic Prognosis	Neutral Prognosis	Pessimistic Prognosis	Successful Middle America Revolt	Successful Liberal Revival	Cold War Revival
A	1. Achievement per se	+	0	-	0	+	0
	2. Meeting commitment per se	0	-	-	+	-	0
B	3. Man's conquest of space	+	0	-	-	-	-
	4. International cooperation	0	-	-	-	++	+
	5. Moral equivalent of war	++	0	0	-	++	+
C	6. Increasing U.S. prestige	0	-	-	++	-	+
	7. Succeeding in US-SU prestige competition	0	-	-	+	-	++
	8. Succeeding in US-SU military competition	0	-	-	++	-	++
	9. Succeeding in SU economic and geographic competition	0	-	-	++	-	++
D	10. Satisfying curiosity	+	0	-	-	0	-
	11. Scientific advance	++	-	-	+	+	+
	12. Technological advance	+	0	-	++	0	++
E	13. Mobilization base for achieving other items	+	0	-	-	0	+
F	14. Potential economic benefits from space technology	+	+	++	++	+	-
	15. Short-term economic benefits from stimulation of national economy	0	+	+	++	+	-
G	16. Entertainment of public	-	-	-	+	-	-
	17. Redirecting attention of society	0	+	++	0	-	-
H	18. Advancing personal careers	0	+	++	0	-	-
	19. Advancing organizational interests	0	+	++	0	-	-
	20. Maintaining funding	+	-	-	+	-	++

++ much more strongly supported than today

+ more strongly supported than today

0 basically same as today

- less supported than today

-- much less supported than today

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CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

VI. CONCLUSIONS AND RECOMMENDATIONS

In the interim since we prepared the "Workbook" a year ago, our further evaluation of U.S. futures has not substantially revised our major conclusion that NASA's planning for the next decade must take place within the economic and political constraints suggested in the "neutral" or "pessimistic" prognoses about the future. It is therefore desirable to reconsider the responsibilities of technicians and scientists in such a period.

To the extent that they are expected to function for purely technical objectives NASA may alienate itself from significant sectors of American opinion. The accumulation of a relatively open-ended scientific and technological agenda and the bureaucratic momentum established in compiling such an agenda almost guarantees some harmful results: It could stigmatize NASA as an institution that is out of touch with national economic, social and political realities. Then, constraints on NASA's budget can intensify the gap between what NASA would like to do and what it can do. Obviously, this would ultimately lead to lowered staff moral and recruitment problems.

Basically, NASA must recognize a new era in American society, one that does not accept purely technological or scientific agendas as ends in themselves. Rather, the trend is toward a skeptical view that demands a clearer relationship between scientific research and other social values.

It is therefore crucial to NASA's survival as a base for future space exploration to inject a clearer emphasis on goals and values throughout its planning processes--including the initial stages that are traditionally limited to technological considerations. Indeed, this is what the Long-

Range Plan drafters have tried to do. They have selected optimistic values and goals to justify maximal programs and ignored neutral or pessimistic assumptions designed to facilitate programs within a broad framework of constraints.

Somewhere in the planning process, then, it is important to give sufficient emphasis to policy goals and to assumed sources of support for particular proposals; to clarify important hidden assumptions about certain missions and technologies; to go beyond a purely technical compilation; and to do an effective job of relating policy goals, programs, groups in society and long-range social-political change. Of course, it is not necessary to do these things in a document identified as a "long-range plan"; but it is necessary to attempt, at some point, a comprehensive analysis of all the factors related to program areas.

There is a danger that the task will otherwise fall between stools. As one of us, in collaboration with H. Kahn, wrote in a recent study:

Because of new technologies, new wealth, new conditions of domestic life and of international relations, unprecedented criteria and issues are coming up for national decision. But in the usual bureaucratic situation an executive is expected to be concerned with his own immediate responsibilities and not to worry unduly about others except for purposes of "political" bargaining or compromise. The only man who has nominal responsibility for the "overall" problem is the President (or other chief executive), who has little time to spend on anything except already "felt" pressures; and his competence obviously is limited. Furthermore, executives often do not make the crucial design decisions or even have much effective influence on them; they tend to make choices among already designed systems. As a result the principles of contingency design are often neglected, or the choices and compromises that are formulated may be far from optimal.

Thus the national executive viewpoint may be narrow simply because there is no group whose professional and continuous job it is to worry about the appropriate issue. We have seen more than one instance in which a new issue is identified, all the officials to whom it is pointed out agree that it is significant, and it remains neglected simply because no one in the bureaucratic structure has a "mission" that would permit him to take cognizance of the new problem. Similarly it often happens that although there are offices in many parts of the government that are responsible for various parts of a problem, there is no one who has responsibility for the problem as a whole, for fitting the traditionally recognized part into a newly glimpsed total system--except of course the Chief Executive, for whom the problem may be at too high or low a level of abstraction or too low in priority in comparison to more pressing (and possibly less important) demands on his attention. It is one of the most important objectives of a policy-oriented research organization to function as a "lobby for the future": that is, to make a deliberate attempt to take a broad and long-range view of problems, and to try to create intellectual pressures on behalf of considerations outside the institutionalized criteria, particularly those considerations relevant to the long-run future or to the larger community, as in the case of issues such as international security. Policy studies should seek to discover important issues that are not currently recognized and should try to see that they are not unduly neglected in favor of more obvious, more pressing, or better-institutionalized considerations.*

SUMMARY OF TRENDS AFFECTING NASA PROGRAMS

The Uses of Branch-Point Analyses

Our review of a number of branch points, or unresolved major issues that will influence the over-all direction of American society, has been a preliminary exploration. To some extent, we have deliberately over-dramatized some alternate consequences of different branch-point outcomes. The objective has been to underscore the importance of some specific future developments, to indicate that the Advanced Missions and Concepts should consider these branch points as key open questions, should remain alert

*Herman Kahn & Anthony J. Wiener, The Year 2000: A Framework for Speculation (New York: Macmillan, 1967) pp. 390-391.

to the answers as they develop, and should be attuned to the relationships between various combinations of these future events. Preliminary planning for specific outcomes should be undertaken as developments appear to be ripening in any of these areas. The objective has been to sensitize planners to the issues rather than to propose excessive planning for unlikely events.

Dominant Trends

In our judgment, the dominant trend in American society for the foreseeable future is reflected in the "neutral," "straight-line" and "pessimistic" prognoses rather than the "optimistic" ones.

We foresee a period of constraints on NASA. These constraints stem from the following general factors:

The International Climate: Despite much public rhetoric concerning the space age and the future, it is essential to acknowledge the degree to which the space program is rooted in the past--the age of the cold war, the missile gap, and Soviet one-upmanship resulting from Sputnik. Since World War II, we have passed through three eras: the immediate postwar period, the cold war period, the emergence of a detente. The space agency achieved its initial impetus from the second period. To the extent that NASA has relied heavily on Soviet policies to justify U.S. space programs, NASA's role in an era of detente is no longer self-evident, particularly if the Soviet Union makes a de facto concession that the U.S. has in fact won the space race.

The Domestic Climate: The diminishing sense of national mobilization for cold war has been paralleled by dispute over new national priorities backlogged from the cold war period and emerging from changing values.

Space Achievements: Much of NASA's momentum was centered on the aim of landing men on the moon. Clearly, the reception to the first hesitant suggestions that the U.S. should undertake a similar commitment to Mars has been less than enthusiastic.

The most likely future for NASA will therefore be an ambivalent environment. Expressed in monetary terms, there will be substantial resistance to increases in NASA budgets for the following reasons:

1. Hostility from all segments of the public, particularly Middle America, to increases in Federal taxation and spending.
2. Hostility from the Intellectual Estate, the Humanist Left, and the lower class to any projects which divert funds from social programs.
3. Hostility from the Humanist Left to science and technology, with some spread of this attitude to the Intellectual Estate, the Responsible Center and perhaps even Middle America.
4. Increased concern by Intellectual Estate scientists for "pure science" projects with decreasing tolerance for nationalist and charismatic goals.
5. The Responsible Center will give increasing attention to social programs,
6. Responsible Center and Middle America are likely to successfully resist substantial defense budget cuts. If social programs are to be increased, this may have to be done at the expense of non-defense programs, including NASA.

