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PROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

REPORT
1967-1968



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"The destiny of the University and the destiny of all society are inextricably entwined. In the Nation's Capital, The George Washington University has elected to develop a national center for the interdisciplinary study of problems facing that greater society. The setting is entirely appropriate, since so many major policy decisions are made at the seat of government."

Lloyd H. Elliott, President

The George Washington University

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Those persons listed above were members of the Program of Policy Studies staff who gave their total effort (or a substantial portion) to Program activities during all or part of fiscal year 1967-68. Directors and members of the staffs of other policy study groups in the University and numerous members of the University faculty other than those listed above participated in the various seminar series, conferences, and other activities of the Program.

(*Will not be with the Program during 1968-69.)

(**Deceased.)

The following persons will join the professional staff on a full time or reduced basis during the Fall Semester 1968-69:

MARIE BESTUL	<i>Research Scientist (Sociology)</i>
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It is anticipated that Dean Harold Liebowitz and several members of the faculty of the School of Engineering and Applied Science will participate in various activities of joint interest to SEAS faculty and other Program staff members.

Research Associates

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ANN B. FINKELSTEIN	<i>Sociology</i>
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* JANET PORTER	<i>Public Administration</i>
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(*Will not be with the Program during 1968-69.)

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Allocation of Resources for Science Project

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Interdisciplinary Systems and Cybernetics Project

LINDA TAYLOR	<i>Secretary to Dr. Ericson</i>
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FOREWORD

HE Program of Policy Studies in Science and Technology was established in its present form at The George Washington University in 1966. It is supported by funds from several sources, including the University, government agencies, and private industry. Primary funding is provided by an institutional grant from the National Aeronautics and Space Administration. Other government agencies providing support through grants or contracts include: the Department of Health, Education, and Welfare (Office of Education); the Department of Commerce (National Bureau of Standards); the Department of State (Arms Control and Disarmament Agency); the Commission on Marine Science, Engineering and Resources; and the National Endowment for the Humanities.

A strong senior research staff, including University faculty members, has been assembled, reflecting a diversity of talent and experience in the areas of economics, political science, sociology, psychology, law, the humanities, systems analysis, research management, government and business administration, geography and regional planning, statistics, and engineering.

The Program makes its research capability and policy advisory resources available to government agencies, committees of Congress and other relevant organizations which have increasingly sought its advice and assistance.

STATEMENT BY THE PROGRAM DIRECTOR

OVERVIEW

THE basic concept of the Program and a continuing framework for guiding and evaluating future activities are reflected in the concluding statements of the First Annual Report:

The whole cluster of continuing and prospective activities of the Program is designed to increase the University's policy research capability and to stimulate thought and new activities on questions involving the Science/Society interface. In our view, one of the principal functions the Program can perform is that of providing a forum for the discussion of such matters. From a broader perspective, the Program of Policy Studies is a mechanism for exploring alternative ways of organizing intellectual skills so as to apply effectively such resources to the urgent needs of contemporary society. It seems likely that increasing demands will be made upon the universities, particularly large urban university complexes with impressive reservoirs of intellectual skills, for assistance in evaluating existing Social programs and in analyzing new proposals for achieving societal goals. The fact that such claims are being made upon university resources requires that careful thought be given to the types of linkages a university should establish and maintain with the participants and institutions in the broader social-political context. As stated earlier, the Program of Policy Studies is undertaking to contribute to a better understanding of how the university is to relate to the evolving values and institutions of the total social system.

The level of magnitude of Program activities has increased substantially during the second year. Additions to the professional staff and the involvement of new members of the University faculty in Program activities have broadened considerably the range of interests and capabilities of the Program. Further, the conduct of cooperative, interdisciplinary study projects, the preparation of monographs and discussion papers, the development of new study proposals, professional seminar discussions, intra-University

seminars and meetings, and briefing sessions with non-University agencies and organizations have had the cumulative effect of contributing substantially to the understanding of the policy analysis function by Program associates. It might be added that this greater insight and corresponding development of our policy analysis capability have been accompanied by a more mature appreciation of the complexity of public policy problems.

Present areas of Program inquiry will continue as major foci for study projects. Technology assessment will receive close attention, both at the conceptual and case study levels. The research-development-application process will continue as a primary area of concern for some members of the Program staff, including consideration of the policy problems in the advancement of civilian technology.

One specific new study will be devoted to an analysis of the Economics of the Space Program. An increasing level of effort will be given to the multi-lateral and international organizational aspects of technological applications, particularly with reference to space developed technology.

The special competence already existing in educational technology will be subjected to further challenge with new projects during the coming year. In the urban affairs area, attention will be given to several problems, including metropolitan government decentralization, and the improvement of urban program management. All the foregoing study areas involve, to an appreciable degree, evaluative concepts, methodologies, and skills. In this connection, special attention will be given to the continuing development of the appraisal-evaluative function as a special capability of the Program.

As appropriate challenges arise for the initiation of an institutional response, new experimental techniques will be applied to translate this concept into an effective operational activity within the University structure. The School of Engineering and Applied Science is expected to become much

more deeply involved in projects of joint interest to the School and to the Program. The Systems and Cybernetics Seminar Series will move into the next phase of exploring means of bringing into focus a synthesis of concepts and an integration of skills among the various disciplines and professions.

The Program's public service activities will include a professional seminar series on the Technology Assessment Function, the completion of the seminar series on Federal Contributions to Management, and follow-up efforts to the Urban Challenge Conference held at Airlie House in June which was designed to establish permanent government-industry-university cooperative mechanisms for coping with special aspects of the urban problem situation. The technology assessment series will be directed to the following or similar topics: 1) Information needs of the Congress for reliable assessments of technological programs; 2) The process by which technology assessment data reaches Congress, including sources, adequacy, reliability, and timeliness; 3) The function of the adversary process in technology assessment; and 4) The role of the Congress in providing "early warning" of technological hazards.

CONTINUING APPRAISAL

Our continuing appraisal of the basic concept of the Program and of the extent to which the objectives of the Program are being realized, is comparable in importance to the studies, intra-University seminars, public service conferences and advisory meetings, and other activities of the Program. Have the basic assumptions made with respect to a university-based, problem-oriented policy analysis function withstood the test of experience? What is the potential for the Program of Policy Studies and similar university multi-disciplinary programs to become recognized national resources for

public policy analysis, forums for the discussion of alternative policies, and instructional bases for producing broad-gauged and highly skilled public policy analysts? Much is being written along these lines today but the relatively limited experience of such university programs does not yet permit conclusive answers to many questions which inevitably arise. In fact, as this Program continues to explore the policy analysis function and attempts to cut more deeply into the ways in which a university might organize its resources to make a useful conversion of intellectual skills into the on-going governmental process, more difficulties are uncovered in bridging this intelligence-policy process gap. Our work in the area of technology assessment has explicitly disclosed the complexities inherent in some aspects of the policy analysis process, while our efforts in the urban affairs area, particularly the Urban Challenge Conference, have emphasized the difficulties with the planning, programming, and coordinating of participants and resources for a systematic attack on problems of the urban environment.

During the first year of the Program's operation in its present form (1966-67), a strategy was adopted which combined a relatively well-structured plan of activities with an experimental, permissive attitude toward the individual interests and activities of those associated with the Program. Positive steps were taken to delineate primary areas of research interest, to undertake specific studies, to have monographs and papers prepared by University faculty members, to improve the coordination of the structure of University courses and seminars in the area of Science and Society, to explore various Institutional Response Mechanisms, to put into operation the professional seminar concept, to bring graduate students into the Program, to develop a closer working relationship with the prime sponsoring agency, and to seek new sources of financial support. Moreover, a wide range of possibilities was considered in order to determine the most significant types of study inquiries and other activities to which the Program should allocate its resources.

In October 1967 a paper was prepared by the Director titled "The Development of an Institutional Response Mechanism: The First Year's Experience", which treated the following topics: a) concept of the Program of Policy Studies, b) the Institutional Response Mechanism, c) initial practices with the Institutional Response Mechanism, d) the Institutional Response Mechanism in the university structure: some problems—some solutions, e) evaluative criteria of Program performance, and f) continuing development of the Institutional Response Mechanism.

A paper in elaboration of this second annual report is being prepared. It will reflect the evolving thoughts of the Director and other staff members on the operating rationale of the Program as an integral, multi-disciplinary, problem-oriented component of the University structure. While the remarks made herein are based primarily on the experience of the Program of Policy Studies in relation to The George Washington University and the various external entities and constituencies with which the Program is in some way related, it is felt that such experience might have relevance to other university programs with similar objectives and to the various agencies, organizations, and other participants that must necessarily interact with policy analysis groups.

INSTITUTIONAL RESPONSE

Considerable attention has been given during the past year to the Institutional Response Mechanism, including criteria for selecting challenges which are both intellectually stimulating and with which the Program has a capability to deal. As previously recognized, while the assembly of appropriate skills for a given project is the essential first phase for an institutional response, the second phase of assuring an integrated focus and coordinated

effort by a multi-disciplinary group presents a more formidable task. The first phase is largely organizational; the second involves intellectual interaction, organization being only one aspect of the task.

The notion of an institutional response was first thought of in terms of projects or task groups, that is, the assembling of relevant skills for particular projects as the challenge or opportunity arose. This approach viewed the institutional response as a specialized sub-function of the Program's basic purpose of developing a University policy research capability. While the project or task group perhaps reflects the institutional response in its most obvious and clean-cut form, it is now evident that the types of problem situations which arise and the corresponding variations in the character of the response required are so diverse that the notion of an institutional response must provide for great flexibility. A multiplicity of organizational patterns is needed in order to accommodate to a continuously changing sequence of specific requests and challenges. The talents required for particular problem situations obviously differ. The phasing of skill inputs must be adjusted to the character of the problem and the time available for analysis. A truly staggering number of factor-variables can be relevant to the organization and performance of a multi-disciplinary project. A growing realization of the variety of levels of effort and types of tasks that the Program staff and University associates might be expected to undertake emphasizes the fact that such concepts as University policy analysis capability, institutional response, and multi-disciplinary approach to problem analysis all refer to the primary goal of developing the ability within the University to mount an "institutional effort" whatever the character of the problem presented, the skills required, and the source of the request or challenge.

After two years, the conclusion seems justified that definite progress has been made in the development of a multi-disciplinary, problem-oriented

approach to policy studies. The interest of individual faculty members in participating in Program activities has been most encouraging. The number of University faculty members allocating part of their effort to Program activities could readily be increased if resources permitted. Many faculty members have participated in Program projects on a wholly voluntary basis. The cooperation of Deans and Departmental Chairmen has, in general, been forthcoming. Obviously, the release of a full-time faculty member from part of his regular departmental obligations imposes additional burdens on the responsible administrator, but such arrangements can usually be made if sufficient advance notice is given. While many novel and troublesome administrative and organizational problems have arisen in performing the Program's functions, no problem areas have yet presented difficulties which appear insurmountable to the continuing development of a viable institutional policy analysis function.

Undoubtedly, increasing systematic and critical thinking will be undertaken in describing, analyzing, and structuring so-called *inter-multi-cross-supra* disciplinary efforts as experience is gained in problem-oriented analytical groups in the universities and other policy research organizations. While this approach to analysis confronts difficulties and sometimes serious obstacles, we are confident that it is a promising means of gaining insight into complex social problems and providing useful exposure to those students and professionals who will eventually find themselves in policy analysis or program management positions.

At this point we have been able to do far more than merely assemble people from the various disciplines and professions to discuss policy problems. We have moved to the stage of attaining productive multi-disciplinary inputs in several of our projects as noted in Part III of this report.

The development of a university policy analysis capability requires continuous exposure to the challenges of problem analysis as well as to the

tough critiques of interdisciplinary seminars and briefings. But long-term assurance of this capability also depends upon continuing, focused, intra-university efforts which will regularize the multi-disciplinary, problem approach as a recognized function of the University. This aspect of the Program's educational function is represented by the Systems and Cybernetics Project of Professor Ericson noted in Part III of the report. Of course, there is little purpose in striving to develop the policy analysis function in a university unless there is organizational and budgetary support for such function and the effort promises to be productive in terms of advancing the quality of the educational system, broadly conceived. The prospects for such contribution seem promising. Not only has the need for such organizations been expressed by many knowledgeable people, but there is a definite trend in the initiation of university-based, interdisciplinary programs. However, these efforts face obvious difficulties in assembling and applying multiple skills to the policy analysis process, since the university's organizational structure is highly compartmentalized and continues its historical trend toward an increasing degree of specialization and differentiation.

The very fact that knowledge and techniques are becoming increasingly specialized would seem to require enlarged efforts toward the synthesis of knowledge and the invention of new ways of focusing diverse skills on social problem contexts. In the university environment, certain conditions are unfavorable to the problem-oriented approach. Given these circumstances, such programs must be assured of sustained support through a sufficient period of time to demonstrate their worth or their lack of productive performance commensurate with the effort expended. The necessity to rely heavily on project research support tends to deflect these programs from their primary roles of: 1) developing an institutional policy analysis capability in selected problem areas, and 2) engaging in the types of studies and other activities required to enhance this capability. If this effort is to receive a fair trial,

it is essential that sufficient sustaining support be available to assure continuing control over the direction of the program.

To pursue this line of thought a step further, a point which should be self-evident but which tends to be driven home only through experience, is that while university organizational and budgetary support for a policy analysis function is indispensable to assure a minimum level of constructive effort, the effectiveness of such programs can be usefully viewed only in the larger system of participants, institutions, and resources affected by such policy analysis. In short, the response of a university-based program will depend not only upon its own interests and resources, but upon the degree to which other participants and institutions within relevant problem contexts are disposed to challenge, utilize, and support the university policy analysis function.

While the types of public policy issues to which the Program of Policy Studies and similar university programs are undertaking to address themselves are recognized as major and even critical national problems on which the best analytical talents should be focused, there is obviously need for better interaction among all the entities involved if the university intellectual resource is to be effectively applied.

To put the matter more specifically, effective policy analysis is not merely a matter of universities being equipped to engage in such analysis; it also requires that governmental agencies, community groups, industrial participants, and others involved recognize this capability and encourage its application to challenging tasks. Even assuming performance of a high quality, this will take time, since our own learning curve is paralleled by similar learning experiences in the organizations with which the Program of Policy Studies deals. Only through persistent challenge and genuine cooperation from other involved entities can a university be expected to develop viable "institutional effort" mechanisms.

THE CHANGING PERSPECTIVE

s suggested above, this Program's inquiries into the technology assessment function and the application of systems thinking to urban problems has pressed us into a somewhat revised concept of the Program's challenges, opportunities, and operational problems. Our attention, which was initially almost wholly directed to intra-University organizational problems, has tended to shift toward a concern with establishing and maintaining operational arrangements with non-University participants in the problem contexts of interest to the Program. This is well illustrated in connection with our effort in the urban area. The Urban Challenge Conference brought into focus the full intricacy of the communications networks and operational linkages required for effective participation in policy analysis and program planning for urban problems. Without being at all critical of the extraordinary efforts being made by various participants, public and private, or the programs which have been undertaken to correct certain social imbalances, it nevertheless seems fair to say that an appalling degree of uncertainty exists among skilled professionals and the governmental, industrial, research, and educational institutions of this nation as to how to move toward the resolution of critical social problems on a total problem or systems basis. This is not to suggest that there is only one solution, or one way to attack such problems. There is, no doubt, a multiplicity of ways. Certainly we shall have to show a willingness to initiate and accept innovative and experimental approaches in various problem contexts where our knowledge of cause and effect relationships is scant and our skill requirements deficient. The difficulties sometimes seem overwhelming in the planning, programming, and coordinating of participants and resources for a systematic attack on problems of the urban environment. The slightest probing into these problem

contexts confirms, sadly, the low utility or irrelevance of many academic studies directed to such problems.

