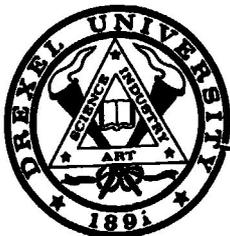


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DREXEL UNIVERSITY
Center for the Study of Environment

RESEARCH AND EDUCATION
IN MANAGEMENT OF LARGE-SCALE
TECHNICAL PROGRAMS

NASA Grant NGL 39-004-020

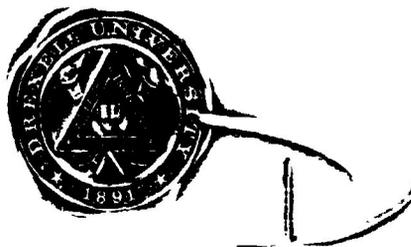
Final Report

June 2, 1973

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RESEARCH AND EDUCATION IN MANAGEMENT OF LARGE-SCALE TECHNICAL PROGRAMS

An increased awareness in recent years that many government structures within our nation's urban centers are inadequate to meet the needs of society has caused a sharp reduction in active participation in those systems and thus diminished the meaning of democratic government. What has been produced is an often apathetic society caused by bureaucratic structures that are either too complicated to work within, unconcerned with or unable to recognize today's problems, or simply not equipped to cope with the complex problems of our modern society.

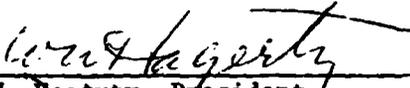
Drexel University's concern for this situation stems from the knowledge that most existing government structures have been organized to meet yesterday's needs--those of a generally placid (cause and effect) society whose interests are centered around cost effectiveness. Yesterday's environment, however, did not include black agitation, blue-collar disillusionment with jobs, etc.--the environmental factors that make up today's turbulent society in which priorities for action are often unknown and where few methods of identification exist. The results have often led to confused and inadequate "crisis" reaction to community explosions.

Drexel University firmly believes that urban planning can no longer be based on textbook statistical extrapolation rather than human and political environmental factors. Under conditions of chronic change our society has been competing for survival. The current inability of many governmental structures to recognize potentially explosive social problems is a major weakness of our existing system. This has been, however, the focus of new management technology developed within the National Aeronautics and Space Administration (NASA) as applied recently in conjunction with Drexel University to the needs of New Castle County, Delaware.

This cooperative Action-Research effort, based on the NASA Planning Process established systems to resolve existing problems and to prepare for future unknown turbulent environmental priorities. In this combined program the NASA Planning Process was used as a force to return the citizen to active democratic community involvement and to establish the means by which new social factors can be continuously uncovered and identified before explosions occur to force recognition.

Drexel University's participation in this program was consistent with its image and posture as a technological university concerned with the application of theories to the solution of practical problems.

Drexel University



W. W. Hagerty, President

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SECTION I

NASA/DREXEL PROGRAM BACKGROUND AND INITIAL RESULTS

INTRODUCTION

The National Aeronautics and Space Administration, in conjunction with Drexel University, engaged in a research effort directed toward an improved understanding of large-scale systems technology and management. This research program had as its major objectives: (1) the demonstration of the applicability of the NASA organization and management experience to the solution of large-scale public administration problems; (2) the expansion of the University's research competence in this area, as well as strengthening the faculty and curriculum of the University; and (3) the generalization of the knowledge gained in this demonstration project to other similar large-scale problems of concern to the nation.

Supported as NASA Grant NGL 39-004-020, this effort has resulted in a multidisciplinary approach within the University, and the development of a NASA/Drexel Consulting Team which consulted for two years with the County Executive, New Castle County, Delaware, to test research results in an actual large-scale social system.

RESEARCH ORGANIZATION

Three primary research areas were identified for attention: technology, management science and behavioral science. W. W. Hagerty, President of Drexel University and Professor of Mechanical Engineering, served as Principal Investigator. The remainder of the project organization consisted of:

E. S. Golden, Professor of Behavioral Science
 A. J. Pennington, Associate Professor of Electrical
 Engineering
 M. Silver, Professor of Management

H. H. Annett; G. M. Cadwell, Jr.; T. A. Michael; J. A.
 Orlando; S. R. Siegal--Research Associates

Other Drexel faculty and consultants from organizations such as the Fels Institute of the University of Pennsylvania were called upon to provide expertise in human behavior, sociology, government and urban affairs.