Conversely, the following trends will favor NASA and hinder major budget decreases:

1. Continued public awareness of the general, long-term benefits of science and technology.
2. Skepticism about the value and effectiveness of social programs, particularly among Middle Americans.
3. Continued public interest in space, particularly in the manned program.
4. An increasing number of technically educated Middle Americans who will strongly identify with and strongly support the space program.
5. A continuing though diminished Russian challenge.
6. A fear that cancelling or severely cutting back the space program would have detrimental effects on national prestige and morale.
7. Interest--NASA employees, contractors, their employees, their local economies, and their politicians have an interest in maintaining the space program.
8. Inertia.

These factors lead us to assume that NASA:

- (a) Cannot expect any significant increase in its budget.
- (b) Can continue to be funded near its current level, provided that NASA's programs continue to be, or appear to be, favorable to the goals of the significant elements in society.
- (c) Can avoid becoming an isolated target for budget cuts, but will not escape general cuts affecting many Federal agencies.

RECOMMENDATIONS

One cannot expect a consideration of alternative futures such as we have presented above to lead directly to detailed recommendations for policy planning. The function of alternative contexts is to affect choices that are made by policy planners principally on other, more immediate grounds. Rather, the primary function of this report must be to stimulate the imaginations of NASA planners themselves and to enhance their awareness of what is entailed in long-range choices. Since we who are outside NASA and untrained in the space-related sciences must be naïve about program choices, it is our hope that raising the issue may have some heuristic value for those who are more knowledgeable about the technical bases for choice.

Nevertheless, we feel we should attempt the exercise of identifying some of the recommendations that seem to us to emerge from the work we have done. We must emphasize that the work is still in a preliminary stage; that we would expect, in a continuation of this project, greatly to increase our knowledge of some of the detailed and current issues involved in NASA planning, and that we have no difficulty in imagining that NASA planners immersed in current issues would view what we bring to their attention quite differently than we do.

The following recommendations are put forward merely as provocative and heuristic illustrations of the fact that plausible recommendations might be derived from scenarios like the foregoing, and as invitations to NASA planners to reconsider both the scenarios and the conclusions that can be drawn from them. We do not hold these recommendations strongly: they are sensitive to answers to many questions which need further investigation by us, by NASA, or both. We expect to change our minds as our

knowledge increases. The point of the exercise is simply to indicate that if certain assumptions are made about the results of mission analysis, the scenarios can help point to program choices. If the analyses change, so will the choices.

Since NASA will function within new significant socio-political and economic constraints, it will be necessary to review the entire range of possible projects in the future, establish priorities for the purpose of preliminary mission analysis, clarify the implications of alternatives, and make more explicit the bases on which priorities are assessed.

This implies a need to analyze, in broad terms, the implications of the following conclusions and questions:

1. Only a comparatively small amount of new funds will become available to NASA from the "peace bonus" resulting from reduced U.S. commitments in Vietnam, and probably not until the mid-1970's.
2. Thereafter the NASA budget will probably not rise faster than the than the GNP for another decade, and there will be years in which it may be cut back.
3. Under certain plausible conditions extremely bad planning by NASA officials might cripple or even kill the U.S. space program.

This implies a need to consider appropriate staging of and relationships among the conclusion of Apollo; the beginnings of two possible orbital laboratories (small and large); the development of shuttles; and the beginning of major Mars programs. Recommendations then turn on the answers to questions such as: Are Apollo program costs mostly fixed,

whether or not the program is accelerated? If so, is it possible to phase in a full-scale space station program that will take up the slack following Apollo--in order to avoid both higher budget requests due to overlapping, or budget cuts due to the space stations's lower requirements in the initial stages? If we can turn from Apollo directly to the space station, will much time be lost by postponing expensive starts on other deep space missions? Can the space station and a minimal space exploration program overlap within the period of the expected budget constraints? What specific goals are needed to justify the space station effort? What kinds of results will be needed later in order to be valued by Congress and the public?

What is the best way to insure maintenance and effective use of the national space mobilization base, looking forward to the time when sufficient progress has been made in meeting other national needs to permit increases in the NASA budget? In our judgment, groups in American society who now oppose a major space program will become more interested in space efforts once their present demands are satisfied. These groups therefore have a stake--whether they know it or not--in the goal of maintaining the space mobilization base. The public interest goes beyond public relations, and the responsibility of a public agency should sometimes conflict with its responsiveness.

In this context, the following suggestions should be evaluated:

1. In what seem to be the most plausible of the alternative futures we have considered, considerations of domestic morale and international prestige (symbolizing to the world American elan and confidence) will be an uncertain basis for justifying NASA programs. Leadership in science and technology, however, may provide a much more stable cohesive force.

2. If analysis shows that dropping Apollo in favor of some new program will not offer the public comparably impressive results and successes in the immediate future, then the current series of Apollo lunar landings should probably be continued through to their currently scheduled completion with Apollo 17. If Apollo were to be dropped, and were not to be followed by any new and similarly significant program, this would be interpreted both at home and abroad as a sign of the erosion of the American ethos and visible evidence of the weakening technological and military posture of the country. The loss that the attendant dissolution of manpower and plant would bring is clear.

3. If analysis shows that the scientific advantages to be gained from an orbiting manned scientific laboratory, in contrast to orbiting unmanned scientific facilities controlled by men on earth, are not significant for most purposes, and if the costs of the latter are significantly lower, then obviously the latter missions should be favored. The gaining of increased experience with problems of maintenance of men in space becomes a less important objective if the orbiting manned scientific laboratory has already been precluded, and if, as suggested below, the Mars shot is to be postponed.

In the absence of a middle-range manned space program, are there good reasons for beginning now to develop a capacity to maintain large numbers of men in orbit for long periods of time? If not, are there good reasons to develop a technologically sophisticated space station, as a preliminary to a later manned Mars program? Does this necessitate a low-cost shuttle and a capacity to maintain a small number of men in orbit for reasonably long periods of time? If so, can the current budget permit this effort

to begin immediately? Can spending on it be phased in so as to take up the slack created by the phasing out of the Apollo program? By the time the Apollo program is completed, would it be possible to pursue the orbiting space station at an equivalent budgetary level? (If there is no significant diminution in Apollo expenses until completion of the Apollo project and if--at the same time--it is not economical to initiate the orbiting space station without taking time to build up to a three- to four-billion-dollar level, then is there some other program that can fill that gap?)

4. Does analysis show that in order to initiate a serious space exploration program before 1976, while maintaining both Apollo and space station programs, a significant increase in the NASA budget would be necessary? Given the plausible future possibilities we have sketched it seems implausible that public or Congressional support will be available for the needed increases in funding. Assuming such fiscally-constrained choices must be made, does it follow that further space exploration ought to be deferred? Is it possible to initiate such a program in the late 1970's, following successful completion of Apollo, and successful operation of a space station? If so, and if too much delay were not introduced, funds and public support for what now seems to be a reasonable follow-on step might then be forthcoming.

5. Is NASA's earth applications program a major contender for an increase in emphasis? In addition to reasonable arguments which have been heard for some time, there is now much naive enthusiasm for applying the methods and personnel of space technology to social problems "here on earth." Does analysis show that the large-scale organization of technical personnel and large-scale management of highly technical engineering

problems is not easily transferrable to the far less tractable social problems with which domestic policies are concerned at various levels of government? If so, are there other less ambitious potential applications of technology and even perhaps of systems analyses produced by NASA to other social and political applications?

Historically, however, NASA is said to have spun off much of its new technology to other public agencies and corporations. Would it not be wise to continue this practice? Would a change in this policy affect an organizational and economic pattern far beyond the confines of NASA? Would NASA be an effective alternative in comparison with its competitors such as universities, corporations and research organizations, which are increasingly entering the new socio-technical areas and applying the resources of systems analysis and large-scale technical management which also have been used by NASA?