This is not to say that the university in its conventional modes of operation has not contributed to the analysis and solution of urban problems. The university can and will contribute to policy problems in a variety of ways, such as through its curricula offerings, dissertations, individual faculty research projects, and in some measure, through small formal and informal professional groups. These are and will continue to be important functions of the university.

If anything, the scope of needed tasks which might best be performed by individual scholars or specialized research groups has been greatly expanded. Highly specialized research projects will obviously continue. But individual scholars have roles which transcend this type of inquiry. The university scholar can give perspective to social trends, he can experiment with problem definition, invent alternative solutions, and construct general social process models which will provoke new thinking on troublesome problems.

We need individual scholars who will analyze goal setting mechanisms; review existing means and formulate new means for organizing the resources of government, industry and the universities for analyzing, planning, and implementing programs once objectives have been set; and devise appraisal mechanisms whereby a continuing interaction among governmental, industry and university elements can be assured and the combined efforts of such elements evaluated. But the absolutely massive efforts required to get at solutions to many of those problems whose root causes are deeply embedded in the long established practices and institutions of society will surely challenge the very best interdisciplinary problem-oriented groups that can be assembled. Here again, however, there is a most important role for the

scholar in this comprehensive problem analysis and program planning approach. How does the total problem approach affect value and institutional change? attitudes toward innovative social programs? the design of new goal-setting mechanisms? the role of the adversary process in establishing goals and selecting means? the institutional structure for total problem analysis and program management? or the prospects for more democratic (or elite) decision-making on public issues?

Yet society's need in a time of rapid change and clear and pressing problems is for contributions to the policy-making process that transcend the limitations of research as it has been conducted heretofore. The scale of the needed efforts is an important factor, but the nature of the audience to which policy research is addressed is also of special significance. That audience does not consist principally of a professional peer group as is characteristic of most university research. Instead, the audience includes generally any member of the public who may have an interest in the problem, and specifically a core consisting of the governmental agency or agencies with the special interest that goes with responsibility for action.

It is clear that in undertaking policy research in an organized fashion and with the intent of being responsive to the needs of decision-making bodies, it is necessary to be intimately but independently involved. The core audience, the government agency, will be staffed with men who are in various ways experts in the area of their responsibility, but who lack the time and frequently the perspective for applying their expertise to the analysis and evaluation of next steps. They will have some concept of success or failure, and of next steps. Such notions may be right or wrong, and may be lightly or strongly held. In any case, it is essential for the university policy analysis group to be aware of their interests, priorities, evaluations of programs and ongoing research, and opportunities for continuing work. It is further essential that the university policy group have access to all relevant data,

much of it likely to be held by the agency, since failure to use all the data available will almost certainly vitiate the work done. The university policy research group must then be alert to opportunities to apply the university's resources to meet needs beyond the capabilities of individuals or limited professional groups. Such sensitivity, if effectively applied, will be exercised well beyond the conventional academic interest in most policy problem areas.

These comments emphasize the point that a university policy analysis group must, in some problem contexts and particularly with respect to many urban problem areas, view itself as an integral part of the total system. This is essential not only for purposes of grasping the scope of the problem but also for purposes of assuring the availability of all relevant data and of active, continuing interchange with those holding operational responsibilities.

But it is also clear in the case of certain types of problems, such as major studies of metropolitan systems and subsystems, that institutional resources reaching beyond a single university are required. There are several reasons why combined institutional efforts may be the only feasible mode of approaching such tasks. The skill base required for the effort may exceed that of any one organization; the responsible government entity may insist that a coordinating organization serve as spokesman, negotiator, and implementer for the various interested institutional groups whose skills are required for the analysis of certain patterns of problems; or the existing pattern of organization and practices may demand a consortium approach rather than unilateral institutional arrangements with governmental entities. The reservoir of talents required for particular analytical efforts may not be found in one institution or even in several of similar kind. More and more, it appears, *institutional combinations* will be needed, including governmental entities, industrial groups, R&D firms, universities, and other organizations

to perform complex, long-range analysis and planning functions. In those problem contexts in which the very matrix of society is involved, in which the analysts and planners must deal with harshly conflicting interests, long established practices, bureaucratic fragmentation and overlapping of functions, the analysis and programming of remedial programs is unlikely to fit a neat flow chart approach. If the problem goes to the very social core of a metropolitan area or region and has persisted through time, new approaches will probably require a massive preparatory educational effort including reviews of past programs and proposals, empirical investigations to determine present conditions, and extensive coordination of organizations for program implementation. Such a task can be a "study by one organization" in form only. The entire system of participants and institutions is involved and all must make their relevant inputs.

These remarks have served to again emphasize that the modes by which intellectual resources can be applied to the task of social problem analysis and program planning are diverse indeed. However, the challenge to more effective intelligence-policy analysis conversion processes can be posited simply by reference to the complex of unresolved problems of urban environmental quality in its many dimensions. Much more careful, critical attention is needed to analyze the response to this challenge, whether in terms of *institutional efforts* by government entities, private industry, research firms, the universities, or some combination thereof, or whether in terms of *applicable developing skills* and techniques, including systems analysis, automatic data processing and advanced managerial concepts and techniques. Representative efforts should be examined for effectiveness by reference to the *components of policy analysis* (goal specification, context description, problem definition, invention of alternatives, model construction, outcome projection, impact prediction, and selection of recommended course of action) and by reference to the *components of program management* (pro-

gram planning, research and development, engineering prototype, experimental project phase, organization of operational program, resource funding for operations, management of operating programs, monitoring and appraisal of operations with modification as required). By explicit and systematic reference to such analytical, planning, and managerial components, it becomes practicable for a university-based policy analysis group or any other organization in the analysis, planning, and implementation continuum to relate its interests and capabilities most effectively to particular aspects or dimensions within the total problem context or relevant system.

Continuing careful and systematic reviews of all programs—such as the Program of Policy Studies in Science and Technology—should eventually produce a much better feeling for the types of problems that need to be handled by a broad-based multi-disciplinary group or by institutional combinations, and those which can best be left to the individual scholar or highly specialized study groups.

I. THE DEVELOPING RATIONALE

VENTS since World War II have created an awareness of the need to probe more deeply into the causes and consequences of social problems. The movements and trends which have forced recognition of this need are familiar. Demands to share in the opportunities and abundance of our society, crises of urban areas, and spectacular advances in science and technology are illustrative of conditions which characterize the contemporary environment. Daily headlines remind us that we are not performing the job of social program management effectively. To inquire into such matters productively—to describe adequately present conditions, posit community goals, and invent alternative means of bringing conditions into accord with such goals—requires a problem-oriented approach as well as traditional discipline-oriented analysis. Questions now being asked persistently include:

- How can we assemble, if available, or how do we obtain, if not available, the intellectual resources which can analyze and manage such typical programs as: quality controls over the environment; the exploitation of space technology for social purposes; the administration of a national marine sciences program?
- What existing institutions, if any, are capable of performing these tasks?

More effective ways of organizing our intellectual resources are being sought in order to advance the solution of such problems. Our traditional institutional patterns, including joint arrangements of government, industry, and university components have not provided an adequate mechanism for coping with current social complexities. For example, in urban affairs there are many conflicting notions of objectives and of desirable priorities among objectives in any particular metropolitan area. Such complexities cannot

be ignored; they must be accommodated. Recognizing this, several government agencies have drawn upon intellectual-analysis resources outside the government. They have approached not only the universities but also numerous for-profit and non-profit organizations, most of which are of recent origin and are undertaking to fill the need for more rational and comprehensive analyses of public policy issues.

This emergence of new institutional structures responsive to the demands for cross-disciplinary, problem-oriented policy analyses, raises a number of problems, particularly for the universities which traditionally have been organized along specialized departmental or professional school lines. While professors and students have, of course, always given attention to matters of public policy, this has usually been from the limited perspective of a given discipline or profession. To the extent that universities have undertaken to address themselves to total social problems, some addition or readjustment in organizational structure has been required in order to focus relevant skills on particular problem contexts.

The Program reflects in part the effort of The George Washington University to respond to the foregoing needs. The Program undertakes to serve as a forum for the discussion of policy problems and as an organizing element for the continuing development of a University policy research capability.

In pursuing this objective, the Program is establishing mutually beneficial working relationships with other policy research groups and faculty members of the schools and departments of the University which have an interest in interdisciplinary, problem-oriented studies and wish to function as part of a University policy analysis effort. Not only does this approach generate a useful interchange of ideas; it also facilitates occasional transfer of staff members between research groups of the University or from departments and schools to such groups to perform specific research studies or

participate in seminar series. This arrangement encourages a feed-back of new knowledge and skills into courses and seminars and strengthens the University's capability to carry on long-term systems-analyses of major, gradually evolving socio-political programs.

In the broadest sense, the Program of Policy Studies is undertaking to contribute to a better understanding of how the University is to relate to the evolving values and institutions of society.

II. AREAS OF INQUIRY

GROUP ONE:

THE principal focus of the Program's study effort from the outset has been on the structure and functions of institutions designed to stimulate, utilize, regulate, and appraise the application of science and technology to the achievement of basic community goals, i.e., the institutional structure for converting advancing science and technology to national and international social needs.

Study reports and staff papers directly relevant to this study focus, summaries of which are in Appendix A (pages 36 to 57) include:

- The New Technological Era: A View from the Law
- Government Relief Programs for Major Disasters
- Toward the "Techno-Corporate" State?
- An Analysis of the International Organization of Space Activities
- A Cross Polity Research Approach to the Study of Developing Countries and the Establishment of a Data Bank on Selected Countries
- International Participation in an Earth Resource Survey Satellite Program
- Organizational Dimensions of Marine Science Programs
 - a) Interdependencies between Public and Private Interests in the Advancement of New Technologies
 - b) Civilian-Military Interests in New Technologies
 - c) Institutional Arrangements for Scientific and Technical Programs: The Experience of the Federal Government
- Organizational Conflicts of Interest

- The Expanding Roles of Non-Profit Organizations as Contractors with Government: Some Research Needs
- Education in the 70's: The Study and Description of Model School Systems of the Next Decade Utilizing Computer-Assisted Instruction as an Integral Component of the Educational Process
- Analysis of the Need For and Feasibility Of More Effective Distribution of Government-Supported Non-Written Material

Technology Assessment

The most concentrated effort of the Program, and one in which many members of the Program staff have participated, has been in the area of technology assessment: the identification of the effects (direct and derivative; immediate, intermediate and long-term) and the evaluation of the social desirability or undesirability of such effects as related to particular technological applications. While there is considerable literature relating in some way to technology assessment, systematic attempts to describe the function as a process and to develop useful conceptual models have only recently been undertaken. Program reports and papers relevant to this topic include: (page 43)

- Some Research Approaches to Studying the Development and Functioning of Technology Assessment-Control Processes
- The Technology Assessment Function
 - Part I: Basic Concepts and Analytical Models
 - Part II: Illustrative Cases of the Assessment of Technological Applications
- Early Experiences with the Hazards of Medical Use of X-Rays: 1896-1906
- The Control of Incinerator-Caused Air Pollution in New York City: 1946-1965: A Technology Assessment Case Study Based on Events Reported in the *New York Times*

- Technology Assessment as Reflected in the Evaluation of the Supersonic Transport
- The Process of Setting Safety Standards in the Courts, Congress, and Administrative Agencies
- Social Control of Technology: The Problem of Nuclear Energy
- The Role of Crusader-Triggered Controversy in Technology Assessment: An Analysis of the Mass Media Response to *Silent Spring* and *Unsafe at Any Speed*
- Community Broadcast Satellites for Instructional Television in the Developing Countries

Technological Innovation

The following reports and papers consider problems associated with technological innovation, transfer, and utilization in the civilian sector of the economy: (page 48)

- The Processes of Technological Innovation: A Conceptual Systems Model
- Promising Approaches Toward Understanding Technology Transfer
- Technology Transfer by People Transfer
- Public Policy Issues Related to the Advancement of Market-Oriented Technology

Institutional Response

In developing an institutional research capability with respect to the policy analysis function, the interests of individual staff members, the proposals for group effort, and the requirements of specific grant and contract objectives are considered. Study activities have tended, therefore, to reflect *special* aspects of the primary study focus. The allocation problem, for example, is being treated in the following studies: (page 50)

- The Allocation of Resources for Science
- Financial Variables Associated with R&D Expenditures by Industry
- Some Effects of Federal Procurement of Research and Development on Industry

Papers relevant to some special aspect of the Science/Technology/Society relationship are: (page 51)

- The Space Program and the Urban Program: Case-Studies of the Components of National Consensus
- Science, Technology and the Political System
- The Conversion of Intellectual Resources to the Tasks of Social Problem Analysis and Program Implementation
- The Social Science Debate: 1968

GROUP TWO:

THE Program has also undertaken to give attention to a second, more narrowly focused study area, namely, the application of modern R & D management concepts and skills to the planning, programming, and managing of social programs, with emphasis on urban problems with important technological components. (pages 54 to 57)

- The Systems Approach and the Urban Dilemma
- The Decentralization of Urban Government: A Systems Approach
- Systems Approaches to Multi-Variable Socio-economic Problems: An Appraisal
- Special Mechanisms for Policy and Decision Analysis
- Alternative Evaluation Models for an Experimental Humanities Regional Grant Program

III. THE PROGRAM AND THE UNIVERSITY

ANY specific steps have been taken by the Program staff to establish continuing, mutually supportive interactions with the schools, departments, other policy analysis groups and individual faculty members within the University. The first Annual Report of the Program and an issue of the George Washington University Magazine with an article about the concept and activities of the Program, were distributed to all University faculty members. Numerous members of the faculty have participated in our professional seminars and other meetings. Special briefings on the Programs' activities have been conducted for faculties of certain departments. Individual faculty members have been engaged by the Program to write papers or to participate in proposal-drafting or in briefings by representatives of non-University governmental and research entities. A meeting of representatives from all University research groups with an interest in policy analysis was held on November 30, 1967 to explore areas of mutual interest and to develop means for strengthening the policy analysis function within the University. Participants were:

- Human Resources Research Office
- Center for Manpower Policy Studies
- Social Research Group
- State-Local Finances Project
- Biological Sciences Communications Project
- Center for Natural Resources Policy Studies
- Institute of Sino-Soviet Studies
- Institute of Law, Psychiatry and Criminology
- Patent, Trademark and Copyright Research Institute

Three faculty members have provided the Director of the Program with thoughtful analyses of the relationship of interdisciplinary, problem-oriented

studies and other activities to the existing university structure of incentives and rewards for professional effort. Such papers contribute to the continuing analysis of the function and status of inter-disciplinary activities within the university community. Many basic considerations were previously outlined in an internal reference paper of the Program Director entitled: "The Development of an Institutional Response Mechanism: The First Year's Experience."