ACADEMIC PROGRAM

An academic program leading to the Doctor of Philosophy with special emphasis on public administration relative to technology and management of large-scale programs was developed by the Research Faculty and administered by the Center for the Study of Environment.

The research areas correspond to three major factors which are necessary for a person to be effective in the context of large-scale social systems: (1) an understanding and awareness of the basic components of modern technology--information processing, automatic control, materials and environmental factors;

(2) an understanding and awareness of economics and management science--national income economics, urban economics, project evaluation, management control and the systems approach; (3) an understanding and awareness of the philosophic, psychological and social functioning of the person, the small group and the community in a technological society. The last is most important because one must have the philosophic and intuitive base which assures that a project in which he is involved will truly serve human needs. For this reason the program included work with concepts of individual and social value, socio-economic decision making, the political process, the nature of man and his relationship to his environment and to his fellow man.

These goals dictated that the candidates' learning experience not be confined to formal courses. Independent study, small-group problem solving, field experience in NASA, the aerospace industry and actual socially oriented projects were used in addition to course work.

RESEARCH PROGRAM

The research program consisted of two separate phases. The initial phase stressed exploration of the problem from the point of view of the three primary research areas and the building of a multidisciplinary team. The final phase consisted of a clinical demonstration program called "Action Research" in which the research associates consulted in New Castle County, Delaware, to aid the County Executive in solving actual problems confronting the County Government.

MULTIDISCIPLINARY TEAM APPROACH

A primary goal of this grant was the multidisciplinary approach to administration, management and the transfer of relevant technology. The approach taken at Drexel was to build a multidisciplinary team of individuals with various and diverse specialities and personalities. An initial task was to integrate the five research associates into a single group which would function as a unit in the action-research phase of the program. The approach taken emphasized that individuals must consider their personal impact upon one another if they are to work together; that is, multidisciplinary research may run into difficulty because of the researchers themselves.

A number of activities contributed to this team development. The Research Associates and faculty participated in many weekly, monthly and quarterly planning and review meetings; attended several professional meetings and made several visits to NASA headquarters; collaborated in the development of MISPA and BUILD (simulation games discussed below), served as consultants to the Dean of the College of Business and Administration on the development of a Ph.D. program; and spent considerable time objectifying their own educational, organization and interpersonal processes. Each of the Research Associates also had exposure to teaching in human relations training. To participate in Action Research, one must have appropriate skills prior to entry into an urban system. Therefore, the group focused primarily on its own system and sub-systems as a method of developing these skills.

These first months were not only productive in terms of the educational process, but in defining relationships, establishing trust formation and opening lines of communication.

Every effort was made by the faculty to encourage the Research Associates to initiate and participate in the decisions that affected their education, time and goals. As a result of these kinds of activities, processes, and reflective thinking, the classical lines between faculty and students were modified, and both faculty and students engaged in a participative management style where all entered into decision-making and planning.

Another unique feature of the program was the decision to shape the educational experience to meet personal needs and goals. The Research Associates and faculty engaged in appraising the personal career goals of each and through a capability analysis, attempted to mobilize the total human resources available within the team.

Thus, a multidisciplinary team was developed through greater interpersonal sensitivity, organization diagnostic skill, confrontation and feedback. It was agreed that the five Research Associates would continue the multidisciplinary approach and work together within the same urban system engaging in integrative action research.

INITIAL RESULTS

The preliminary research undertaken by faculty and students resulted in several valuable outcomes:

1. Urban Systems Simulation and Gaming

Simulation gaming is a relatively new learning technique which relies on the following elements:

- 1) Availability of factual knowledge and analytic techniques,
- 2) Experience with use of this knowledge and these techniques,
- 3) Feedback evaluation of the first and second elements, and
- 4) Repetition of the process.

This approach has always been the basis of effective learning, but the advent of sophisticated audio-visual aids, computers and related technology in recent years has made it possible to implement these elements in far more powerful ways than when instruction was confined exclusively to the lecture/reading mode.