6. Underlying these questions is the commonly held view that a new direction for NASA, to follow the Apollo project, will soon be urgently needed and should be defined now. Some conspicuous achievement is a highly desirable goal for a technical organization, if it is to maintain professional morale, attract imaginative and talented staff, and command public and Congressional acceptance and enthusiasm, respectively. Is there some new direction which can be chosen on the basis of systematic and explicit consideration of budgetary limits, other costs, and--to the extent feasible--the merits of the alternatives? If not, can more limited programs be paced so as to make an adequate contribution to a wide enough range of aeronautics and space goals?

It may be that current very constrained conditions and hostility to NASA may make this a poor time to advocate a new, and ambitious (and expensive) space goal. Perhaps this is the time to adopt a low profile position, laying over for better days. If so, a low profile position does not necessarily require inaction--quietly and relatively inexpensively, NASA can prepare the mobilization base for grander missions. For example, instead of proclaiming a deep-space exploration objective at this time, pursue those missions which are necessary incremental steps such as determining what are the problems inherent in keeping men in space for extended periods of time, and sending the necessary unmanned reconnaissance probes.

7. To deal with questions such as these requires concerted attention to the implications for the analysis of program choices, of the methodology of projection of futures, the analysis of the present and projected structure of social valuation, and the mechanisms of translation of social valuation into decisions reached by political processes outside and inside NASA. Difficult as these tasks are to study separately, they must be dealt with in an integrated manner. Only then can the results be used by top management to shed some light on what is involved in the program choices for which they are responsible. To furnish support for the making of major decisions, NASA's mission analysis and planning activities should present case analyses which explicitly relate technical choices before NASA to alternative future environments in which criteria for valuation will vary.

NEW DIRECTIONS FOR NASA

It is clear that in the past NASA has principally emphasized manned space flight with an explicit and implicit intention of employing these programs to achieve the goals which we have categorized as man's conquest of space, success in various types of U.S. and U.S.S.R. competition, as well as scientific and technological advance. As we have emphasized in this report, (particularly in section IV), these goals are by no means universally held in society. Perhaps the goal which is most basic to high NASA staff--man's conquest of space--seems to be limited to a tiny segment of our society. The great mass of Americans is not especially excited by scientific and technological advance, unless they can be shown that there is some reasonable and immediate chance of direct benefits from some activities--the highly visible NASA programs appear to them to be extremely expensive with unknown returns. NASA is also aware that there is a small but well-placed and highly vocal group of critics of the space program who are indifferent and/or hostile to the nationalist goals of U.S.-U.S.S.R. competition--these people we have identified here as the Intellectual Estate and Humanist Left. It seems from public statements and internal documents that NASA wishes to satisfy the desires of people who are unhappy with the current policies and programs. In this section we shall examine the implications of more NASA emphasis upon several space goals that would appear at first glance to be more widely supported by currently unenthusiastic elements in our society--to space programs which would be internationalist rather than nationalist in emphasis and to programs which will deliver tangible and immediate real earth benefits to the citizenry. And we also briefly discuss possibilities for low-cost space ventures and the importance of mobilization bases for future opportunity.

INTERNATIONAL COOPERATION

Currently there is widespread discussion within NASA about the advisability of increasing the agency's emphasis on cooperative ventures in space. The recently appointed Administrator has been quoted as favoring such a thrust.

Reasons for More International Cooperation

1. Gain Public Support of Key Groups

As we discussed at some length in our section on the Intellectual Estate in Section IV, the academicians and high level journalists of our nation are unenthusiastic and indeed, hostile, to appeals to nationalism and patriotism. To some degree they view themselves as part of an international, enlightened elite. Again, to some extent, they identify more with persons of similar background and values in foreign nations, even hostile ones. For example, we cite the uproar caused by the Soviet Union's pressure on professional writers; a good deal less sympathy is shown to Communist oppression of workers and peasants. People of the Intellectual Estate man a great number of institutions which are devoted to promoting international cooperation and/or operating on an international scale-- such as the United Nations, the State Department, the Agency for International Development, foreign affairs and relations councils, foundations, and charitable organizations of all kinds. There is no question that space programs aiming to encourage international cooperation would be more favorably received by these people.

Also, the Intellectual Estate and the Humanist Left are extremely hostile to the waging of the Cold War. Like all of us, they very much desire a détente and friendship with the Soviet Union and other hostile powers; however, compared with members of the Responsible Center and the Right they prefer not to emphasize

basic ideological and national conflicts of interest between ourself and these hostile states. Advocates of international cooperation generally believe that whatever differences exist are not very important considering the community of mankind, and the community of interest that we all have in averting war, particularly in averting thermonuclear war. Therefore such people will be very much more sympathetic to programs which encourage cooperation between the U.S. and the U.S.S.R., which will demonstrate that cooperation is possible and which will bring Americans and Russians closer together, on the assumption that if we know and understand each other we are less likely to fight.

Many Congressmen, including most of those who would describe themselves and are described as "Liberal," share the view of the Intellectual Estate that international cooperation is good for its own sake. Some NASA people obviously are members of the groups mentioned above who would be favorable to international cooperation, at least partially because international cooperation could be expected to elicit a favorable response from scientific colleagues and personal friends outside of NASA who value internationalism and devalue nationalist and military activity. There may also be a group within NASA that believes that mankind's conquest of space is a desirable and necessary goal for the human race--and that even though it would be better if America accomplished this historic task, if America is not going to do it, someone else must do it.

2. International Cooperation Might Provide Money

This concept requires some elaboration. It seems quite unlikely that over the long run any substantial amount of foreign money will be used to

pay for U.S. space efforts. Even if there is a joint U.S. foreign space program with a substantial foreign contribution, in the long run such a joint program is very likely to involve as much foreign spending as foreign funding. But foreign funding of a joint program can mean that the U.S. can achieve space goals--in cooperation with non-U.S. partners--at a smaller price in U.S. dollars than would be required if the U.S. were to pursue the same program alone.

And for a period of a few years it is possible that foreign funding may be available for space program expenditures in the United States. This point will be discussed below.

Obviously saving money is a less controversial and more "solid" objective than the desirability of international cooperation per se. However, there are only limited possibilities for saving money on a scale that would be important to NASA. There are only three places that could conceivably put up enough funds for a joint project with NASA to have a major budgetary impact. These are the Soviet Union, Japan, and a group of European countries. The possibility of cooperation with these will be discussed below.

3. Helping U.S. Foreign Policy

There are two ways in which cooperation on space projects might be thought to help U.S. foreign policy. One possibility is a foreign policy objective of increasing this country's image of international cooperation for peaceful purposes, our image of being a good neighbor, etc. The second possibility is that a cooperative space program would be used to enhance a foreign policy purpose related to some particular country. For example, we might enter into a joint program with Japan on an equal partnership basis in order to encourage the international recognition of Japan as a super-power

because we believe that Japan should gain super-power status without having to acquire nuclear weapons.

4. Spreading Responsibility

It is possible that occasions may arise where there are controversial space projects, the orbiting belt of di-poles ("needles") might be an example of such a "controversial" project. The U.S. might feel that it was undesirable to undertake such a project on U.S. sponsorship alone and seek sponsorship of an international group of nations or an international agency.

5. International Cooperation As A Way of Achieving Commitment

It is widely believed that one of the key reasons why the U.S. was able to land a man on the moon in 1969 was that we had made a firm commitment to do so through the statements of President Kennedy in 1961. Such long term commitments to a scientific or technical objectives are rare. One way of getting a form of commitment which might have a similar strength would be an international partnership to accomplish a particular goal. For example, there is some reason to believe that both the British and the French, at different times, would have preferred to drop out of the Concorde project if doing so had not been so embarrassing for British-French relationships. In other words, it was the partnership commitment that sustained this program.