The Program has adopted several approaches to the development of mechanisms for expressing an institutional response to policy problems. Two basic tasks are involved in the implementation of an institutional response:

- That of providing the organizational arrangement whereby the relevant skills for a given policy analysis response can be assembled.
- That of assuring an integrated focus and effort on the part of the cross-disciplinary talents brought to the specific problem.

Flexible accommodations are necessary to achieve the benefit of interaction between the policy analysis function and the instructional function. A somewhat different arrangement is required in each instance. Movement must be provided within an identifiable but flexible organizational arrangement which can adjust both to a diversity of personal skills and interests and to existing formalized departmental relationships. The mechanism must seek the optimum form to facilitate the assembling of effective combinations of skills required to cope with a variety of policy analysis situations.

The challenges to the response mechanism will necessarily be of variable character as to subject, time to respond, and nature of skills required. The mechanism might be brought into operation to respond to:

- A long-range study requiring an immediate commitment.
- An immediate response to a policy question.
- The preparation of a research design with a definite time limit.

During the current year, the Program staff has given considerable attention to alternative ways in which this concept might be usefully applied. For example, should the University be primarily concerned with responding to inquiries or questions posed from outside agencies and organizations, or should we initiate questions which present a special challenge to the University community? Are there certain types of policy issues particularly suitable to a University response? If so, what are the characteristics of such questions?

As a means of improving the Program's ability to organize for an institutional response, a survey is being made of research interests of all full-time members of the University faculty and research group staffs.

Projects possessing some characteristics of an institutional response have taken several forms during the past year. The basic effort is reflected in the intra-University project of Professor Richard Ericson which involves an Interdisciplinary Seminar Series in Systems and Cybernetics. The purpose of this project has been to acquaint University faculty and other research personnel with the analytic and organizational potential of the systems approach and cybernetic concepts.

The project is based on the belief that considerable individual and University-wide benefit is probable if a suitable milieu is provided for the interchange of systems and cybernetic concepts among and between specialists in various disciplines throughout the University. Accordingly, the Interdisciplinary Seminar Series consisted of a University-wide introductory session on December 8, 1967, including professors from several schools and departments, University administrators, and representatives of the Program of Policy Studies in Science and Technology; a second general meeting on February 2, 1968, provided additional focus; and a series of meetings built around the contributions of visiting scholars (Dr. Karl Deutsch, Professor

of Government, Harvard University, on February 28, 1968; Dr. George Kozmetsky, Dean, School of Business Administration, University of Texas, on March 22, 1968, and Dr. Kenneth Boulding from the Institute of Behavioral Sciences, University of Colorado, on April 28, 1968).

This series of interdisciplinary seminars has helped to meet certain academic needs typical of urban universities such as George Washington, with a geographically dispersed and highly diverse faculty composition. Gains are already evident in terms of improved interdisciplinary understandings and a disposition to view the University as an articulated system.

The long-range objectives of this project include: the continuing examination of systems and cybernetic concepts for curricula revision and university reorganization; the stimulation and increasing level of interdisciplinary effort in problem analysis; and the formulation of a special University curriculum which will reflect a synthesis of specialized disciplinary skills toward the development of professionals capable of analyzing and managing total problem situations. The prospective impact of this project can be enormous in shaping the organization and content of University activities, including the cultivation of an environment in which more particularized institutional responses can be executed with minimum organizational obstruction and with maximum effectiveness in terms of analytical quality.

Other projects in which the relevant skills have been assembled and integrated group efforts have been applied include:

1. The development of a design for the Applicability of Communications Satellite Technology to the Educational Needs of Developing Nations. This project involved a quick response to an invitation to submit a proposal, and was completed within the period February 19-March 4, 1968. Resources were drawn from the fields of political science, educational psychology, law, engineering, and economics.

2. The design of a proposal for the Development of Alternative Evaluation Models for Appraising Pilot Projects initiated by the National Endowment for the Humanities utilized expertise in the fields of economics, public administration, systems analysis, American studies, and social psychology. The project was funded and is now underway.

3. A proposal on the Development and Application of the Need For and the Feasibility Of More Effective Distribution of Government-Supported Non-Written Material was funded, and relies on the application of skills in psychology, business administration, educational technology, data processing, and law.

4. The development of a proposal for a study of the Utilization of Airspace over Urban Freeways and its broad spectrum of social implications for the urban community. Skills involved in this effort included: geography and regional planning, urban planning, sociology, economics, law, and engineering.

5. In May, a Survey and Inventory of Current University Activities in the Urban Social/Minority Group Problem Area was undertaken. It significantly advanced the Program's basic objective to examine how the University can best relate to the urban community and concurrently to appraise the utility of the systems approach to urban problems. The effort had the full cooperation of President Lloyd H. Elliott, as well as that of deans, department heads, research program directors and others having primary responsibility for the University entities. It was a concrete and outstanding example of the Program's ability to quickly respond to a problem when asked to do so on short notice. Within eight days questionnaires to fifty University professors and administrators were analyzed and a draft report completed. Shortly thereafter the final report, including a comprehensive matrix of University courses and activities related to its urban environment, was submitted to President Elliott.

This survey provided data never before assembled and collated in the University, and the report has served the useful purpose of providing a basic reference document for organizing the University's efforts in the urban problem area. A faculty committee, including representatives of the Sociology Department, the Department of Geography and Regional Planning, the Economics Department and the National Law Center is now working with the Program to examine ways in which the interest and capability of University faculty members can best be utilized in the analysis of critical urban problems.

The Program has undertaken to bring into focus the courses and seminars offered by the University which are directly related to the Science/Society interface area. While the adoption of new courses is a matter for the faculties of the various Schools and Departments, the Program has encouraged all professors giving courses related to Science, Society, and Public Policy, or who have an interest in introducing new courses in this area, to give thought to the building of a comprehensive scheme of curricula without unnecessary duplication. Such courses are also made available, as deemed appropriate, to students in all Schools and Departments of the University and to students of the Washington Consortium Universities. An announcement of such courses has been prepared and distributed.

Courses and seminars regularly offered by the University in the area of Science, Society, and Public Policy are:

DEPARTMENT OF HISTORY	DEPARTMENT OF ECONOMICS
History of Science	Economics of Natural Resources Policy
DEPARTMENT OF SOCIOLOGY	SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION
Science and Society	Policy Formulation and Administration
DEPARTMENT OF PHILOSOPHY	Science, Technology and Public Policy
Myth, Science and the Modern Mind	Social Environment of Business

SCHOOL OF LAW

Legal Protection Against Technological
Hazards

Intergovernmental Aspects of
Technological Change

Science and the Legal Process

Science Policy Formulation

International Law of Air and Space

IV. THE PROGRAM AND PUBLIC SERVICE

SEVERAL activities of the Program, completed and continuing, are designed to relate the University and the Program to various public sectors, including the "Federal Community", by means of linkages to particular agencies and individuals and through the analysis of significant current and emerging policy problems having substantial technological components. During the past year the Program has conducted a number of professional seminars and meetings which have drawn representatives from government, industry, academia and research organizations. The public has benefited in some cases through the availability of papers and published proceedings, and less directly through the effect these meetings and seminars have had on non-Program participants. A professional seminar on the *Impact of Science and Technology on Human Values* was initiated in the Spring of 1967 and continued through the Fall of 1967. Separate seminars treated the following topics:

- The Sonic Boom
- Medical Experimentation on Humans
- Weather Modification
- Implications of Computer Technology
- Radiation Hazards

Another professional seminar was devoted to the topic of *Social Change and the American Value System* at which Professor Seymour M. Lipset, of the Harvard University Center for International Affairs, presented the major paper with a response by Dr. John P. Roche, Special Consultant to President Johnson.

A professional seminar series was initiated during the Spring of 1968 under the direction of Professor David S. Brown of the School of Government

and Business Administration, on the subject of *Federal Contributions to Management*. Papers were presented at separate sessions on the following topics:

- Integration and Systematization of Planning, Programming and Budgeting
- Evolution of the Management Audit as a Means of Appraisal
- Involving Clients and the Public in Federal Administration
- Communications and Federal Management: Some Current Highlights
- Federal Experience with Productivity Measurement
- Value Engineering: Its Development and Application
- The Uses of Simulation in Management
- Economics and Its Uses in Government
- Federal Contributions to Procurement Management

Six additional seminar sessions will be held during the Fall of 1968 and the collection of papers will be edited for publication by Professor Brown.

The Program of Policy Studies, in cooperation with North American Rockwell Corporation and the Systems Development Corporation conducted a conference, *The Urban Challenge*, at Airlie Conference Center, Warrenton, Virginia, from June 19-21, 1968, with invitees from government, industry, universities and various research organizations. The Conference participants examined relevant urban policies, technological and institutional problems, urban program management, and requirements for the cooperation and continuing interaction among the government, business, and university communities in the area of urban affairs.

In addition to the formally structured professional seminars and conferences, numerous sessions have been held with government agencies—

some of which are referred to in more explicit context elsewhere in this Report—including the National Aeronautics and Space Administration; National Science Foundation; National Foundation for the Arts and Humanities; Office of Education and the Public Health Service of the Department of Health, Education and Welfare; National Bureau of Standards and Environmental Science Services Administration of the Department of Commerce; Department of Housing and Urban Development; Commission on Marine Science, Engineering and Resources; President's Task Force on National Communications Policy; Department of State; Department of Defense; and the Arms Control and Disarmament Agency. Prospective projects have also been discussed with representatives of the Organization of American States and the United Nations Secretariat.

The Director of the Program of Policy Studies was invited by Congressman Emilio Q. Daddario to participate in the Technology Assessment Seminar of the House Subcommittee on Science, Research and Development of the House Committee on Science and Astronautics in September 1967 where he made a statement on the Program of Policy Studies' involvement in the area of technology assessment which was published in the *Proceedings* of this subcommittee. (See Appendix D for citation of Report)

The Program has made valuable use of its facilities as a forum for the discussion of a variety of public policy matters by a broad spectrum of public and private organizations.

Interdisciplinary University groups organized by the Program of Policy Studies have discussed various projects with representatives of the District of Columbia Government and the Washington Center for Metropolitan Studies concerning the University's activities in urban affairs.

A particularly interesting and useful discussion was held on February 13, 1968, to discuss with Dr. Nicholas E. Golovin of the Office of Science and

Technology his paper proposing *A Fourth Branch (Evaluative) of Government*.

Sessions have been arranged with several industry and research organizations relating to joint participation in research projects, conferences, or instructional programs.

Several staff members have been consulted by a representative of the Inter-American Development Bank in connection with means of encouraging greater research and development activity in South American countries.

Members of the Program staff are participating on two study panels of the National Academy of Sciences and Engineering: the Technology Assessment Panel of the Committee on Science and Public Policy (COSPUP) and the Research Advisory Committee on Science, Technology and Regional Economic Development.

Two members of the Program staff have been active participants in PROJECT ARISTOTLE (Annual Review and Information Symposium on the Technology of Training, Learning, and Education), sponsored by the National Security Industrial Association, which includes representatives from Education, Industry and Government.

While we are encouraged by the interest shown in Program activities by representatives of various government agencies and Congressional committees, possibly the most significant development to date is the fact that an increasing number of inquiries is made to the Program concerning its research activities and objectives. These come from government, industry, research organizations, and university sources here and abroad. Professionals and graduate students with excellent credentials are being referred to the Program through government, research organizations, and university associations. These indicators demonstrate a growing recognition of the Program, its objectives, and its activities. In short, the Program of Policy

Studies has now attained a reasonably effective level of performance. The organizational effort of the first year provided the staff capability, the intra-University support, and the external relationships essential to the continuing development of the policy analysis function. Performance by the Program during the past several months as measured by monographs and reports produced and other policy analysis activities has been encouraging. Nevertheless, there is no intent to convey the notion that we are fully satisfied with our efforts nor that we have solved all the problems confronting this innovative university function. One point is perfectly clear, however: the challenges for this Program are enormous and expanding. We sense that our activities are beginning to forge a crucially important linkage between the University's policy analysis capability and the on-going governmental process.

APPENDIX A

DESCRIPTIONS OF RESEARCH STUDIES AND PAPERS

**Starred papers are available for distribution.*

GROUP ONE: THE INSTITUTIONAL STRUCTURE FOR CONVERTING ADVANCING SCIENCE AND TECHNOLOGY TO SOCIETY'S NATIONAL AND INTERNATIONAL NEEDS.

The New Technological Era: A View From The Law (Completed Paper—M#1)*

Harold P. Green

The increasingly inadequate protection of the public from technological hazards is becoming an important problem which urgently needs attention. A national obsession with technological advance is preempting the normal operation of the law as a mechanism for protecting the public against the undesirable consequences of emerging technologies. The speed with which new technologies develop and become embedded in our society as a result of the enormously increased federal governmental support of research and development is now outdistancing the speed with which the law can move to provide private citizens with the traditional protection from technological hazards.

For protection, reliance must be placed upon our legislative bodies and on other governmental structures which formulate, interpret, and oversee the application of certain protective restraints upon those technologies which can potentially inflict harm upon society. The legal profession, with its special qualifications and training, can make a substantial contribution in this area by giving assistance to the rule-making bodies; it is not enough for the profession simply to provide protection through the courts which of themselves are inadequate to protect society. This study proposes that the solution for balancing these pressures and trends is an institutional structure, such as the proposed Technology Assessment Board, which would strive to conduct technology assessment within a broader framework and in so doing would incorporate social as well as political and economic values.

Government Relief Programs For Major Disasters

(Study In Progress)

James M. Brown

This study deals with government activity instigated by a "disaster situation". It considers existing laws and institutions which alleviate the consequences of disaster rather than those which assess fault and compensatory responsibility. Attention is paid to the difficulty of efficiently implementing and coordinating all levels of Government (from Municipal to Federal) at times of crisis because of confused lines of communication and ill-defined lines of responsibility. The Study seeks to structure decision processes which will enable the policy maker to respond more effectively to disaster situations.

Toward the "Techno-Corporate" State?

(Completed Paper)

Arthur S. Miller

It is suggested in this study that the United States is becoming the "techno-corporate state." In this constitutional change, the supposedly neutral values of "technicism" dominate; the men of power are called "technocrats," operating with pseudo-objectivity. The techno-corporate state is not a system of state socialism; ownership of the units of the economy rests with private individuals, and not with government, although there is a high degree of cooperation between units of public and private government. Since the attempt in the 1930's to engraft a form of corporativism on the American political economy by fiat, developing technology, external threats and other coalescing drives have resulted in the building of the corporate state, little by little, through the myriad transactions between government and the super-corporations. Business and Government need each other; the technocrats in each institution have their important roles to play. They exhibit a coincidence in goals and values. That their goals and values may be technological, not humanistic, is one of the burdens others must bear.

An Analysis Of The International Organization of Space Activities

(Study in Progress)

John Hanessian, Jr.
Joseph Pelton and William Kallon

By contrasting the current and near-future needs and interests of space-oriented countries (especially in view of continuing technological advances which open up new avenues of space activities) against the effectiveness of currently operational international space arrangements, and of such relevant existing organizations as the International Atomic Energy Agency and INTELSAT, a greater understanding will be gained of the degree of multilateral activity in this area which can realistically be expected.

This study, in addition to its important policy analysis perspective, will also serve as one of the most complete sources of information on the operations and programmatic interests of the numerous governmental and non-governmental organizations dealing with space activities and research.

The methodology of study includes a thorough examination of existing literature, interviews with relevant source personnel including U.S. government officials, members of the United Nations Secretariat, and, within necessary limitations, officials of other countries and regional organizations having a direct interest or concern with the question. It is expected that the final independent analysis of all the data and information will provide not only a basis of a published monograph, but also an extremely useful resource for policy considerations.

A Cross-Polity Research Approach To The Study Of Developing Countries And The Establishment Of A Data Bank On Selected Countries

(Study in Progress)

John Hanessian, Jr.
Joseph Pelton and William Kallon

Because of a lack of current and reliable data, the Program of Policy Studies has had a major recurring problem in its projects dealing with the interface between science and tech-

nology and international affairs in developing countries. This project is applying a cross-polity research approach to 13 countries, (Chile, Mexico, Colombia, Iran, Iraq, Morecco, Thailand, Indonesia, Nepal, Kenya, Congo-Kinshasa, Ethiopia, and Yugoslavia) which will provide a reliable data base for generalizing about them. The Data Bank contains over 100 indicators, including: economic; political; educational; developmental; scientific and technological capabilities; extensiveness of communications facilities; basic demographic parameters; and the relative influence of various sectors of the traditional elites. Once this particular reservoir is completed, more comprehensive and aggregative analysis will continue and the result will be a useful resource for a wide variety of ongoing research projects which involve developing countries.

International Participation In An Earth Resource Survey Satellite Program

(Study in Progress)

John Hannessian, Jr.
Joseph Pelton and William Kallon

This policy study incorporates an analytical examination of questions raised by the proposed extension of earth orbital satellite operations to include economically beneficial surveys of the earth's resources through the innovative use of remote sensing techniques.

Among the most important issues being examined is the question of alternative systems management methods for conducting international participation and data distribution in such earth resource survey satellite programs. In this regard analysis is being made of a number of relevant factors: (i) nature and extent of possible participation of European space-interested countries, the U.S.S.R., regional organizations, international specialized agencies, and the United Nations itself, (ii) feasibility of utilizing commercial involvement, (iii) the extent and nature of the internal administrative management problems which will face participating countries (especially the lesser developed countries, which are most interested in the benefits of such a program) in the effective utilization of the available data, and, (iv) related aspects of international law, especially the rights and obligations of countries which may be conducting such programs by collecting, analyzing, disseminating, and using data relating to the resources of other countries.

Research for this project includes a review of existing literature as well as extensive interviews of U.S. Government officials at NASA, ESSA, USDA, Interior, representatives of private

enterprise, universities, and research institutes, as well as officials of space-related international organizations, including ESRO, the U.N. Committee on the Peaceful Uses of Outer Space, and ELDO.

Organizational Dimensions of Marine Science Programs
(Three Studies. Completed.)

Clarence H. Danhof, Coordinator

The purpose of this series of three studies is to provide active critical and constructive information and advice to the Commission on Marine Science, Engineering and Resources (COMSER) regarding existing institutions that have similar concerns in the development of new technologies. The three areas of study are:

1. Interdependencies between Public and Private Interests in the Advancement of New Technologies, a survey designed to provide the members of COMSER with an appreciation of the range of relationships that may be used and some considerations of their use.—Clarence Danhof (Paper Completed)
2. Highlights from the Literature on Organization for Federal Programs in Science and Technology.—Fred R. Brown and Stephen R. Chitwood (Paper Completed*—M2)
3. Interdependencies between Civilian and Military Interests In and Responsibilities For the Advancement of New Technologies.—Enid Curtis Bok Schoettle (Paper Completed)

These studies constitute a significant contribution to COMSER's consideration of its responsibilities. They were part of the subject matter of several seminars held at the Institute for the Study of Science in Human Affairs, Columbia University.

*Organizational Conflicts of Interest.
A NASA Study of Extracontractual Influences
in Government Contracting
(Study in Progress)*

John Cibinic and Gilbert Ginsburg

The purpose of the study is to determine the extent to which NASA and other government agencies are concerned about organizational conflicts of interest, to examine the ways in which this problem is being handled in the field, and to analyze the problem and discuss alternative approaches to the manner in which it is being handled.

Research included visits to all of the major NASA field centers and headquarters, and to some of the smaller ones, where interviews were held with procurement officers, negotiators, and lawyers to determine which contracts contained clauses relating to organizational conflicts of interest, and to attempt to ascertain the criteria governing the use of such clauses. To gather data from industry, two seminars made up solely of industry representatives were conducted in Los Angeles and Washington, where participants candidly discussed their experiences with regard to the handling of organizational conflicts of interest clauses and problems and the alternatives available.

This study should provide some insight into the Government policy-making process in a situation in which Government action is motivated to a substantial degree by Congressional concern.

*The Expanding Roles of Non-Profit Organizations
As Contractors With Government:
Some Research Needs.
(Completed Paper* — SDP 301)*

Clarence H. Danhof

The Federal Government is increasingly turning upon private, non-university, non-profit corporations to assist in the accomplishment of many objectives. The study surveys the

relationships between the government and the non-profits to identify common as well as unusual problems, and successful, difficult, and unsuccessful relationships.

Education In The Seventies
(Completed Study)

Joseph B. Margolin and Marion R. Misch

This study, supported by the Bureau of Research of the U.S. Office of Education, resulted in a book-length report directed to determining and understanding critical issues that will affect the development of computer-assisted instruction in American education during the next ten to twenty years. These encompass a range of technical, economic, political, sociological and psychological realities and needs as they relate to the state of the art of education.

Issues discussed range from those broadly affecting society to those involving specific effects on the school itself. The first category includes, for example, educational opportunity, privacy, mental health, and teacher training factors as they relate to computer-assisted instruction.

Effects within the school cover those influencing both: (1) *the individual student* (e.g., requirements for logical thinking; possible loss of creativity; the teacher as a model in control of a powerful electronic tool; personalization of the machine vs. feelings of achievement and conscious mastery); and (2) *the school staff* (e.g., effects on administrative routines and decision making; the circumvention of the teacher vs. the master teacher concept; the role of teaching aides). Issues are presented in the context of broad educational values and goals. Systems analysis potentials and recommended areas for future research and development are outlined.

*Analysis of The Need For And Feasibility of More Effective Distribution
of Government-Supported Non-Written Material*

(Study in Progress)

Joseph B. Margolin and James E. Mahoney

The project will provide an analysis of policy issues and management factors, reviewing a series of alternative courses and action and spelling out the implications of each decision route for the purposes of: (1) providing an enhanced understanding of current dissemination of non-print educational and educational research materials by the U.S. Office of Education and wherever else required by the objective of the study; (2) refining and developing projections concerning the future needs and direction of education with respect to the dissemination of nonprint materials.

The study will provide Office of Education management with suggested techniques and flexible procedures which will assemble policy and/or machinery for the continuing improvement and assessment of present dissemination systems and those that may evolve.

*Some Research Approaches To Studying The Development And Functioning
of Technology Assessment-Control Processes*

(Paper Completed*—SDP 200)

Richard Myrick and Barbara S. Marx

This paper discusses some of the needs for research which can provide a better understanding of the emergence, development, and functioning of technology assessment-control processes in American society. Outlines for seven possible future research studies are presented, with a description of possible methods and feasibilities of each approach, together with remarks about the likely payoffs.

The Technology Assessment Function (Study in Progress)

Louis H. Mayo

This study is a response to a wide concern expressed by members of Congress, various public officials, and academicians that the detrimental as well as beneficial aspects of new technological applications be considered before the nation becomes irrevocably committed to major new programs. The study undertakes to explore the following: the emerging interest in technology assessment, concepts relevant to an analysis of the technology assessment function, the existing technology assessment structure, Congressional expression of need for more adequate technology assessment, classification of technological applications meriting continuing Congressional attention, illustrative cases of the assessment of technological applications, specification of the functions and tasks that a technology assessment board or similar organization might usefully perform for Congress, and alternative institutional approaches for performing the selected technology assessment functions.

There will be three parts to this study.

Early Experiences With The Hazards of Medical Use of X-Rays: 1896-1906 (Paper Completed*—SDP 205)

Barbara Marx

The purpose of the paper is to identify those means used by society to protect itself against possible undesirable effects of technological innovation and change. Research consisted largely of collecting case history material concerned with the history and problems of assessment and control of radiation hazards in the medical use of X-rays during the first decade of X-ray use. The focus is on some problems which are not resolved through current technology assessment control processes and which present dilemmas for policy-makers.

*The Control of Incinerator-Caused Air Pollution
in New York City: 1946-1965*
(Paper Completed* — SDP 202)

Richard Myrick and Barbara Spencer Marx

This paper represents a preliminary attempt to document in case-history form some of the social processes which underlie attempts to assess and control the undesirable effects of a specific technology. The author describes the changing attitudes and approaches in New York City toward air pollution caused by incinerators, showing the largely ineffective struggle to achieve control of the problem. The inter-play between different groups is depicted, emphasizing their opposing interests, and viewpoints, together with the kinds of conflicts which arose. Among the points made are the seemingly inevitable long "life-span" of such problems; the greatly fluctuating involvement of many of the groups, particularly of those representing the forces for change; and the more enduring strength of the vested interests and "status quo" forces in the struggle.

*Technology Assessment As Reflected In The
Evaluation of The Supersonic Transport*
(Paper Completed)

David Kroenlein

This paper uses the case-study approach to portray the process by which the Supersonic Transport has been assessed to date, tracing the major events and decisions in the SST's development. The complexity of the decision-making process in making the multiorganizational assessment is emphasized. This complexity is attributable to the great number of organizational participants, the fragmentation and contradictions of their roles, and the conflicting political, economic, and social values which have been asserted. The author discusses some of the resulting problems which have hampered the assessment. Diagrams are included of the decision-making and assessment process for each of the four stages of the SST's development.

*The Process of Setting Safety Standards In The Courts, Congress, And
Administrative Agencies*

(Paper Completed* - SDP 204)

Michael Wollan

The study, in analyzing government-established safety standards, considers the following questions: (1) who sets safety standards; (2) what factors are emphasized in the process; (3) how are the various factors balanced (and why); and (4) what problems are encountered in the standards-setting process.

These questions are approached through studies of levels of safety required by the common law and by the federal government in its safety standards for coal mines, flammable fabrics, new drugs, transportation of explosives, food additives, and pesticides.

Social Control of Technology: The Problem of Nuclear Energy

(Paper Completed)

John Snow

Using, as a case history, nuclear technology and the benefits and risks of its development, this paper discusses the role of potential legal liability for social "costs" of a technology as a mechanism of social control over the technology. The author takes into consideration the effects of the indemnity provision of the Price-Anderson Bill of 1957; traditional methods of social control of technology; and the conflicting public policy goals of both promoting and controlling nuclear technology in the public interest.

**The Role of Crusader-Triggered Controversy In Technology Assessment:
An Analysis of The Mass Media Response To *Silent Spring* And
Unsafe At Any Speed
(Paper Completed*—SDP 203)**

Dennis W. Brezina

Rachel Carson and Ralph Nader rocked the nation with their controversial accounts of the impact of technology on society. This paper examines some of the effects of *Silent Spring* and *Unsafe at Any Speed*, within the context of the growing concern over the profound effect technology is having on our democratic form of government. The books are not appraised in terms of the mass media response to them, and the changes they helped to produce. The utility of this approach is derived from the premise that interest groups and institutions tend to interpret social and even scientific knowledge on the basis of their own biases and self-interests.

**Community Broadcast Satellites For Instructional Television
In The Developing Countries
(Paper Completed)**

Penna L. Rao

Among all of the broadcast satellites' prospects in the coming years, none is more intriguing than the potential instructional role of the medium in the developing nations of Asia, Africa and South America. How can the broadcast satellites' unique capacity for informing and persuading be applied to the massive modernization problems of the underdeveloped world? Finding constructive answers to this question can have important implications for the political and social evolution of the new nations. Television may be a potentially revolutionary weapon in the battle against a staggering educational deficit. This study proposes to analyze the impacts and implications of introducing space technology into the existing educational system of the developing countries. A composite nation consisting of the characteristics of most of the developing nations which are potential users of the satellite technology is used as

a model. Emphasis on specific nations, however, is placed on Australia, Brazil, India, Indonesia, and the United Arab Republic.

The Processes of Technological Innovation
(Study in Progress)

Ellis Mottur

This project is devoted to enhancing understanding of the processes of technological innovation in society as an aid to policy makers. (Support is provided by the Office of Invention and Innovation, National Bureau of Standards, and by the U.S. Arms Control and Disarmament Agency.) The first phase of the project resulted in the January 1968 report to NBS entitled: "The Processes of Technological Innovation: A Conceptual Systems Model." The second phase, now underway, is devoted to development of detailed analytical techniques for applying the model to specific policy issues in technological innovation. The focus of the current effort is on comparative analysis of the processes of innovation as they occur in different sectors of the economy, in different industries, and under different environmental conditions.

Promising Approaches Toward Understanding Technology Transfer
(Paper Completed*—SDP 201)

James E. Mahoney

The importance of the innovation process, and of technology transfer as an important part of the process, has been widely recognized. It is argued that the resource, *technology*, must be managed in an efficient and effective fashion. This paper suggests that the present technology transfer programs should be expanded and particular attention focused on documenting their experience. The output of these activities and the output of research done by various disciplines must be systematically organized by a mechanism, such as a national society that would be able to enhance our understanding of this area, to excite the interest of potential users and scholars, and to suggest the logical courses for future policy decision.

Technology Transfer By People Transfer
(Study In Progress)

Clarence H. Danhof

By means of a brief questionnaire, addressed to scientific and technical people who have left NASA over a period of time, this study will seek to determine types and frequency of technology transfers occurring as a result of change in employers.

*Issues In Public Policy Relating To
The Advancement of Civilian Technology*
(Study In Progress)

Clarence Danhof

The growth of federally funded R and D has placed heavy emphasis on objectives that relate only indirectly, if at all, to the economic productivity of the nation's economy. At the same time, continuing progress in market-related productivity enhancing technological change is assumed to be forthcoming. Such continuing progress may well be essential to support the application of new technology that is not closely related to markets as in health, education, and the quality of the environment.

The changing emphasis within the mix of the nation's technological objectives calls for more comprehensive measures of change than that of real per capita income. Aside from that problem, it seems clear that provisions must be adequate to assure that continuing increases in real per capita income as now defined are forthcoming. This is necessary not only to meet national expectations but also as a source of support for the application of new technology that is not closely related to markets as in health and environmental quality control.

Against this background, the viability of the nation's private market-oriented R and D effort will be appraised in some detail for the purpose of identifying barriers to optimal effort and to make recommendations that would enhance the effectiveness of private organizations directing their efforts to market-oriented new product and process development.