Motivations of Foreign Countries for International Cooperation

Looking at the other side of the coin, why should other countries cooperate with us? There are several reasons which might affect their decision making in this regard: perhaps the most important is national prestige. At various times in history nations feel obliged to undertake certain types of activities to demonstrate their status. In the 18th

century it was de rigueur for a prince to have a well-turned-out standing army and prestigious court musicians. In the 19th century railroads and artillery were required. As we know, in the 20th century even the poorest mud-hut republic must have an airport, a modern hotel, and at least a squad of paratroopers. Also a modern state feels itself obliged to support scientific advances, because that is what civilized countries do. Nations with some pretence at grandeur believe it necessary to have some sort of space program, however trivial; witness Egypt. Currently most of these efforts, we think here of Europe and Japan, are minimal. But it may be that in the near future such trivial efforts will be insufficient to guarantee the desired level of prestige and more ambitious programs may be required by these nations to maintain and increase their status.

Also we must not ignore the military potential of space operation. Given the current state of the military art, a really first class nation has ballistic missiles with nuclear warheads. Nuclear weapons are relatively easy to manufacture, if a nation has the will to do so. Effective ballistic missiles are a more difficult proposition, and many nations who would deny even to themselves that they have any desire for such weapons must have, in the back of their minds, the idea that some day it might be necessary to deploy them for self-defense. Toward this end, a space capability would constitute a mobilization base for late 20th century weapons systems.

Possible Cooperators

A discussion of international cooperation must have at its outset a reasonable discussion of with whom and how we can cooperate. Within the next 15 years the possible candidates for cooperation will be limited to the following powers: 1) the U.S.S.R., 2) China, 3) Japan, 4) a European combination, 5) a consortium of all other countries in the world, 6) some combination of some or all of the above. In addition there may be bi-national partnerships between the United States and individual small powers. Under most circumstances these would have the second power as a very minor junior partner of the United States. Such cooperation may be as trivial as the establishment of a NASA tracking station in a underdeveloped country such as Tanzania.

Europe is an important possible cooperator in space. Europeans have a high degree of technical competence, plenty of money, and somewhat of a desire to make themselves independent of both the United States and the Soviet Union. However, the Europeans have not demonstrated that they have the will or the desire to spend large amounts of money on space. They find it difficult to force themselves to fund their own defense. A large part of their additional wealth is devoted to social welfare programs. Despite efforts at unity, the Europeans still remain fragmented and except in a few (and very successful) areas cannot cooperate on major ventures.

Japan, on the other hand, lacks most of these disadvantages. Japan has plenty of money, and is likely to have a good deal more in the near future.* The Japanese are highly competent technically, and have a real

*For an extended discussion of Japanese potential see: Herman Kahn, The Emerging Japanese Superstate, (New York, 1970).

appreciation of the desirability of scientific and technological advance. Japan already has a small but promising space program.

But most important is that Japanese have a highly developed sense of national purpose, a powerful urge to excel in the world. The Japanese want prestige and status. The traditional means of obtaining world power status--military strength--is for historical reasons not particularly attractive to the Japanese at this time. They have strong lobbies in their own country which are opposed to armaments, and especially nuclear armaments. A resurgent Japan may overcome these forces, but not without a sharp initial fight. It would be a good deal easier for the Japanese to seek international prestige through an ambitious space program. With U.S. space budgets being cut, it is quite within the realm of possibility that Japan could support a space program as large as that of the United States today without straining their economy. And considering the efficiency of the Japanese management and labor, they could possibly get a good deal more effect for such a budget. The Japanese have the potential for being a competitor with the U.S. in space; however, it would take them a very long time to catch up with us in technology.

The observer of specific Japanese industries in the 20th century can discern a clear pattern in their products lines. At first, they would merely copy foreign products, then they would improve upon them; and finally they would produce superior goods. Assuming the Japanese were interested in space, it is reasonable to assume that they would at first wish to imitate foreign goods. However, advanced space equipment cannot be purchased on the open market, shipped to Japan, taken apart, and reproduced line for line. If they were interested in going into space, the Japanese would be willing to

pay a good deal for the privilege of obtaining access to such equipment. In other words, it is within the realm of possibility that the Japanese might be very favorably disposed to an international space agreement with the United States which would give the Japanese parity with the United States--parity with the U.S. being a major step up for the Japanese--as well as permit them to establish a technological base for their own space ventures in the future. In a domestic context which very much limited the space program, U.S. space officials, perhaps partially motivated by cosmopolitan desires to see man conquer space, might look with favor upon such an arrangement in order to keep the space program moving.

We do not believe it is realistic to consider any cooperation between the U.S. and Communist China before 1985 at the earliest. On the contrary, the bellicosity of that power might even provoke closer cooperation between the U.S., Japan, and the U.S.S.R.

In examining possibilities of cooperating in space with the Soviet Union, a few general observations may be in order. For one, the Soviet Union at present is the only country in the world with comparable, or near-equal capabilities in space. Thus, the first question: "is cooperation feasible" can be answered in the affirmative as far as technical capabilities are concerned. Moreover, the Soviet Union is the only country in the world with whom major space cooperation would be feasible right now. In fact, some modest beginnings of such cooperation are already apparent, and have been outlined in another section of this report.

On the other hand, the desirability of such cooperation, especially on a large scale, presents us with a very thorny political problem. Again,

should the current détente continue along the lines we have sketched in at the beginning of the Japanese scenario, then some forms of cooperative endeavor would not only be possible, but even quite likely to occur. Should the U.S.-S.U. climate improve--for example, as a result of a breakthrough at SALT and/or a favorable Middle East settlement--then prospects of some joint enterprise with the S.U. might improve commensurately. Essentially, then, we might rather inquire what forms this cooperation should not take, rather than examining the broad spectrum of possible cooperative scenarios.

1) The now limited and informal exchange of information could be gradually broadened, if the S.U. were to agree, for example, to interpret the telemetered information received from their moon landers. This would amount to broadcasting such information "in the clear," and would invite some reciprocity on our part.

2) In all future manned flights, the U.S. might brief the Soviets in detail on the medical-physiological aspects of the mission. Such briefings are unlikely to arouse much political antagonism, and would gain us favor in the eyes of those Americans intent on strengthening the current atmosphere of détente.

3) At a later date, informal (but not surreptitious) efforts could be made to coordinate the two countries' space programs, mainly so as to avoid duplication. For instance, future U.S.-S.U. lunar missions could divide the work-load by specializing on some aspect of lunar exploration, and leaving others to the other country, provided the information gathered by each were made available on an equal basis to the other. Here again, perhaps the one kind of division of labor to be avoided would be to divide the lunar surface

along topographic, rather than functional lines. Claiming one half of the moon as "ours," and conceding the other to them as "theirs" might be both highly politically unpopular as well as risky, in that if the cooperative attitude of the Soviets were to deteriorate in the future, we might be effectively barred from significant areas on the moon's surface. Thus existing antagonisms would be intensified, and extended into space to boot.

Aside from avoiding duplication by information exchanges, it is difficult to write a cooperative scenario with the U.S.S.R. which would specifically benefit NASA directly. The price of cooperation with the Soviets might very well be the reduction of NASA budgets, even for such programs where the U.S. would be "going it alone," such as the space shuttle. In the eyes of middle Americans, NASA might be "tainted, and therefore less worthy of support. And it would be even more difficult to deal successfully with "priorities" issues unless the performance of the U.S. economy and the "Great Society" programs were to improve dramatically.

In general, it might be less risky to respond favorably to Soviet offers of cooperation, but the current domestic context does not allow for many dramatic U.S. initiatives. And it will probably continue to hold true into the '70's that Soviet competitive efforts would act as a much more effective stimulant to the U.S. space program than any form of cooperation one could devise.