Allocation of Resources For Science (Study in Progress)

Norman Kaplen

Funded by the National Science Foundation, this interdisciplinary study of science resources allocation focuses on some of the main decision points in the system within the federal government and the scientific community. In presenting major dynamic forces at work and an analysis of policy implications for the future, the study describes the organization for and processes through which decisions are made by major Federal agencies, a selected sample of universities and their scientists, as well as several interagency bodies. Emphasis is placed on a variety of "basic" programs which include: scientific specialty research programs scattered among many agencies as opposed to those identified primarily with a single agency; the coincidence (or not) of scientific specialties with agency mission; the coincidence (or not) of missions with scientific specialties (e.g., oceanography); big versus little science; etc. The underlying question is how do the "needs" of science perceived by individual scientists as well as by educational institutions become meshed with the complexities of federal agency missions, finally emerging in a somewhat coherent set of science policies and a national research effort?

Financial Variables Associated With R&D Expenditures By Industry (Paper Completed*—SDP 300)

Guy Black

This paper concludes that empirical investigations lend more support to the hypothesis that private R and D funding is associated with sales and profits than to the hypothesis that it is associated with investment, operating rate, or prices. Federal R and D funding, equity, and general business conditions are in an intermediate position. Tabulated results presented suggest that meaningful outcomes for hypotheses associated with financial variables are especially likely to be found in the primary ferrous metal, fabricated metal products, electrical and communication equipment, motor vehicle, and non-ferrous metal products industries.

R and D funding behavior in the chemical industries, rubber products and petroleum industries, may be relatively better explained by non-financial hypotheses.

*Some Effects of Federal Procurement of Research
And Development On Industry*

(Paper Completed*--SDP 302)

Guy Black

For many years, the federal government has been the principal source of research and development funding in American industry. The manner in which the R and D policies of industrial firms are affected by the federal presence is potentially too important to ignore, but it is not well understood. Research and development have become increasingly important as a vehicle for economic growth and for achievement of a broad range of social and political objectives. Industry is, of course, principally oriented toward economic objectives and the R and D performance of industry is one of the important factors in attainment of national economic objectives. In order to make an assessment of industrial R and D performance and its consequences for national objectives, this paper considers separately the quantity of resources directed into R and D, the efficiency with which they are used and the mix of objectives sought through R and D and the actions of the federal government affecting all of these.

*The Space Program And The Urban Problem: Case
Studies of The Components of National Consensus*

(Paper in Progress)

John Moeser

The nature of national consensus is analyzed in this study from two perspectives: (1) consensus on the democratic "rules of the game" and (2) consensus on specific policy. In both cases, because of an uninformed and passive public, consensus refers to basic agreement by those politically involved. By analyzing why the American efforts in space were sustained by a strong, cohesive and long-lasting consensus and why the question of urban poverty fails to

generate a comparable consensus, this paper suggests certain variables that seem to be essential prerequisites for any viable national consensus.

Science, Technology And The Political System

(Paper in Progress)

Edward Chaszar

Political alienation, political participation, and the creating of political consensus are interrelated concepts and processes and, in a broad sense, appear to be aspects of social integration. Consequently, although this paper is concerned mainly with alienation and participation, it might be broadened to include the process of creating consensus. Presently, it poses such questions as: to what extent do science and technology contribute to or alleviate the problem of political alienation? Is the political system structured and oriented toward handling problems of a highly industrialized and urbanized society? Concepts of political alienation and its measurements are considered as well as means for creating new consensus by enlisting the cooperation of science and technology in the process of social integration.

The Conversion of Intellectual Resources To The Tasks of Social Problem Analysis And Program Implementation

(Paper in Progress)

Louis H. Mayo

The paper on the Converter Function will focus on the process whereby intellectual resources are applied to the tasks of social problem analysis and program implementation. The challenge to more effective conversion processes can be posited simply by reference to the complex of unresolved problems of urban environmental quality in its various dimensions. The preliminary inquiry will review the response to this challenge in terms of institutional efforts (governmental, private, industry, the universities, etc.) and developing skills (systems analysis, automatic data processing, innovative managerial concepts, etc.). Representative efforts

at total problem analysis and program management will be examined for effectiveness by reference to the components of policy analysis (goal specification, context description, problem definition, invention of alternatives, model construction, outcome projection, impact prediction, and selection of recommended course of action) and program management (program planning, research and development, engineering prototype, experimental project phase, organization of operational program, resource funding for operations, modification as required). The final section will be devoted to an examination of the interaction between the total problem analysis approach and emerging value and institutional change, attitudes toward innovation and change, prospects of shift toward democratic or elite control, continuing role of the adversary process, new goal setting mechanisms, institutional restructuring for total problem analysis and program management.

The Social Science Debate: 1968
(Paper in Progress)

Dennis W. Brezina

The article documents and analyzes the national debate that occurred between January and July, 1968, over certain aspects of the question of legitimacy of sponsorship of social science research by the federal government and the matter of striking a balance in allocating resources between the social sciences and the natural sciences. The article focuses on the Fulbright hearings on "Defense Department Sponsored Foreign Affairs Research", the Senate appropriation hearings on the National Science Foundation Budget for FY 69 and recent developments relating to the proposed National Foundation for the Social Sciences and, in addition, draws on articles, editorials, speeches and other commentaries related to the debate that has ensued.

GROUP TWO: THE APPLICATION OF MODERN R AND D MANAGEMENT
CONCEPTS AND SKILLS TO THE PLANNING, PROGRAMMING
AND MANAGING OF SOCIAL PROGRAMS.

The Systems Approach And The Urban Dilemma
(Paper Completed*—SDP 101)

Robert G. Smith

This paper examines the concept and application of the systems approach as developed and utilized by the aerospace industry, the Rand Corporation, and the Department of Defense, and traces the evolution of this analytical and management innovation from its initial application by British and American scientists in World War II through the technological revolution of the 1950's and early 1960's to the present time.

From operations research to systems management, various aspects of the systems approach are defined, and examples are noted of the application of these techniques by public and private organizations to a variety of urban problem areas, such as "new town" development, air pollution, education, transportation, crime prevention, and city administration. The study also examines some of the organizational and procedural problems that might be encountered when the systems approach is introduced into an established administrative structure, outlines a series of recommendations and conclusions, and suggests follow-on studies.

The Decentralization of Urban Government: A Systems Approach
(Paper Completed*—SDP 102)

Guy Black

The City is a system in the non-technical sense that a system is an assemblage or combination of things forming a complex or unitary whole. Most cities are now complex organizations serving a multiplicity of functions. So far, systems analysis applied to cities has been partial in scope and generally oriented toward limited problem areas rather than the city as a whole. Given the analytical difficulties involved, it is not clear that this pattern can change very quickly

but what are the potentials of the systems approach in urban affairs? Are hardware-oriented aerospace systems approaches, dealing with elaborate, technological systems, directed at fairly limited purposes, for use by a strongly hierarchical organization, also suitable for systems of people motivated by complex, conflicting and undefinable purposes which are loosely coordinated by the diffused power embodied in constitutionally limited urban government? The purpose of this paper is to suggest systems approaches which appear to be promising. Particular attention is paid to the interaction of governmental organization with the systems approach.

*Systems Approaches To Multi-Variable
Socio-Economic Problems: An Appraisal*
(Paper Completed*--SDP 103)

Ernest M. Jones

This paper is an appraisal of the potential contribution of systems approaches to the most difficult problems of governmental decision-making, with special emphasis on problems not arising from space and defense concerns. The discussion identifies concepts and phases of a systems approach, the methods or techniques typically associated with it, its general orientations, and its advantages and disadvantages. An overall appraisal concludes the paper, suggesting that systems approaches, although they promise distinguished service to the policy functions of government, are not panaceas and should be carefully evaluated with criteria relevant to the public interests they serve.

Special Mechanisms For Policy And Decision Analysis
(Study in Progress)

James E. Mahoney

This study is aimed at enhancing our understanding of the unique mechanisms which are being used with increasing frequency by policy makers to perform a policy and decision analysis function. This approach takes a number of the organization forms which have been identified by several names, including workshops, task forces, ad hoc committees, etc. That which

differentiates this analysis mechanism from others is the inclusion of the following five factors in the group's structure and activities:

1. Problem is multi-disciplinary
2. Experts are contributors
3. Participants have a different organizational or functional basis
4. Limited life-time for the group is clearly established
5. Group task is to define the problem, explore alternative solutions, and make recommendations.

The initial phases of this study will concentrate on an analysis of a workshop sponsored jointly by the Massachusetts Institute of Technology and a number of industrial firms. This effort is entitled "Air Transportation and Its Interfaces: A Systems Approach." Personal interviews and questionnaires are being used to identify, document, and analyze selected variables encompassed within and resulting from the "Air Transportation Workshop." Following the refinement of the methodological approach it is planned that other *ad hoc* policy mechanisms will be explored in a somewhat similar fashion which will allow for the strengths and weaknesses of this approach to defining and developing alternative solutions to the complex questions of public policy.

*Alternative Evaluation Models
For An Experimental Humanities Regional Grant Program
(Study in Progress)*

Co-Investigators:
Guy Black and James E. Mahoney

On July 1, 1968, the National Endowment for the Humanities entered into a contract with the Program of Policy Studies in Science and Technology to fund a study running through August 1969 on the development and application of alternative evaluation models for an experimental humanities regional grant program. The primary purpose of the study is to provide a means for the National Endowment for the Humanities to evaluate experimental programs; to enable it to determine which of the experimental programs worked, and why, and to provide insights which can be used in future program implementation.

The creation of the National Endowment for the Humanities and its advisory group, the National Council on the Humanities, by the National Foundation on the Arts and the Humanities

Act of 1965, represents the first major step by the government of the United States to support research, planning, and programs in the humanities. The main thrust of the Endowment is to provide the American people with a better basis for making judgments of value in private and public life by improving access to the thoughts and activities of human beings in the past.

The Public Programs of the Endowment, of which this study is a part, seek to stimulate public interest in the humanities in order to help create in American public life a climate in which the human dimensions of problems can be more clearly seen, and more centrally considered. This is achieved through two major programs, one dealing with the development of the vehicles through which the humanities can be disseminated to the public, the other dealing with efforts to provide direct confrontation of the public with the humanities through regional activities, activities aimed at special segments of the public, and support for public conferences.

APPENDIX B

SEMINAR PARTICIPANTS

SEMINAR SERIES: THE IMPACT OF SCIENCE AND TECHNOLOGY ON HUMAN VALUES

October 2, 1967: "Impact of Computer Technology on Human Values"
December 4, 1967: "Impact of Radiation Technology on Human Values"

HAROLD P. GREEN, Chairman

The following participated in one or both meetings:

Allan, Frank B.	G. W. U., Professor of Anatomy and Coordinator of Teaching Aids, The Medical School
Ashton, Murray D.	United Kingdom Scientific Mission, The Embassy of Great Britain
Baum, Werner	Environmental Science Services Administration, Deputy Administrator
Billick, Irwin H.	Library of Congress, Legislative Reference Service
Black, Guy	G. W. U., Program of Policy Studies, Senior Staff Scientist
Boone, W. H.	U. S. House of Representatives, Committee on Science and Astronautics
Carey, William D.	Bureau of the Budget, Assistant Director
Colman, William G.	Advisory Commission on Intergovernmental Relations, Executive Director
Cooper, Joseph	American University, School of Government and Public Affairs; Howard University, School of Government
Cotter, Francis P.	Westinghouse Electric Corporation, Vice President
Danhof, Clarence H.	G. W. U., Program of Policy Studies, Senior Staff Scientist

Goodman, Leo	AFL-CIO, Industrial Union Department; Atomic Energy Technical Committee, Secretary
Gray, Irving	Georgetown University, Professor of Biology; Washington Colloquium on Science and Society, Director
Green, Harold P. (Chairman of Seminar)	G. W. U., Professor of Law
Kaplan, Norman	G. W. U., Program of Policy Studies, Senior Staff Scientist
Mahoney, James E.	G. W. U., Program of Policy Studies, Senior Staff Scientist
Margolin, Joseph B.	G. W. U., Program of Policy Studies, Senior Staff Scientist
Mayo, Louis H.	G. W. U., Vice President for Advanced Policy Studies; and Director, Program of Policy Studies
Michaelis, Michael	Arthur D. Little, Manager, D.C. Branch
Mondale, Clarence	G. W. U., Professor of American Civilization
Mottur, Ellis	G. W. U., Program of Policy Studies, Senior Staff Scientist
Multhauf, Robert P.	The Smithsonian Institution, Director, Museum of History and Technology
O'Brien, Brice	National Coal Association
Orlans, Harold	Brookings Institution, Senior Staff Member
Radius, Walter A.	NASA, Special Assistant to the Assistant Administrator for DOD and Interagency Affairs
Schubert, Leo	American University, Professor of Chemistry
Sherwin, Chalmers	Office of Science and Technology, Executive Office of the President
Strickland, Stephen	The President's Commission on White House Fellows, Associate Director
Trainor, William J.	Department of State, Special Assistant to the Director, Office of External Research
Weyl, F. Joachim	National Academy of Sciences, Special Assistant to the President

SEMINAR: SOCIAL CHANGE AND THE AMERICAN VALUE SYSTEM

November 15, 1967

CLARENCE MONDALE, Chairman

SEYMOUR M. LIPSET, Speaker

JOHN ROCHE, Discussant

(Published Proceedings Available)

Beckler, David	<i>Office of Science and Technology, Executive Office of the President</i>
Black, Guy	<i>G. W. U., Program of Policy Studies, Senior Staff Scientist</i>
Brown, Robert G.	<i>G. W. U., Professor of Sociology</i>
Carey, William	<i>Bureau of the Budget, Assistant Director</i>
Danhof, Clarence	<i>G. W. U., Program of Policy Studies, Senior Staff Scientist</i>
David, Henry	<i>National Academy of Science — National Research Council, Executive Secretary of the Division of Behavioral Sciences</i>
Elliott, Lloyd H.	<i>President, The George Washington University</i>
Glick, Nathan	<i>United States Information Agency, Senior Editor</i>
Halpern, Irwin P.	<i>National Aeronautics and Space Administration, Director, Policy Analysis Staff</i>
Hanessian, John	<i>G. W. U., Program of Policy Studies, Senior Staff Scientist</i>
Kaplan, Barbara H.	<i>G. W. U., Department of Sociology</i>
Land, Robert H.	<i>Library of Congress, Chief, General Reference and Bibliography</i>
LeBlanc, Hugh	<i>G. W. U. Professor of Political Science</i>
Lipset, Seymour M. (Speaker)	<i>Harvard University, Center for International Affairs</i>
Margolin, Joseph B.	<i>G. W. U., Program of Policy Studies, Senior Staff Scientist</i>
Mayo, Louis H.	<i>G. W. U., Vice President for Advanced Policy Studies; and Director, Program of Policy Studies</i>
Mondale, Clarence (Chairman of Seminar)	<i>G. W. U., Professor of American Civilization</i>

Mottur, Ellis	G. W. U., Program of Policy Studies, Senior Staff Scientist
Orlans, Harold	The Brookings Institution, Senior Staff Member
Riecken, Henry W.	Vice President, Social Science Research Council
Roche, John P. (Discussant)	Special Consultant to President Johnson,
Schlagel, R. H.	G. W. U., Professor of Philosophy
Scribner, Duane	Office of Senator Walter Mondale, Administrative Assistant
Shapley, Willis H.	National Aeronautics and Space Administration, Associate Deputy Administrator
Smith, Robert G.	G. W. U., Program of Policy Studies, Senior Staff Scientist
Washburn, Wilcomb E.	Smithsonian Institution, Chairman, Department of American Studies
Olson, Mancur	Department of Health, Education, and Welfare; Deputy Assistant Secretary for Social Indicators
Wright, Charles R.	National Science Foundation, Department of Sociology and Social Psychology
Young, Michael	Council of Great Britain, Chairman, Social Science Research

SEMINAR SERIES: SYSTEMS AND CYBERNETICS CONCEPTS
IN UNIVERSITY CURRICULA

RICHARD F. Ericson, Series Chairman
Department of Business Administration, G. W. U.