Varieties of Cooperation

There is a wide spectrum of means by which the United States may cooperate with other nations in space ventures for various purposes. The type of cooperation necessary would depend largely upon the results that

all the parties involved seek to gain from cooperation. If cooperation is sought among more than two parties, some type of new form of space organization will likely be necessary. If it is desired to have a space program involving many nations, it is likely that some sort of extra-national space organization would be needed. The United Nations would be a model for such an arrangement. An independent international space authority could be created which would be above and apart from any national agency and operated by an extra-national space bureaucracy. Such an arrangement would likely be well received throughout the world, but would not likely be as favorably accepted in the United States. Like the United Nations, an international space authority would probably be principally supported and funded by the United States, but the little nations would have disproportionate power in making decisions and in accepting credit. In effect, the U.S. taxpayer would be footing the bill with little to show from it directly. If such an international space authority were created it is reasonable that the bulk of the original positions in the authority would be filled by those men who have the most experience in space administration--that is, NASA (and perhaps Russian) officials. Even though such an arrangement might look desirable to high space officials, it is not likely to be so favorably received elsewhere.

A more likely model would be a multi-national space agency. Instead of being above and outside of the nation states, a multi-national agency would be created by and answerable to the cooperating nations. Intelstat would be a model for such an organization. Indeed, Intelstat is an even more apt model because the Russians could be invited, and if they refuse (which is likely) the multinational space agency would effectively be

a free world body dominated by the United States. In some ways it would be like Intelstat or NATO, or any other free world agency--international, but U.S. dominated. Compared with the extra-national model described above, the multinational organization has great advantages from a domestic American political point of view: again, assuming Russia would not cooperate, it would be a non-Communist body, which could continue to compete militarily and politically and prestige-wise with the Soviet bloc.

The most likely form of international cooperation in space is through partnership--that is, bilateral agreement between the United States and other powers. Compared with the models described above, partnership has great advantages of flexibility, ease of negotiation, and lack of "constitutional problems" of who has the power and who pays the bill. Partnership agreements can be negotiated with any power (including the Soviet Union) and can cover a multitude of activities ranging from, at the very minimum, mere talking about international cooperation, to information sharing on any level desired by both parties, division of labor, particularly in earth application and/or interplanetary exploration, up to much more sophisticated arrangements as contributing various components to vehicle configurations and even partnership in the construction and crewing of space vehicles.

Obstacles to International Cooperation

The domestic obstacles to international cooperation should be made quite explicit. In our discussions on the value systems of the groups which make up Middle America we emphasized the very strong national feelings held by these people. If the United States should undertake international cooperation in space to the detriment of predominately U.S.

endeavors, this would likely undercut a great deal of the present support given for NASA. At the very least, a international cooperation agreement which appeared to deny the United States full credit for space achievements would not be acceptable if the United States was paying most of the price. A hypothetical middle American would likely say, "why should we pay for it, if we are not getting anything for it?" This attitude was expressed quite clearly by the Congressional resolution which prohibited NASA from flying a U.N. flag on the Moon. It was not the United Nations, or mankind in general, that made this great achievement--it was the United States of America that did it; America has the right to be proud of the achievement, and to take full credit.

There is an even higher price to be paid for cooperation with the Soviet Union. Despite the official denials by the U.S. government and NASA officials that the U.S. space program is predominately peaceful in nature, it is clear that the average man on the street believes that the conquest of space has extremely important military implications. The military concepts of "high ground" and technological superiority are well known to most adult Americans. They know that the Russians are very active in space also, and they presume that they are up there for the same reasons that we are--to make themselves stronger. Explicit and obvious cooperation with the Soviet Union would seem to indicate that military objectives are not present. If the promotion of national security is not a purpose of the space program, then those people who support the space program on that basis will be lost from the NASA constituency. The nationalist right and large element of Middle America will also be extremely hostile to international cooperation with

the Soviet Union because this represents collaboration with a communist power which is viewed as an immoral, evil, and dangerous force in the world. According to this point of view, we do not shake hands with the devil.

Neo-Isolationism

In our previous discussion of the value systems of the various groups within American society we commented upon the great value held for the "international cooperation" space goal by both the Intellectual Estate and the Humanist Left. However, recent tendencies suggest that this goal may be less attractive to these groups. There seems to be, among the Humanist Left, and spreading somewhat to the Intellectual Estate, a turning away from internationalism. We do not perceive that these groups are becoming more nationalist rather than internationalist; rather, the recent disillusion with our post-war containment foreign policy promoted particularly by the Vietnam war, has encouraged these people to turn away from various aspects of internationalism, such as collective security. This new movement is commonly called by its critics "neo-isolationism."

Compared with a decade or two decades ago, educated academics, particularly young ones, are less interested in the outside world, and are indifferent or even hostile to U.S. involvement with foreign countries. This lack of interest or hostility is attributable to a feeling among these people that U.S. foreign activities are pernicious to the outside world as well as to the United States. U.S. cooperation with other leading industrial countries is seen as a conspiracy between the rich nations of the world. U.S. cooperation with the U.S.S.R. is seen by some radical Humanist Left elements as a plot

between two super powers to dominate the world. The great visible symbol of international cooperation--the United Nations--is frequently viewed as an irrelevant talk-shop. Under these conditions, then, attempts to appeal to the Humanist Left and to the Intellectual Estate through attempts at international cooperation will be less successful than they would have been, say, five years ago. To some degree, this phenomenon relates to the age of the members of the group. Most older members of the Intellectual Estate would share the belief of the Responsible Center that a belief in internationalism is synonymous with progressive, enlightened thought, whereas isolationism is a sign of obscurantism. However, the younger members of these groups, whose experience is limited to the decade of the 1960's, are far less sensitive to a belief in what Wendell Wilkie called "one world."^{*} At the present time, few members of these groups would be incensed by a project having important implications for international cooperation (unless it had a counter-insurgency implication--such as use of satellites for improved social and/or political control in an under-developed nation). But most of them will certainly be a good deal less enthusiastic about such programs compared with their elders.

It seems to a certain extent that this is a world-wide movement. We see a tendency among many countries to turn inward, to take the position that they should deal first of all with their own problems and not worry themselves so much about what is going on in other parts of the world. The trend is obvious among the new elite in the developing world and can

^{*}E. Allison, "Cool It; the Foreign Policy of Young America," Foreign Policy, Winter 70-71; pp. 144-160; J.A. Johnson, "A New Generation of Isolationists" Foreign Affairs, Oct. 70; pp. 122-135.

be seen among the young elites of the industrial states of Europe, North America, and less so, in Japan. In the words of Voltaire's *Candide*, they feel that first of all they should "tend their own gardens."

This trend will probably continue throughout the decade of the 1970's and will be limited probably by some event which drives home strongly the point that security is, indeed, world wide. Some disaster, such as the Nazi occupation of Czechoslovakia in 1939, will probably be necessary to break this trend. In the meantime, NASA and other government agencies who seek to appeal to the Intellectual Estate and the Humanist Left by putting forth programs emphasizing international cooperation will likely find this appeal to be less persuasive than it would have been in the 1950's and early '60s.

General Objections that Apply to One or More Forms of Cooperation

This is a brief list of the kinds of problems that international cooperation can face. Of course decision about international cooperation involves a balancing of benefits and costs. The first question is "what benefits does the cooperation produce?" If there are no substantial or only small benefits, then it is unwise to proceed even if the costs are small. If, on the other hand, the benefits appear to be substantial, then it makes sense to proceed even in the face of substantial costs.

1. Hurts decision-making

This is likely to be the overwhelming objection to international cooperation on space projects. It is clear that some forms of cooperation are not subject to this objection. For example, information can be exchanged between national programs in a way that does not hurt decision making. However, when we think of international cooperation here, we are talking about

joint projects. International projects will require international decision making.

While some may argue that the international politics influencing a joint project would be no worse than the internal politics that already exist in an agency as large as NASA, it should be noted that the fact that there are international politics will not eliminate local politics. The two problems simply add to each other. If nothing else, international decisionmaking is almost certain to be slower than national decisionmaking. Organizationally an international program may mean that the State Department is almost certain to be included in the decisionmaking process.

2. The problem of recrimination

The problem of recrimination for accidents, failures, and cost overruns, is likely to be more severe in an international program than in a national one.

3. To the extent that space programs are undertaken for reasons of prestige, or can be thought to produce prestige benefits, then an international program is something that reduces these benefits by involving a sharing of credit.

4. In some cases a joint program might interfere with military applications of space programs.

MILITARY EMPHASIS*

Another possibility is that NASA should emphasize the military importance of its activities. A military emphasis would follow the nationalist goals of Middle America. To a large extent, what little support NASA has had with "the man on the street" has come from his perception that NASA

*This discussion is derived from Max Singer's studies of international securities issues.

already is a predominantly military program. It is almost certain that the Agency's insistence upon its peaceful, pacific mission has cost it support among the general public.

In considering the advisability of a military emphasis, we must take into account the domestic and foreign contexts. Americans are not especially militaristic or aggressive, they view military expenditures as justified only by a foreign threat. For most purposes that a space threat can only come from the Soviet Union.

Obviously one of the most important factors on the international scene as far as NASA is concerned is the Soviet Union and the U.S.-Soviet relationships. The underlying relationship between the United States and the Soviet Union is relatively fixed and long-lasting. It is determined by the size and power of the two countries, and the profound differences between the fundamental political ideology of the two governments and the people of the United States. While relatively few Americans feel that non-expansionist Communists are enemies whose existence is unacceptable, there are a great many Americans who would be profoundly disturbed by the spread of Communism. On the other side, while the Communist leadership, and any likely succeeding leadership, is not reckless or in any way committed to war or any other short-term solution to co-existence, the Communist leadership does regard the West as enemies in a very profound sense. There is no point in doing any planning on the basis of a change in these underlying elements of the relationship between the United States and the Soviet Union.

On the other hand, the "tone", or as some specialists like to say the "the atmospherics", of the U.S.-Soviet relationship do fluctuate over the

years. In general, the Soviet Union determines whether or not we shall have a period of relative tension or relative "detente."

Particularly after the Cuban missile crisis there has been a relatively long period of a "detente" tone to U.S.-Soviet relationships. The question for NASA is whether this long standing tone of the relationship is likely to continue, or to sharply change. We would like to suggest that NASA take very seriously the possibility of a change. This is not a prediction that there will be a change, rather, this is a statement that there is a good possibility of a change. If one were forced to be quantitative, we would say that there is at least an even money chance that over the next ten years the tone of U.S.-Soviet relationships will change in the direction of sharply reduced detente atmosphere as compared to the last half of the '60s.

We should make very clear the limits of this statement. Notice, for example, that we are not saying that there will necessarily be a war, or even a major crisis or threat of war. Nor are we saying that the fundamental attitudes of the Russians are likely to change for the worse. We are talking about the tone of the relationship. This is something that manipulated by the Soviet Union for their internal purposes. A worse to more tension and unpleasantness, does not mean they are really more "war like" or "anti-U.S."; it merely means that they have decided that a different tone temporarily suits their purposes.

Although for many fundamental issues whether the tone of U.S.-Soviet relationship is more like detente or more like cold war doesn't make much difference. The issue of tone, or atmosphere, or mood, can make an

important difference in terms of support for the space program, and the shaping of the image and exact nature of the space program.

There are basically two reasons why there is a good chance that the Soviets will move away (and the U.S. will respond similarly), from a detente atmosphere. The first reason is that this is a phenomena that seems to us to be inherently a fluctuating one. Therefore, after any long period with one kind of atmosphere there is some reason at least to expect a change. In this case, the Cold War can either get "cooler" or "warmer". But apart from this general rule, there are some strong signs of things that have already happened that look in the direction of a change in the tone of U.S.-Soviet relations, although they are not any means of proof that this will happen.

The first reason to think that there may be a worsening in U.S.-Soviet relationship is what seems to be the current Soviet view of the Middle East. They seem to be taking the position, and to some extent this may reflect their real feelings, that the Middle East is their proper sphere of influence and that the U.S. is interfering and ought to get out. To the extent that this view requires Soviet support for Arabs to the point that Israel is truly endangered, it is not likely to be acceptable to the United States and it might not be acceptable for other reasons as well. In other words, there seems to be a good chance that the U.S. and the Soviet Union have essentially incompatible view of their proper relationship in the Middle East and until this incompatibility is resolved, there will be an important reason for bad relations.

The second recent trend that suggests a possible worsening of U.S.-Soviet relations is that in the last few years the Soviets have been

spending a great deal of money sharply increasing their strategic forces and moving the balance--at least the numerical balance--of strategic forces sharply in their direction. There is a good chance that they will feel that this change in the "objective factors" of the strategic relationship will entitle them to some political advantage. At least they may feel that they have a duty to try to get some political advantage out of all the money they have spent on strategic forces. This attempt on their part, to the extent that it is made, may also tend to produce a more tense atmosphere.

A third reason for thinking that the tone of the U.S.-Soviet relationship is likely to get worse is that for the first time the Soviet Union has been using virulent anti-American propaganda at the personal level. That is, posters, etc., in the Soviet Union are now designed to stir up hatred against individual Americans in a way that has not been seen since the anti-German propaganda used during World War II.* While this propaganda is not likely to have a great deal of effect on the mass of Soviet citizens, it is interesting to ask the reason for the Soviet decision to undertake such a propaganda campaign, and what it may imply for future relations.

A fourth factor in the same direction is that Soviets, or at least some of them, seem to overestimate the importance of internal disorders in the United States. Looking at American dissent, political disorder and "public immorality" in the light of Marxist doctrine, some of them get the feeling that the United States is falling apart. This is consistent with the basic communist view of history in which communism

*This was reported to us by a recent visitor to the Institute, a Quaker scientist devoted to peace who was greatly troubled by what he saw in Moscow.

spreads throughout the world in the wake of capitalist collapse because of "internal contradictions" in the capitalist system. The communists see this as a time of danger to them because of the possibility of a "flashing-out" by the West as a result its internal decay. But they also feel a duty, to Communism or to history, to hasten the collapse of the West by putting pressure upon it. It seems quite possible that this interpretation of events in the United States could contribute to a Soviet decision to move away from detente.

Just as foreign developments can impact upon U.S. futures, domestic developments can impact upon foreign nations. We have discussed the possible importance of the development of "new values" in America. These can have crucial implications in our relationships with foreign states. In the Soviet Union, according to the official Marxist ideology, these new values are interpreted as bourgeois capitalist decadence. Marxists believe that a socialist form of government is a necessary and an inevitable outgrowth of capitalist society. According to their scheme of history, the last stages of capitalism will see a moral breakdown of the system--capitalist youth will become disaffected from the system, and their better elements will turn to Marxism, others to corrupt hedonism. In its decadent phase, capitalism can no longer count upon the confidence of the people who live under its sway. According to Marxist ideology, this is a particularly dangerous phase for the socialist states because the more perceptive elements in the capitalist world will recognize this impending collapse and their immediate absorption into the socialist system; therefore, they will be tempted to make a preemptive strike to attempt to destroy the socialist

states which will inevitably supplant them. The socialist states must be on their guard and well armed. However, basically the capitalists are morally bankrupt and getting continuously weaker. Sooner or later they will collapse.

In order to promote the revolution to socialism, the socialist states have a historical obligation to continue to put pressure on the capitalist states, probing for the weak points, and accelerating their decay. American phenomenon such as the rising use of drugs, the spread of pornography, upper class alienation, hippies, peaceniks, wide-spread strikes, terrorism, demonstrations, and public disorders of various kinds indicate to the Soviet Union that capitalism is the state of dissolution long anticipated by Marxist science. Given this interpretation of U.S. events, it is sensible and correct for Soviet policy makers to get tough with the Americans, knowing that toughness will likely pay off in the achievement of world wide socialism. Of course, Soviet policy makers must be somewhat cautious for fear of a last gasp strike at the Soviet Union. Note that this conjectural Marxist analysis does not require that the Soviet Union attack the United States-- such an attack would be pointless, because the socialist victory is already in sight. The Soviet Union must only prepare to defend itself from capitalist aggression and to continue to put pressure on America in order to promote the internal decay of capitalist society. Up to certain limits, it is quite safe to put such pressure on America, because the Americans no longer believe in their system and will not fight for it.