Speakers:

February 28, 1968—DR. KARL DEUTSCH, Professor of Government
Harvard University

March 22, 1968—DR. GEORGE KOZMETSKY, Dean, School of Business
Administration, University of Texas

April 28, 1968—DR. KENNETH BOULDING, Institute of Behavioral Sciences
University of Colorado

The following G. W. U. Faculty Members participated in one or all of the Meetings:

Abell, David	Commission on Undergraduate Education in the Biological Sciences
Allen, George R.	Department of Business Administration
Allen, Richard C.	Law, Psychiatry and Criminology
Allensworth, Don	Department of Political Science
Baker, Stanley	Department of Biology
Baker, Robert E.	School of Education
Banks, Arthur S.	Department of Political Science
Bari, Ruth	Department of Mathematics
Barrett, Richard A.	Department of Business Administration
Black, Guy	Program of Policy Studies, (Economics)
Bradley, Charles	Department of Economics
Bright, Harold F.	Vice President for Academic Affairs
Cisin, Ira H.	Social Research Group, Director
Cloutier, Raymond	Department of Public Administration
Cohn, Victor H.	Department of Pharmacology
Coleman, Roy M.	Department of Psychiatry
Conner, George F.	Department of Business Administration
Crafton, Paul A.	Department of Engineering Administration
Dailey, John T.	Education Research Project
Danhof, Clarence H.	Program of Policy Studies, (Economics)
DeMoody, Harold C.	School of Engineering
Dockeray, James C.	School of Government and Business Administration, Dean
Douglas, Donald S.	Department of Biology
Eisenberg, Marvin	School of Engineering and Applied Science
Fowler, Richard F.	Rehabilitation Center
Gibbs, Frederick H.	Health Care Administration
Gibson, Samuel	Public Health Service
Gintzig, Leon	Health Care Administration
Glennie, John R.	Department of Business Administration
Green, Harold P.	Law, Science and Technology
Griffith, William	Department of Philosophy
Grub, Phillip	Department of Business Administration
Gyorgy, Andrew	Institute for Sino-Soviet Studies

Hansen, Ira B.
 Henney, Dagmar
 Ireland, Clifford
 Jessup, Joe L.
 Jordan, Robert S.
 Kaplan, Norman
 Katz, L. William
 Kayton, Irving
 Kent, Stephen G.
 Kirsch, Arthur D.
 Knetsch, Jack L.
 Kopstein, Felix
 Kramer, Robert
 Levitan, Sar A.
 Lippitt, Gordon
 London, Kurt
 Lyons, John D.
 Magruder, Eugene R.
 Mahoney, James E.
 Manne, Henry G.
 Marlow, William H.
 Mason, Martin A.
 Mayo, Louis H.

 McClelland, William A.
 Meltzer, Arnold C.
 Montgomery, Jean
 Mosel, James
 Mottur, Ellis
 Nash, Ralph C.
 Nimer, Benjamin
 Page, Henry R.
 Phillips, Ewing L.
 Pinkus, Charles E.
 Rice, Charles E.
 Rizzo, John R.
 Roman, Daniel D.
 Root, Blake S.

Department of Biology
 Department of Mathematics
 Department of Statistics
 Department of Business Administration
 Department of Political Science
 Program of Policy Studies, (Sociology)
 Health Care Administration
 Computer-in-Law Institute
 Department of Pathology
 Department of Statistics
 Center for Natural Resources Policy Studies
 HumRRO
 National Law Center, Dean of the Law School
 Department of Economics
 Behavioral Science
 Institute for Sino-Soviet Studies
 HumRRO
 College of General Studies
 Program of Policy Studies
 National Law Center
 Navy Logistics Center
 School of Engineering and Applied Science
 Vice President for Advanced Policy Studies, and
 Director, Program of Policy Studies
 HumRRO
 School of Engineering and Applied Science
 Center for Natural Resources Policy Studies
 Department of Psychology
 Program of Policy Studies
 National Law Center
 Department of Political Science
 Department of Business Administration
 Department of Psychology, Psychological Clinic
 Department of Engineering Administration
 Department of Psychology
 Behavioral Science
 Department of Management
 School of Education

Rothrock, Addison M.
 Rubin, Joan
 Sawitz, Peter
 Schlagel, Richard H.
 Seidel, Robert J.
 Shane, Presson
 Shilling, Charles W.
 Sinick, Daniel
 Smith, Herbert E.
 Smith, Joseph B.
 Smith, Lowell C.
 Smith, Robert G.
 Solomon, Henry
 St. Cyr, Carol R.
 Stevens, Edwin L.
 Stewart, Charles T.
 Taam, Choy Tak
 Thomas, Raymond E.
 Tidball, Charles S.
 Trinkl, Frank H.
 Tropea, Joseph L.
 Walther, Carl H.
 Walther, Regis
 Wood, Reuben E.

School of Engineering and Applied Science
Department of Anthropology
Department of Electrical Engineering
Department of Philosophy
HumRRO
Department of Engineering Administration
Biological Science Communication Project
School of Education
School of Engineering and Applied Science
School of Engineering and Applied Science
Department of Business and Public Administration
Program of Policy Studies
Department of Economics
School of Education
Department of Speech
Department of Economics
Department of Mathematics
Department of Statistics, Computer Center
Department of Physiology
State and Local Finances Project
Department of Sociology
Vice President for Academic Affairs
Social Research Group
Department of Chemistry

SEMINAR SERIES: FEDERAL CONTRIBUTIONS TO MANAGEMENT

DAVID S. BROWN, Director of Series
Professor of Public Administration, G. W. U.

April 18, 1968

"Integration and Systematization of Planning, Programming, and Budgeting"
(First in a series of 9 seminars)

Paper presented by HARRY PAGE
Department of Business Administration, G.W.U.

Participants:

Black, Guy	G. W. U., Program of Policy Studies, Senior Staff Scientist
Carter, Sherman F.	Department of the Army, Chief, Cost Analysis Team
Chitwood, Stephen	Industrial College of the Armed Forces
Danhof, Clarence H.	G. W. U., Program of Policy Studies, Senior Staff Scientist
Finley, James J.	Environmental Science Services Administration, Chief, Management Analysis Branch
Held, Walter G.	Brookings Institution, Director Business Programs
Juncker, Carl	G. W. U., Navy Graduate Finance Management Program
Kendrick, John	G. W. U., Professor of Economics
Kotz, Arnold	Stanford Research Institute, Senior Economist
March, Michael	Bureau of the Budget, Assistant Director, Resources Planning Staff
McConville, William	G. W. U., Department of Public Administration
Mogin, Bert	Department of Health, Education, and Welfare; Program Analysis Officer, Office of Education

Mayo, Louis H.	G. W. U., Vice President, Advanced Policy Studies; and Director, Program of Policy Studies
Posner, Benjamin	United States Information Agency, Assistant Director for Administration
Rosenthal, Irving	Agency for International Development, Program Officer
Specter, Manes	Veterans Administration, Member, Administrator's Advisory Council
Stromsem, Karl	G. W. U., Chairman, Department of Public Administration
Temple, Ralph R.	G. W. U., Department of Public Administration
Uscher, Arthur	Office of Secretary of Defense, Program Analyst

April 25, 1968

"Evolution of the Management Audit as a Means of Appraisal"

(Second in a series of 9 seminars)

Paper presented by CECIL E. GOODE
Department of Public Administration, G.W.U.

Participants:

Acree, Vernon	Internal Revenue Service, Commissioner, Inspection Division
Berg, Clifford	Commission on Marine Science, Resources, and Engineering
Bergman, Henry	Veterans Administration, Acting Director, Management & Appraisal Staff
Brown, Fred R.	American University Adjunct Professor of Public Administration
Campfield, William L.	General Accounting Office, Assistant Director, Policy and Special Studies
Danhof, Clarence H.	G. W. U., Program of Policy Studies, Senior Staff Scientist

Deckard, Edwin	<i>Bureau of the Budget, Staff Member, Management Systems Branch</i>
Finley, James J.	<i>Environmental Science Services Administration, Chief, Management Analysis Branch</i>
Fox, George	<i>Forest Service, Assistant Chief</i>
Freeman, Sydney	<i>Bureau of the Budget, Staff Member, Management Systems Branch</i>
Lewis, E. J. B.	<i>G. W. U., Department of Government and Business Administration</i>
Mastro, Anthony J.	<i>G. W. U., Department of Government and Business Administration</i>
Mayo, Louis H.	<i>G. W. U., Vice President for Advanced Policy Studies; and Director, Program of Policy Studies</i>
Paik, Chei-Min	<i>G. W. U., Department of Accounting</i>
Paine, Frank	<i>University of Maryland, Department of Business Administration</i>
Powell, Arthur	<i>National Aeronautics and Space Administration, Manager, Finance Manpower & Construction Audits</i>
Smith, Lowell C.	<i>G. W. U., Assistant to the Dean, School of Government and Business Administration</i>
Sommers, Waldo	<i>G. W. U., Department of Public Administration</i>
Stringer, R. C.	<i>Bureau of Finance Administration, Director, Management Systems Division</i>
Stromsem, Karl E.	<i>G. W. U., Chairman, Department of Public Administration</i>
Temple, Ralph R.	<i>G. W. U., Department of Public Administration</i>
Yanak, Albert	<i>Bureau of the Budget, Budget Examiner</i>

May 2, 1968
"Involving Clients and the Public in Federal Administration"
(Third in a series of 9 seminars)

Paper presented by MANES SPECTER
Member, Administrator's Advisory Council,
Veterans Administration

Participants:

Allensworth, Donald	G. W. U., Department of Political Science
Berg, Clifford	Commission on Marine Science, Resources, and Engineering
Bingman, Charles F.	National Aeronautics and Space Administration, Deputy Director, Organization and Management Planning Division
Black, Guy	G. W. U., Program of Policy Studies, Senior Staff Scientist
Cosgrove, Thomas	Office of Economic Opportunity, Acting Assistant Director for National Councils and Organizations
Lanhof, Clarence H.	G. W. U., Program of Policy Studies, Senior Staff Scientist
Francis, Thomas	Upper Great Lakes Regional Commission, Federal Co-Chairman
Hanna, Jane	Office of Civil Defense, Associate Director
Intermaggio, Joseph	G. W. U., Department of Urban and Regional Planning
Jennette, Joe Ellen	Department of Health, Education, and Welfare, Program Analyst, Administration on Aging
Kaplan, Norman	G. W. U., Program of Policy Studies, Senior Staff Scientist
Kendrick, John	G. W. U., Professor of Economics
Lamont, John	U. S. Department of Justice, Attorney in Anti-Trust Division
LeBlanc, Hugh	G. W. U., Professor of Political Science

Mayo, Louis H.	G. W. U., Vice President for Advanced Policy Studies; and Director, Program of Policy Studies
Mitchell, James	Brookings Institution, Director, Advanced Study Program
Patterson, Bradley	National Advisory Council on Economic Opportunity, Executive Director
Phillips, David	Department of Health, Education, and Welfare; Program Analyst, State Agency Cooperation Division
Purcell, Ralph	G. W. U., Professor of Political Science
Randall, Raymond	University of Oklahoma
Robertson, Joseph	Department of Agriculture, Assistant Secretary for Administration
Sprague, Lloyd D.	Defense Intelligence Agency; Management Operations Office
Stromsem, Karl E.	G. W. U., Chairman, Department of Public Administration
Sundquist, James	Brookings Institution
Timbers, Edwin	G. W. U., Director, Navy Graduate Finance Management Program

May 8, 1968

"Communications and Federal Management: Some Current Highlights"

(Fourth in a series of 9 seminars)

Paper presented by FRED R. BROWN
Adjunct Professor of Public Administration
American University

Participants:

Allen, George	G. W. U., Department of Government and Business Administration
Barrett, Richard	G. W. U., Department of Government and Business Administration

Bartholomew, Lloyd	G. W. U., Health Care Administration
Brisbin, Albert	Internal Revenue Service, Assistant Commissioner for Planning and Research
Clewlöw, Carl	Department of Defense, Assistant Secretary of Defense for Civilian Policy
Coughlan, John	Certified Public Accountant
Eastin, Roy	G. W. U., Department of Government and Business Administration
Fazar, William	Bureau of the Budget, Member, Resources Planning Staff
Guthrie, Chester	National Archives, Acting Assistant Archivist for Records Management
Kator, Irving	Civil Service Commission, Assistant to the Chairman
Mayo, Louis H.	G. W. U., Vice President, Director, Program of Policy Studies
Page, Harry	G. W. U., Department of Government and Business Administration
Rapp, William	Department of Commerce, Director, Office of Management and Organizations
Rizzo, John	G. W. U., Department of Government and Business Administration
Sommers, Waldo	G. W. U., Department of Public Administration
Stephens, James	Department of Labor, Director, Advanced Education in Manpower and Human Resources
Waldrip, John	G. W. U., Department of Government and Business Administration
Weatherbee, Artemus	Treasury Department, Assistant Secretary of Treasury for Administration

May 16, 1968
"Federal Experience with Productivity Measurement"
(Fifth in a series of 9 seminars)

Paper presented by JOHN KENDRICK
Department of Economics, G. W. U.