From a Marxist point of view, therefore, an America in which Humanist Left values are spreading is a tempting target for Soviet pressure. From their point of view it would be immoral not to take advantage of such an opportunity. Now, how might such Soviet pressure be promoted? One way is to take advantage of all opportunities to press against American positions throughout the world--the Middle East and Central Europe are obvious theatres of operations. Another way for the Soviets to lean on America is in space. Ideally, the Soviets would wish to create defensive systems against American strategic forces which would effectively block any attempt by an American capitalist clique which wished to knock out the U.S.S.R. before it could supplant the U.S.A. Also, the Soviet Union would wish to have a strong deterrent against an American preemptive strike. A strong deterrent force would also have very important possibilities for encouraging the decay of the U.S. By gaining obvious superiority in space, the Soviets would hope to further discredit the American capitalist establishment which has, in the past, placed great emphasis upon space and strategic superiority. An obvious Soviet military dominance in space would also stimulate the breakdown of American society by offering to the corrupt American people a clear and imminent threat of destruction, thus encouraging the spread of "better Red than dead" doctrines among the population. Such a Soviet space threat need not necessarily be cost effective in traditional strategic terms in order to have the maximum possible moral threat. Something which is obviously impressive to the layman--such as the sixty megaton thermonuclear devices exploded in the late 1950's--would

have the desired effect. Such a device could take the form of an armed (and manned?) space station permanently over North America. It may be easy to prove that ICBM's from Soviet launch-sites are a superior weapon system, but missiles hovering directly overhead are a more obvious and frightful threat to the average citizen, and therefore a better weapon against morale.

Fifth, and finally, it is possible that a move away from detente would be motivated significantly by concerns internal to the Communist Bloc. It would be easier to improve Soviet-Chinese party relations in a period in which the Soviet was moving away from detente with the U.S. It might also be true that the Soviet's hand would be strengthened in its relationships in Eastern Europe, or that they would think it would, in a period in which the Soviet was moving against detente.

There are at least two ways in which NASA might be influenced by a reduction of the detente atmosphere with the Soviet Union. First, there might be an increased sense that the United States had to keep ahead of the Soviet Union in space. In other words, there might be an increase of the prestige, incentive, or the general sense of wanting to race with the Soviet Union in space. Secondly, there might be more military support for military space activities.

There are several reasons for thinking that if the need were felt in the United States for increased defense efforts to respond to Soviet programs and increased tension, that a good share of this increased U.S. effort would go to a military space program. The first reason is that the strategic economic case for military space expenditures looks a lot better

than it did ten years ago. For example, space-based anti-missile systems are now much closer to reality and economic feasibility than they were, and there has been a certain amount of disillusionment with ground-based defense systems. It is possible that there will be some irrational preference for using space as the arena for increased efforts to counter the Soviet Union as well as rational reasons. Space competition might look "cleaner" or less controversial, or less complicated, than other possibilities. The Vietnam War has left a strong legacy of dissatisfaction, particularly with the Army, and to a lesser extent with the other more traditional elements of the military operation. While these elements have been "failing", the space program has been a success. Therefore, if we are going to increase military efforts, there may be the feeling that space is the area where we are most effective and that we should concentrate on that area.

Obviously, a military emphasis for NASA is almost the opposite of the international cooperation emphasis discussed above. Indeed, the people most likely to be excited by international cooperation will find a military program to be anathema. And a military emphasis at this time would likely draw a sceptical response from Middle America as well. We suggest the consideration of a military emphasis only in the context of an obvious Cold War revival engendered by blatant Soviet bellicosity. Should the Soviets become nasty, the "doves" will necessarily become somewhat discredited; young people will become disillusioned with prospects for instant peace; and "cold warriors" 1950-style may again be fashionable.

Such prospects may be even more reasonable to consider for the 1970s when we examine the shifts in the domestic political and cultural milieu that have been taking place during the last year. Although it is too soon to identify trends clearly, there are certain signs that the humanist left "counter-culture" may be on the wane: the decline of demonstrations on college campuses, the fragmentation and factionalism of the "New Left", the apparent deflation of revolutionary organizations such as the Weathermen and the Black Panthers, the advent of terrorism and hysteria among radicals, the failure of rock festivals, the switching of pop singers from revolutionary to religious themes, the turning of avant-garde youth to drugs and quietism, the vast popular and commercial success of the romantic film "Love Story". Among the larger society perhaps it is significant to note the adoption of nationalist and "law and order" symbols and slogans by liberal politicians such as Lindsey and Adali Stevenson III, and the "turning to the right" of several important national magazines. An interesting phenomenon is the success of Charles Reich's The Greening of America--this counter-culture book is current the nation's best seller, which means it is widely read by middle class housewives--the counter-culture has become respectable, banal, and middle-aged (Reich is 42), and therefore no longer a suitable vehicle for expressing the individuality of the young and avant-garde. If this be so, then the revolution is over.

So we need not accept the prediction of John Mitchell that "this country is moving so far to the Right that you won't recognize it" in order to note that there are some indicators that suggest a conservative shift in public opinion, even among those elements among whom humanist left values have been

growing during the past decade. If this be so, then there would be more fertile soil for a strong nationalist/military response to a heightened Soviet (or Chicom) challenge and a military emphasis by NASA.

Needless to say the price NASA would pay for a military emphasis would be possible military domination. In terms of meeting the needs and goals of groups in society, NASA would lose support from the largely anti-nationalist, anti-military, pro-detente Intellectual Estate and Humanist Left. The agency would clearly become part of the so-called "military-Industrial complex" and would be open to attack. However, since such people are already opposed to the space program on the basis of "priorities" issue, it is reasonable to wonder if more opposition from that side could hurt any more than it is hurting now. (Conceivably, NASA could be the target of Leftist terrorism, but the Agency's facilities would seem to be secure from these incompetent attacks.)

If humanist left values should spread further among the Intellectual Estate, the agency and its contractors might have trouble recruiting young scientists. Perhaps, but there are now more than enough of such men to man the space program for a decade, and even a rapid expansion of the anti-military feeling would leave at least a substantial minority ready to work on defence projects. In any event, economic considerations will have their effect on "idealistic" young people. NASA personnel might have to endure hostile remarks at upper middle class social gatherings, but that is a small price to pay for contributing to national defense and the conquest of space.

EARTH APPLICATIONS

Criticisms of the large expenditures of the U.S. space program and the apparent lack of visible, tangible benefits are commonly answered by discussions of the large potential benefits of the NASA space applications program, as well as the technological transfers ("spinoffs") to the civil industrial sector and the increment to the national GNP in the form of aerospace employment. In fact, few credible estimates have been made of the present and future economic benefits of the American space program, so that quantitative economic justification for various NASA missions (as well as for NASA funding levels) in the way of cost/benefit analyses is not readily available. Since we expect that strict budgetary constraints will be imposed on NASA during the next decade, quantitative measures of the tangible space benefits could provide excellent support for certain NASA missions and partially justify others which present less visible payoffs.

Since the economic benefits of NASA endeavors are important factors in political decision-making within the present ambivalent, almost austere science policy environment, it is reasonable to assume that Congressional and public criticism of high NASA spending could be influenced by high quality cost/effective studies performed by independent academic and/or research institutions.* These studies would be periodically updated as new technological developments unfold and as space mission requirements evolve in response to social, political, and military pressures.

Meteorological satellites provide an interesting example of an area in which cost/benefit analysis can play a decisive role in marshalling support for NASA programs. In 1965 a National Academy of Sciences (NAS)

*The following section is by Dr. Barry Smernoff.

report estimated that the development of accurate long-range weather forecasting would result in annual savings of \$2.5 billion to the U.S. economy.* One year later, a Stanford study** estimated the annual economic benefits of a proposed Metsat system costing \$600 million to be over \$6 billion. In the construction industry alone, weather damage amounts to between three and ten billion dollars a year.