Participants:

Biglin, Francis	Post Office Department, Special Assistant to the Postmaster General
Caplan, Benjamin	Treasury Department, Director, Planning and Program Evaluation
Carlson, Jack	Bureau of the Budget, Director, Program Planning Evaluation Staff
Carlstedt, Clifford	Civil Aeronautics Board, Director, Office of Management Analysis
Danhof, Clarence H.	G. W. U., Program of Policy Studies
Ericson, Richard F.	G. W. U., Program of Policy Studies
Guthrie, Chester	National Archives, Acting Assistant Archivist for Records Management
Jebens, Arthur	Department of the Interior, Director, Management Research
Johnson, Robert E.	Department of Defense, Deputy for Program Analysis
Katz, William	G. W. U., Health Care Administration
Krieger, Joseph L.	Department of the Air Force, Manpower Control Officer
March, Michael	Bureau of the Budget, Assistant Director, Resources Planning Staff
Mayo, Louis H.	G. W. U., Vice President for Advanced Policy Studies, Director, Program of Policy Studies
Osborn, Gordon	Bureau of the Budget, Chief, Cost Analysis and Reduction Staff
Paik, Chei-Min	G. W. U., Assistant Professor of Accounting

Preston, Edward	<i>Internal Revenue Service, Assistant Commissioner for Administration</i>
Provan, John	<i>Federal Highway Administration, Acting Director of Administration</i>
Rapp, William	<i>Department of Commerce, Director, Office of Manpower & Organizations</i>
Roberts, Elliott	<i>Department of Housing and Urban Development, Director, Federal Relations Staff</i>
Smith, Herbert E.	<i>G. W. U., Chairman, Department of Engineering Administration</i>
Stromsem, Karl E.	<i>G. W. U., Chairman, Department of Public Administration</i>
Terleckyj, Nestor	<i>National Planning Association, Project Director, National Priorities Research</i>
Timoshenko, Peter	<i>Veterans Administration, Director, Management Systems Service</i>
Tisone, Albert	<i>Department of Defense, Deputy Comptroller, Defense Supply Agency</i>
Wells, William G.	<i>Office of Congressman Joseph E. Karth, Technical Assistant</i>

May 22, 1968
 "Value Engineering: Its Development and Application"
 (Sixth in a series of 9 seminars)

Paper presented by GEORGE ALLEN
 Department of Business Administration, G.W.U.

Participants:

Beardman, Ed	<i>Department of the Navy, Chief, Naval Materiel</i>
Chitwood, Stephen	<i>Industrial College of the Armed Forces</i>
Dell'Isola, Al J.	<i>Louis C. Kingscott Associates, Director, Value Engineering Division</i>
Dobrow, Paul	<i>Department of the Army, Chief, Value Engineering</i>

Dockeray, James C.	G. W. U., School of Government and Business Administration, Dean
Gintzig, Leon	G. W. U., Department of Health Care Administration
Horrworth, Richard	Leadership Resources, Inc., Associate
Jebens, Arthur	Department of the Interior, Director, Management Research
Johnson, Kenneth	G. W. U., Department of Engineering Administration
Kempter, R. H.	Department of Defense, Office of the Assistant Secretary/Value Engineering
Krieger, Joseph L.	Department of the Air Force, Management Control Officer
Mayo, Louis H.	G. W. U., Vice President for Advanced Policy Studies; and Director, Program of Policy Studies
Page, Harry	G. W. U., Department of Business Administration
Rizzo, John	G. W. U., Department of Business Administration
Roderick, Morgan D.	Department of the Navy, Head, Value Engineering Branch
Roman, Daniel	G. W. U., Department of Business Administration
Ross, Richard	G. W. U., College of General Studies, Director, Conferences, Seminars, and Institutes
Rush, Charles	Department of the Air Force, Deputy Director of Production, Value Engineering Division
Suter, Larry	Department of the Navy, Director, Value Engineering, Naval Air Systems Command
Shane, Presson	G. W. U., Department of Engineering Administration
Smith, Lowell C.	G. W. U. Assistant to the Dean, School of Government and Business Administration
Timbers, Edwin	G. W. U., Director, Navy Graduate Financial Management Program
Toomey, John	Value Engineering Company, President
Ullman, Charles A.	Department of Defense, Research Psychologist, Office of the Assistant Secretary/Manpower & Reserve Affairs

May 29, 1968
"The Uses of Simulation in Management"
(Seventh in a series of 9 seminars)

Paper presented by STEPHEN CHITWOOD
Industrial College of the Armed Forces

Participants:

Allen, George	G. W. U., Professor of Business Administration
Bakke, Oscar	Federal Aviation Agency, Associate Administrator for Planning
Ball, Howard	Department of Housing and Urban Development
Bingman, Charles F.	National Aeronautics and Space Administration, Deputy Director, Organizational & Management Planning Division
Bright, Harold F.	G. W. U., Vice President for Academic Affairs
Brotsky, Nathan	Office, Assistant Secretary of Defense (Manpower), Directorate for Management Training
Chipman, William C.	Department of the Army, Deputy Assistant Director for Plans and Operations
Cloutier, Daniel R.	G. W. U., Department of Public Administration
Coughlan, John	Certified Public Accountant
Einhorn, Henry	Department of Commerce, Economist
Guthrie, Chester	National Archives, Acting Assistant Archivist for Records Management
Hanessian, John	G. W. U., Program of Policy Studies, Senior Staff Scientist
Humphrey, Thomas	Department of Transportation
Intermaggio, Joseph	G. W. U., Department of Urban and Regional Planning
Jebens, Arthur	Department of the Interior, Director, Management Research
Katz, William	G. W. U., Department of Health Care Administration

Krieger, Joseph L.	Department of the Air Force, Management Control Officer
Mayo, Louis H.	G. W. U., Vice President, Advanced Policy Studies; and Director, Program of Policy Studies
Paik, Chel-Min	G. W. U., Assistant Professor of Accounting
Porteus, Evan	Department of Defense, Office of the Assistant Secretary for Mobility Forces
Raynsford, Robert	Department of Commerce, Economist
Rothman, Aaron	Federal Aviation Administration
Triner, Edwin	Serendipity Associates, Research Project Director
Waldrip, Jack	G. W. U., Department of Business Administration
Winslow, Alan	G. W. U., Department of Urban and Regional Planning
Wofsey, M. M.	G. W. U., Department of Business Administration

June 6, 1968

"Economics and Its Uses in Government"

(Eighth in a series of 9 seminars)

Paper presented by GUY BLACK
Program of Policy Studies, G.W.U.

Participants:

Alterman, Jack	Bureau of Labor Statistics, Chief, Economic Growth Studies
Carlson, Jack	Bureau of the Budget, Director, Program Planning Evaluation Staff
Cloutier, Daniel R.	G. W. U., Department of Public Administration
Danhof, Clarence H.	G. W. U., Program of Policy Studies, Senior Staff Scientist
Einhorn, Henry	Department of Commerce, Office of Programs Analyses and Economic Research

Farioletti, Marcus	<i>Internal Revenue Service, Director of Planning and Analysis Division</i>
Hattery, Lowell H.	<i>American University, School of Government and Technology</i>
Jebens, Arthur	<i>Department of Interior, Director of Management Research</i>
Johnson, Robert E.	<i>Department of Defense, Office of the Assistant Secretary of the Air Force for Manpower and Reserve Affairs</i>
Kaplan, Norman	<i>G. W. U., Program of Policy Studies, Senior Staff Scientist</i>
Katz, William	<i>G. W. U., Health Care Administration</i>
Kendrick, John	<i>G. W. U., Department of Economics</i>
Krieger, Joseph L.	<i>Department of the Air Force, Directorate of Production and Planning</i>
Levitan, Sar	<i>G. W. U., Center for Manpower Policy Studies</i>
Marimont, Martin L.	<i>Department of Commerce, Chief, National Economics Division</i>
Mayo, Louis H.	<i>G. W. U., Vice President for Advanced Policy Studies; and Director, Program of Policy Studies</i>
Mushkin, Selma	<i>G. W. U., State-Local Finance Project</i>
Paik, Chei-Min	<i>G. W. U., Assistant Professor of Accounting</i>
Radius, Walter A.	<i>National Aeronautics and Space Administration, Special Assistant to the Assistant Administrator for DOD and Inter-agency Affairs</i>
Sanchez, Luis	<i>President, Resource Manpower Corporation</i>
Tisone, Albert	<i>Defense Supply Agency, Deputy Comptroller</i>
Upchurch, Louis	<i>Department of Agriculture, Administrator, Economics Research Service</i>
Wyner, Henry D.	<i>Department of State, Arms Control and Disarmament Agency</i>

June 13, 1968
"Federal Contributions to Procurement Management"
(Ninth in a series of 9 seminars)

Paper presented by DANIEL ROMAN
Professor of Management, G.W.U.

Participants:

Abersfeller, H. A.	General Services Administration, Commissioner, Federal Supply Service
Bothmer, Clyde	Small Business Administration, Deputy Associate Administrator for Procurement and Management Assistance
Cloutier, Daniel R.	G. W. U., Associate Professor of Public Administration
Dahlstrom, Warren	Department of the Interior, Chief, Office of Management Research
Danhof, Clarence	G. W. U., Program of Policy Studies, Senior Staff Scientist
Dockeray, J. C.	G. W. U., Dean, School of Government and Business Administration
Gintzig, Leon	G. W. U., Professor of Health Care Administration
Holden, John B.	Bureau of the Budget, Assistant Director, General Government Management Division
Lyons, Robert D.	Office of Assistant Secretary of Defense (Installations and Logistics), Director for Procurement Management
Kaplan, Norman	G. W. U., Program of Policy Studies, Senior Staff Scientist
Krieger, Joseph L.	Department of the Air Force, Management Control Officer, Directorate of Production and Planning
Mahoney, James E.	G. W. U., Program of Policy Studies, Senior Staff Scientist

Marston, Lance	<i>National Aeronautics and Space Administration, Assistant to the Assistant Administrator for Industry Affairs</i>
Mayo, Louis H.	<i>G. W. U., Vice President for Advanced Policy Studies; and Director, Program of Policy Studies</i>
Mullins, George G.	<i>Office of the Secretary of Defense, Director, Contract Support Services</i>
Nash, Ralph C., Jr.	<i>G. W. U., National Law Center, Associate Dean for Graduate Studies, Research, and Projects</i>
Pagano, Leroy	<i>American University, Teaching Fellow, School of Business</i>
Paik, Chei-Min	<i>G. W. U., Assistant Professor of Accounting</i>
Prichard, Walter M.	<i>Atlantic Research Division of Susquehanna Corporation, Director, Manufacturing Department</i>
Risso, William P.	<i>National Aeronautics and Space Administration, Assistant Director of Procurement</i>
Ross, Richard H.	<i>G. W. U., College of General Studies, Director, Conferences, Seminars and Institutes</i>
Rothman, Sam	<i>Naval Materiel Command, Deputy Director, Exploratory Development</i>
Smith, Lowell C.	<i>G. W. U., Assistant to the Dean, School of Government and Business Administration</i>
Tisone, Albert	<i>Defense Supply Agency, Deputy Comptroller</i>
Wessells, Rex G.	<i>District of Columbia Government, Procurement Officer</i>
Yoshpe, Harry B.	<i>Industrial College of the Armed Forces, Chief, Textbook Development Group</i>

THE URBAN CHALLENGE: THE MANAGEMENT AND INSTITUTIONAL RESPONSE
AIRLIE HOUSE

Warrenton, Virginia

June 19-21, 1968

BERNARD A. SCHRIEVER, Chairman
ROBERT G. SMITH, Conference Coordinator

Participants:

Amara, Roy C.	Stanford Research Institute, Executive Director, Systems Sciences
Anderson, Charles A.	Stanford Research Institute, President
Arnow, Philip	Department of Labor, Director, Office of Planning & Research
Barber, Arthur W. (Co-Chairman)	Institute for Politics and Planning, President
Bebout, John	Rutgers University, Director, Urban Studies Center
Beckwith, W. C.	Aerojet-General Corporation, Technical Specialist
Bell, Harold K.	Columbia University, Director, Urban Action and Experimentation Program
Bell, Robert	National Aeronautics and Space Administration, Special Assistant, Office of Technology Utilization
Bendaniel, David	General Electric Company, Advanced Programs in Research and Development
Beresford, John C.	Department of Commerce, Bureau of the Census
Besuden, William	International City Managers Association, Assistant Director
Blumstein, Alfred	Institute for Defense Analyses, Office of Urban Research
Branton, Lucille	
Branton, Wiley	United Planning Organization, Executive Director
Breen, Leonard S.	Purdue University, Head, Department of Sociology
Brown, Ben J.	B. A. Schriever Associates, Inc., Junior Associate
Brown, C. Harold	University of Delaware, Acting Director, Division of Urban Planning
Brown, James M.	G. W. U., Professor of Law

Burrell, Frederick S.	<i>General Electric Company, Manager, Housing and Ocean Systems</i>
Caffrey, John	<i>American Council on Education, Director, Commission on Administrative Affairs</i>
Callan, Patrick	<i>General Electric Company, Manager, Urban Technology Program</i>
Canavan, Richard	<i>National Association of Home Builders, Staff Vice President</i>
Carlisle, David	<i>Management Consultant</i>
Carter, Launor	<i>The System Development Corporation, Senior Vice President</i>
Chartrand, Robert L.	<i>Library of Congress, Information Sciences Specialist</i>
Christakis, Alexander N.	<i>Doxiadis System Development Center</i>
Coggan, B. F.	<i>North American Rockwell Corporation, Vice President for Marketing</i>
Cole, Albert M.	<i>Reynolds Metals Development Corporation, Director</i>
Crago, Robert P.	<i>International Business Machines, Director of Civil Programs</i>
Danaceau, Paul	<i>U. S. Senate Committee on Government Operations</i>
Darney, Arsen	<i>Mid-West Research Institute, Industrial Economist</i>
Dineen, James F.	<i>Raytheon Company, Special Counsel</i>
Dixon, John	<i>Xerox Corporation, Manager, Corporate Communications</i>
Donaghue, Hugh P.	<i>Control Data Corporation, Assistant to the President</i>
Dordick, Herbert	<i>The System Development Corporation, Staff Scientist</i>
Dorr, Russell	<i>The Chase Manhattan Bank, Washington Representative</i>
Downes, Harold J.	<i>North American Rockwell Corporation, Vice President for Special Marketing Development</i>
Doxiadis, Constantinos	<i>Doxiadis Associates, President</i>
Dyer, Lloyd E.	<i>Chesapeake and Potomac Telephone Companies, Vice President for Personnel</i>
Eaton, William	<i>General Electric Company, General Manager, Information Service Department</i>

Elliott, Lloyd H.	The George Washington University, President
Field, John	U. S. Conference of Mayors, Director of Community Relations Service
Feuers, Michael M. (Co-Chairman)	The System Development Corporation, Research and Special Projects Directorate
Firstman, Sidney I.	Planning Research Corporation, Inter-Corporate Director, Urban Programs
Fitzgerald, Thomas R.	Georgetown University, Vice President for Academic Affairs
Franklin, Herbert	National Urban Coalition
Friedman, Marvin	AFL-CIO, Assistant Director of Research
Garn, Harvey A.	The Urban Institute, Senior Project Officer
Gibson, O. James	The Office of the Governor of California, Secretary for Planning and Research
Gilliland, James P.	H. H. Robertson Company, District Manager
Golden, John	Stanford Research Institute, Director, Washington Office
Greene, Lawrence P.	North American Rockwell Corporation, Assistant to the President
Gregory, William	Managing Editor, Aviation Week and Space Technology
Gritz, Alex	Executive Office of the President, Planning Officer, Office of Emergency Planning
Grubb, Clarence A.	Stanford Research Institute, Director, Public Works and Housing
Halpern, Irwin	National Aeronautics and Space Administration, Director, Policy Analysis Staff
Hanessian, John	G. W. U., Program of Policy Studies, and Department of Political Science
Hargraves, Phillip	General Electric Company
Harris, John	The System Development Corporation, Staff Scientist
Hearle, Edward	Booz-Allen and Hamilton, Inc., Vice President
Hines, William	North American Rockwell Corporation, Vice President, and Manager, Washington Office— Rocketdyne Division
Hoeber, Frances P.	RAND Corporation

Howes, Robert	Catholic University of America, Chairman, City and Regional Planning
Hutchinson, Edmond	Research Analysis Corporation, Chairman, Exploration Development Group
Intermaggio, Joseph L.	G. W. U., Adjunct Professor of Urban Planning
Jacobson, Elden	Washington Center for Metropolitan Studies, Senior Associate
Jeffery, David	G. W. U., Editor, G. W. Magazine
Jones, Robert G.	G. W. U., Professor of Religion
Jordan, Fred	Department of Housing and Urban Development, Model Cities Administration
Keane, Mark E.	International City Managers' Association, Executive Director
Kelley, Eamon	Department of Commerce, Consultant, Economic Development Administration
Kirby, Robert L.	The MITRE Corporation, Technical Director
Kummerfeld, Donald	The Urban Institute, Assistant to the President
Kunen, James L.	The Eugene and Agnes Meyer Foundation, Executive Vice President
Lawson, Marjorie (Judge)	Model Inner City Community Organization, General Counsel
Lawwill, Stanley	Analytic Services, Inc., President
Leavitt, Helen	Author
Leavitt, William	Air Force and Space Digest, Senior Editor
Lederman, Leonard L.	Battelle Memorial Institute, Fellow
Leedy, Russell	Catholic University of America, Professor of Social Services
Lewis, Arnold C.	Executive Office of the President, Planning Officer, Office of Emergency Planning
Lewis, Joseph H.	The Urban Institute, Senior Project Officer
Levin, Arthur J.	Potomac Institute, Staff Director
Levin, Ida D. (Mrs.)	Maryland League of Women Voters, State Housing Chairman
Levine, George	B. A. Schriever Associates, Inc., Professional Engineer
Lilley, Leonard W.	B. A. Schriever Associates, Inc., Senior Associate
Loomis, Don	Business Week, Staff Writer

Lowry, C. Ronald	Aerospace Industries Association of America, Director of Air Commerce
Luke, Sherrill D.	The District of Columbia Government, Director of Program Development
Mabuchi, Kenneth	Institute for Politics and Planning, Associate
Magness, William H.	Gulf-Reston Corporation, President
Malakoff, Grete (Mrs.)	Urban Specialist
Martin, Robert	Howard University, Professor of Government
Mayo, Louis H.	G. W. U., Vice President for Advanced Policy
McAuliffe, Robert F.	Department of Housing and Urban Development,
(Co-Chairman)	Director, Office of Business Participation
McGrath, Joseph B.	National Association of Home Builders, Legislative Counsel
Michaelis, Michael	Arthur D. Little, Inc., Manager, Washington Office
Mika, Paul J.	G. W. U., Chairman, Department of Geography
Milligan, Walter	Systems Research Corporation, Systems Engineer
Moore, John R.	North American Rockwell Corporation, President, Aerospace and Systems Group
Nellis, Glenn	U. S. House of Representatives, Legislative Assistant to Congressman Leonard Farbstein
Nixon, John H.	Ralph M. Parsons Company, Economist
Oyster, D. E.	North American Rockwell Corporation, Specialist in Research and Engineering
Paine, Thomas O.	National Aeronautics and Space Administration, Deputy Administrator
Parker, John K.	University of Pennsylvania, Government Studies Center, Manager, Systems Division
Parks, Robert B.	Technomics, Inc., Executive Vice President
Paul, Peter	Urban America, Inc., Program Associate
Pendleton, William C.	The Ford Foundation, Program Officer
Phillips, Hal S.	Fairchild Hiller Corporation, Corporate Director of Public Relations
Pierce, W. J.	Detroit Edison, Communications Director, Developing Urban Research Project
Pincus, John	The RAND Corporation, Staff Economist
Press, William	Metropolitan Washington Board of Trade, Executive Vice President

Radius, Walter A.	<i>National Aeronautics and Space Administration, Special Assistant to the Assistant Administrator for DOD and Interagency Affairs</i>
Reese, Howard C.	<i>Systems Research Corporation, Staff Scientist</i>
Reres, Joseph	<i>The System Development Corporation, Public Systems Division, Director, Plans and Programs</i>
Ross, Richard H.	<i>G. W. U., Director, Conferences, Seminars and Institutes</i>
Rouse, Willard	<i>The Rouse Company, Executive Vice President</i>
Sade, Leo	<i>Sade and Company, President</i>
Saltzman, Stephen G.	<i>B. A. Schriever Associates, Inc.</i>
Saunders, Edward	<i>Executive Office of the President, Office of Emergency Planning, Deputy Director, National Resources Analysis Center</i>
Schertler, Leon A.	<i>Office of Economic Opportunity, Job Corps— Inner City Programs, Director, Task Force</i>
Schneyer, Raymond	<i>Lockheed Aircraft Corporation, Special Assistant to the President</i>
Schriever, Bernard A. (Chairman)	<i>B. A. Schriever Associates, Inc., President</i>
Singleton, James	<i>The System Development Corporation, Vice President, and Assistant Manager, Public Systems Division</i>
Smith, Robert G. (Conference Coordinator)	<i>G. W. U., Program of Policy Studies.</i>
Swenson, Herbert A.	<i>Department of the Interior, Technical Staff Member</i>
Sykes, H. F.	<i>Matrix Corporation, Senior Scientist</i>
Szanton, Peter	<i>The RAND Corporation, Director, New York Office</i>
Taft, Richard	<i>President, J. R. Taft Associates</i>
Taylor, H. Ralph	<i>Department of Housing and Urban Development, Assistant Secretary for Model Cities & Governmental Relations</i>
Teitz, Michael	<i>University of California (Berkeley), Vice Chairman, Department of City and Regional Planning</i>

Thomas, Shirley	Office of the Mayor of Los Angeles, Chairman, Mayor's Space Advisory Committee
Thompson, R. J.	North American Rockwell Corporation, Vice President, and Director, Rocketdyne Division Research Group
Tuffly, Bart	North American Rockwell Corporation, Rocketdyne Division Research, Chief, Environmental Systems Group
Uhl, Edward	Fairchild Hiller Corporation, President
Walther, Carl H.	G. W. U., Assistant Vice President, Academic Affairs
Watt, James G.	U. S. Chamber of Commerce, Senior Associate, Community and Regional Resources
Whitlock, Douglas	Producers' Council, Director
Williams, Richard D.	North American Rockwell Corporation, Washington Representative, Rocketdyne Division
Wood, Robert C.	Department of Housing and Urban Development, Under Secretary
Yarnold, Kenneth	The System Development Corporation, Director, Research and Special Projects Directorate
Zraket, Charles	The MITRE Corporation, Vice President, Washington Operations

APPENDIX C

PROFESSIONAL ACTIVITIES OUTSIDE THE PROGRAM

EXAMPLES OF STAFF PARTICIPATION

Director of the Program, Louis H. Mayo, on November 27, 1967, served as a member of a briefing group regarding the National Communications Policy Task Force. On December 7, 1967, he was Panel Chairman for a Task Group evaluating computer-assisted instruction at the joint NSAI-Labor Department symposium, "PROJECT ARISTOTLE." In December 1967, he participated in the National Science Foundation Seminar regarding international technological problems. Dr. Mayo also serves as a consultant to the National Academy of Sciences Committee on Science and Public Policy for its study of Technology Assessment. This past summer he participated in the National Academy of Sciences/National Academy of Engineering 1968 Space Applications Summer Study Group which met in Woods Hole to review and examine the Earth Resources Satellite Program.

James Brown serves as a member of the National Academy of Sciences Cargo-size Limitations Panel of the U.S. Coast Guard Committee on Hazardous Cargoes. On April 4, 1968, he addressed the American Association of Chemical Engineers in Philadelphia on "Legal, Social and Economic Considerations Affecting Hazardous Materials Decision Processes."

Guy Black presented a paper entitled "The Decentralization of Urban Government: A Systems Approach" at a Seminar in Professional Urban Public Administration held on April 25, 1968 at the University of Missouri, Kansas City. In August, he participated in a Seminar in "Systems Analysis in Government" at the Twelfth Summer Institute for Federal Executives, Center for Advanced Study in Organization Science held at the University of Wisconsin. He presented a critique entitled "Problems of Estimating R and D Investment and Stock" at the Annual Meeting of the American Statistical Association on August 22.

Clarence Danhof participated in six seminars on Marine Science Organization at Columbia University during the first half of the past year. This was closely related to his work on the COMSER contractual study of the organizational dimensions of Marine Science Programs which he shared with Fred R. Brown, Stephen Chitwood and Enid Curtis Bok Schoettle.

Richard F. Ericson was guest of honor at the inauguration of the Center for Interdisciplinary Creativity of the Southern Connecticut State College, New Haven; he chaired a Symposium on "Comparative Administration and Management Systems" at the Annual Meeting of the Society for General Systems Research in New York.

Harold Green and Guy Black discussed the legal implications of twentieth century technology and scientific research on the TV Program "The New Technology: The Lawyer's Role" on Sunday, January 28, WRC-TV, Channel 4. Among areas of research considered on the Program were organ transplants, genetic engineering, weather modification, and computer technology. The panel discussion was produced by the Public Affairs Division of WRC in cooperation with The George Washington University and the University of Maryland. **Professor Green** was moderator.

John Hanessian conducted a lecture/seminar on December 14, 1967 for the Washington branch of the International Studies Association. It was entitled "Policy Studies in Science and Technology and their National and International Implications." Professor Hanessian was an official U.S. representative to the United Nations International Conference on the Peaceful Uses of Outer Space held in Vienna, August 14-27, 1968.

Norman Kaplan conducted a lecture at the American College of Hospital Administrators Educational Conference in Washington in March entitled "The Social Revolution." He was an assessor and participant at the National Manpower Conference on "The Rural to Urban Population Shift: a National Problem" held in May at Oklahoma State University under the sponsorship of the Subcommittee on Government Research of the Senate Committee on Government Operations. Dr. Kaplan is a member of the Columbia University Seminar on Technology and Social Change. He is also a consultant to the National Academy of Sciences Committee on Science and Public Policy for its study on technology assessment.

James E. Mahoney serves as a member of the Board of Trustees of Engineering Index, Inc., one of the country's largest and oldest information systems organizations.

Joseph B. Margolin has made several presentations on the applications and impacts of computerized education. These include a paper presented at a joint NSIA-OE-DOD Conference, "Project Aristotle," held on December 7, 1967. The paper was entitled "Evaluation of the Educational Uses of Technology." In September, he addressed the Annual Meeting of the Aerospace Education Foundation on "The State of the Computer Art: Its Use as an Educational Tool." He presented a paper on economic and social factors affecting the family at a symposium, "The Disrelated Youth and his Family in the American Society" held at the Annual Meeting of the American Psychological Association this past August.

Clarence C. Mondale was a member of the Panel on Social Indicators at the Department of Health, Education and Welfare. This group attempted to formulate a section on group participation and influence in contemporary American Society.

Bernard A. Schriever addressed the National Space Club at the Goddard Memorial dinner on "Perspective on Space." The speech was excerpted as an editorial in *U.S. News and World Report*, 18 March, 1968. In April he addressed the American Institute of Architects in Philadelphia on the subject of "Systems Management and the Cities." At the Fiftieth Annual Meeting

of the American Ordnance Association in May, he spoke on "Advancing Technology and National Security Policy." This address was reprinted in *Ordnance*, July-August 1968. In June, he attended the dedication of the American Cement Corporation Plant in Athens, Greece, where he spoke on "The Urban Crisis: A World-Wide Problem." General Schriever is a member of the National Space Club; the National Academy of Sciences-National Academy of Engineering; The American Ordnance Association; The American Institute of Aeronautics and Astronautics. He is a Fellow of the American Astronautical Society and of the International Astronautical Society and he is President of the Air Force Historical Foundation.

APPENDIX D

NON-PROGRAM STAFF PUBLICATIONS

September 1, 1967—September 1, 1968

Books:

Black, Guy, *The Application of Systems Analysis to Government Operations*, Frederick A. Praeger, Inc., New York, New York (in press)

Danhof, Clarence H., *Government contracting for Technological Change*, Brookings Institution, Washington, D.C., 1968

Margolin, Joseph B., "The Mental Health of the Disadvantaged," Chapter in *Counselling the Disadvantaged Youth*, edited by Amos and Grambs, Prentice Hall (in press)

Schriever, Bernard (with William W. Seifert), *Air Transportation 1975 and Beyond: A Systems Approach*, MIT Press, Cambridge, Mass., 1968

Smith, Robert G. and Levitt, William, *The Think Tanks: A Study of an American Phenomenon*, Coward McCann (in press)

Journal Articles:

Black, Guy, "Systems Analysis in Government Operations," *Management Science*, Volume 14, No. 2, October 1967.

Black, Guy and Evan, William M., "Innovation in Business Organizations: Some Factors Associated with Success or Failure of Staff Proposals," *The Journal of Business of The University of Chicago*, Volume 40, No. 4, October 1967

Green, Harold P., "The New Technological Era: A View from the Law" *Bulletin of the Atomic Scientists*, October 1967

Green, Harold P., "The AEC Proposals—A Threat to Scientific Freedom," *Bulletin of the Atomic Scientists*, October 1967

Green, Harold P., "AEC Information Control Regulations," *Bulletin of the Atomic Scientists*, May 1968

Green, Harold P., "Safety Determinations in Nuclear Power Licensing: A Critical View " *Notre Dame Lawyer*, Volume 43, No. 5, June 1968

Green, Harold P., "Technology Assessment and the Law: Perspective," *George Washington University Law Review*, Volume 36, No. 5, July 1968

Mahoney, James E., "Promising Approaches Toward Understanding Technology Transfer," in *Report of the National Conference on Technology Utilization and Economic Growth*, Aerospace Research Application Center, Indiana University

Margolin, Joseph B., "Are We Building a Tower of Babel?", *American Education*, Volume 3, No. 10, November 1967

Mayo, Louis H., "University Research Capability for Public Policy Analysis," *The George Washington University Magazine*, Fall 1967

Mayo, Louis H., "Statement on the Program of Policy Studies in the Area of Technology Assessment" made before the *Technology Assessment Seminar*, House Subcommittee on Science, Research and Development on September 21, 1967 and printed in *Proceedings* before this subcommittee of the Committee on Science and Astronautics, U.S. House of Representatives, 90th Congress, First Session, September 21-22, 1967

Mondale, Clarence C., "American Studies in the World Community," *The George Washington University Magazine*, Fall, 1967

Wollan, Michael J., "Controlling the Potential Hazards of Government-Sponsored Technology," *George Washington University Law Review*, Volume 36, No. 5, July 1968

Book Reviews:

Kaplan, Norman, "Scientists in Organizations" by Donald C. Pelz and Frank Andrews, in *Industrial and Labor Relations Review*, Volume 21, No. 2, January 1968

Kaplan, Norman, "In the Name of Science" by H. L. Nieburg in *ISIS*, Volume 58.3, No. 193, 1967

Mottur, Ellis, "Science, Technology and American Foreign Policy" by Eugene B. Skolnikoff in *Scientific Research*, December 1967