The portion of the NASA budget allocated to meteorological applications is clearly justified if a network of weather satellites can save the U.S. economy billions of dollars each year; one might even argue that such huge savings alone justify the entire NASA budget. However the NAS and Stanford efforts are not sufficiently credible to warrant widespread expectations regarding the economic return of specific Metsat programs. Although, it is somewhat reassuring that both studies arrived at the same large size of benefits, Jack Thompson, a professional meteorologist involved in the study of economic benefits of long-range weather forecasting, gives little credence to the NAS and Stanford results.

Quite visible benefits of weather satellites include the saving of lives and property due to advance storm warnings. The Environmental Science Services Administration (ESSA) estimates that 50,000 people might have been killed in Hurricane Camille without the early warning, tracking, and credibility provided by satellite pictures and data (70,000 people were evacuated).***

*National Academy of Sciences-National Research Council, Economic Benefits From Oceanographic Research, 1965.

**SPINMAP, Stanford Proposal for an International Network for Meteorological Analyses and Prediction--Summary Report, Stanford University, May 1966.

***Space Program Benefits, Hearing before the Committee on Aeronautics and Space Sciences, U.S. Senate, April 6, 1970.

On the other hand, the satellite-aided decision not to evacuate and not to protect property during Hurricane Laurie saved over \$3 million. According to the National Science Foundation, average annual hurricane losses of \$250 million could be cut by one-third if only minor changes in storm intensity or path can be achieved.* The world-wide economic benefits of the automatic picture-taking systems onboard U.S. weather satellites, by which over fifty countries can view daily weather patterns in their area, have not yet been quantified (but should be).

Communication satellites provide another example of tangible benefits. By providing economical links across the Atlantic, Pacific, and Indian Oceans, communication satellites are having major impact on trans-oceanic traffic. West Coast to Japan cable circuit costs of \$15,000 per month remain much higher than the corresponding Comsat service costs of \$4,000 per month, using Intelsat III.** The annual savings to the U.S. government is estimated at \$9.5 million for this class of rate reductions. In addition the Department of Defense now operates near-synchronous Comsats, as well as a tactical Comsat, which are of high economic and military value. The potential utility of direct broadcasting satellites to the developing countries is impossible to estimate at the present time, but should encompass substantial increments to the increasing GNPs of these countries in the form of educated people with higher productivities and a sense of national unity and purpose. The typical developing country may be able to acquire a nationwide communications network using Comsats at 10-20% of the cost and time it would take to build a conventional microwave network.

*A Survey of Space Applications, NASA Sp-142, April 1967

**When Intelsat IV Satellites become operational in 1971, this figure will drop to \$1,000.

There are many other areas of economic importance in applications satellites. Navigation satellites can preclude the 120-mile lateral separation requirement for aircraft (an anticollision measure), thereby reducing fuel expenditures and saving \$30,000 to \$50,000 per plane-year. A Navsat system which reduces lateral separation to 30 miles would yield an estimated savings of \$20 million a year for the North Atlantic routes alone.* Remote sensing of overgrazing, weed infestation, and other range management problems could give rise to 3.5 million more calves per year in increased carrying capacity, valued at \$350 million. A more timely and perhaps more important goal of remote satellite sensing involves air pollution; an accurate measurement of the rising trend of atmospheric CO₂ and of any global warming trend would be invaluable in any assessment of global ecology. The bare economic benefit of environmental sensing is difficult to assess, sensors in managing the environment.

In conclusion, it appears that the case for NASA funding can be considerably strengthened by the performance of clear, hard-headed cost/effectiveness analyses of NASA programs. Existing studies, although often superficial and overly qualitative, indicate that further efforts should provide NASA with sufficient analytic leverage such that NASA can rationalize its planning strategy and accrue more public support.

Of course, it is possible that a rigorous cost benefit analysis of the gains to be received from such earth applications might not be cost effective compared with other means of achieving the same ends. For example, it appears that communication satellites are certainly cost effective when compared with

* Space Program Benefits

cables; however, it may be that meteorological or earth resources satellites might be much more expensive than other means of achieving the same results, such as aircraft, or even ground surveys.

The second drawback to an applications emphasis is that it might not be possible to justify the manned space program on this basis. If NASA is saying--look at all the nice things we are doing--the public may reply "yes, we like all those nice things that you are doing--but why are you trying to send men to space as well." To some extent however, an earth applications emphasis might at least answer the criticism that NASA is doing nothing useful. The great mass of our citizens believe that government is necessarily inefficient, so they are pleased if they get any return for their tax dollar, and might not look too closely at what could appear to be a wastage in the program.

LOWER COST PROGRAMS

If the constrained condition persists through most of the decade of the 70's--which we believe likely to occur--then NASA might well consider means of keeping the space program alive through various rather inexpensive means--such as concentration on earth applications missions. Another possibility is that it might become necessary to severely curtail or even abandon manned space flight.

A large part of criticism of NASA has come from elements in scientific communities who believe that the manned space program is peniculous and wasteful. These critics are members of what we call Intellectual Estate, and their opposition to manned space program can be fairly easily explained on the basis of their values. They very much dislike the patriotic emphasis of

the manned space program; they very much dislike the idea that test pilots are being sent to perform scientific investigations, rather than trained scientists; they are rational and do not like the flamboyance and "honky-tonk" aspects of the program which they see as a vulgar attempt to cater to the baser elements of Middle America, and they very much value human life, and are offended by the great risks which are taken by the astronauts. These people are extremely hostile to the manned space program on this basis, and point to the Russian program as an example as how a sensible program ought to be conducted.

However, on this space goal there is a divergence of opinion between the Intellectual Estate and Humanist Left. The Humanist Left does not share the Intellectual Estate's belief in reason and tend more to value adventure and human self actualizing. To them the great adventure of space constitutes a great almost spiritual endeavor by man. The Humanist Left position is articulately expressed by Norman Mailer's Of A Fire On The Moon--to Mailer the main fault of the astronauts is that they are too bland and technocratical.

Like all American institutions, NASA likes to go first class with the latest sophisticated systems specifically tailored to the task. But sometimes it is not possible to go first class--we must make do with what we have. Americans are rather good at this too--witness the quick success of the Huntsville team at adopting the Jupiter for a launch vehicle after the sputnik success and the Vanguard fizzle. This precedent is particularly apt because the ground work had been prepared for the Jupiter-Explorer configuration. Everyone hoped that Vanguard would succeed, but quietly a back-up position had been prepared.*

*Metaphorically, we might call these the "Cadillac" and the "hot rod" options. Cadillacs are better, but many people lack the funds and have the skill to convert mundane machines into exciting vehicles.

NASA might consider devising means of getting maximum impact from existing equipment and adaptations therefrom. NASA might make a catalogue of all space equipment held by itself, the military, contractors, to include even proto-types and obsolescent vehicles, with an eye to how this equipment might be fruitfully employed.

MOBILIZATION BASES

All the possible emphases discussed above--international cooperation, earth applications, military, and low cost space programs--have one thing in common: they are not what most people in NASA would really like to do. They are not manned space exploration. From the point of view of America's space goals of the '60s, they represent a falling-off of vigor in obtaining "pure" space goals. But it seems that this retrograde step may be impelled by the changes in the values of society at large and revisions in the international climate. NASA recognizes that it can no longer expect to be given a blank check, as it was by President Kennedy. So the agency and its supporters are seeking other means of achieving the real and perceived needs of society.

Each of the new directions discussed above has another common factor: it will to some extent provide a mobilization base for more ambitious space ventures in the future. At the very least all of these emphases will serve to keep the agency operating and the space program alive during lean years. The integrity of organizations will be maintained. Funding will continue, trained personnel will keep their skills current. The space program will be alive. Furthermore, the agency will have an opportunity to demonstrate

to the public at large that it can accomplish goals that are valued by substantial or significant segments of the public. With this experience behind it and this reputation established, NASA would be in a good position to plan and eventually undertake much more ambitious space ventures further toward the end of the century when it may be reasonably expected that conditions for grander space ventures will be much more favorable.