The work on simulation and gaming resulted in the publication of two "games" (BUILD, MISPA) and the establishment of an Urban Simulation Gaming Laboratory.

A. BUILD

BUILD is a role-playing computer game oriented toward community redevelopment in a city section of approximately 100,000 people. BUILD functioned as an educational resource in courses on urban sociology, urban systems design, and others at Drexel during the Spring of 1970 and has been used subsequently at other universities throughout the country. Student participation in the computer-based game was seen as only one part of a three-part approach to urban education, the other two being the presentation of factual information and the evaluation and challenge of this information in the light of the gaming experience.

BUILD was limited to twelve distinct roles with the options available to each role limited to the major functions of the role. The game was not intended to be a replication of reality, but instead was to be realistic enough to represent to the participant, during a few hours, the major functional and psychological characteristics of his role. The simulation model was deliberately made highly sensitive to player decisions to rapidly and clearly illustrate the consequence of any action.

Simulation gaming was found to be an extremely effective component of urban-oriented courses in that it offers the promise of a substantial restructuring of the educational experience, along the interdisciplinary lines which are necessary for urban problem solving. The value of the game does not reside in the program itself, but in the actual process of the game play through which one becomes more aware of one's factual understanding and emotional awareness of the urban situation.*

B. MISPA** (Management Information Systems for Public Administration)

The management of information is a vital function of problem solving within the urban complex. There are currently a host of

*This discussion is adapted from a manuscript prepared for the Conference, Computer Applications to Environmental Design, April 20-22, 1970, Lexington, Kentucky, by A. J. Pennington, J. A. Orlando, L. P. Wolf, A. B. Shostak, Drexel University. A comprehensive discussion is continued in Appendix A.

**MISPA is published as Section II, Ph.D. Dissertation of S. Siegal, Subjective Risk within the Group Decision Making Process. Available from Drexel University Library and University Microfilms.

simulation models, either in operation or under design, which attempt to explore problem solving from a more humanistic viewpoint, but experience to date indicates that the very complexity of such games in addition to the impersonal atmosphere created by the omnipotent computer greatly hampers this approach toward both learning and teaching.

MISPA is a simplified linear simulation model for both group and individual decision-making which attempts to bring together within one system the behavioral and management science conflicts encountered in problem solving. Teams of 1 to 6 members are formed as a Systems Department within a medium size city. Their role is to make decisions regarding the allocation of resources of money and manpower based on information supplied to them from other departments within the city, and as a result of previous and future data from the resources they allocate. The menu of projects includes problems in areas of pollution, housing, recreation and efficiency of intra-governmental systems. The tasks may be varied as the nature of the groups playing the game dictates. An infinite number of moves can be played with any number of groups. Each move represents a period of six months' time within the life of the organization.

The objectives of the game are to (1) provide a vehicle for studying the behavior of individuals as they respond to group interactions and task oriented problems, (2) provide comparative evaluation of management (decision making) found in federal governmental, city and industrial organization, (3) serve as an

assessment of the transferability of the NASA Management system to solution of urban problems, and (4) training and development of career governmental personnel.

Specific behavioral variables, such as risk taking, leadership determination, communication patterns, etc., are identified within each group prior to playing the game. Such variables are then correlated with respect to the group as a function of their performance, i.e., department savings. This allows for both an insight of why the group responded the way it did and the effect of its response on the tasks undertaken.

C. THE DREXEL URBAN SIMULATION GAMING LABORATORY

This laboratory was authorized in April, 1970, with a stated purpose to develop, acquire, and use a variety of urban simulation games, or decision-making exercises. Administratively, the unit was a part of the Center for Urban Research and Environmental Studies (CURES), with services available throughout Drexel University, and also to outside groups as appropriate. In this way, the Laboratory will continue in a formalized way the work on urban game development and usage which has been carried on at Drexel under the NASA Grant, "Research and Education in Management of Large-Scale Technical Programs." The Drexel Urban Simulation Gaming Laboratory provides a vehicle for rapidly developing the use of these new technologies, and their introduction into the urban-oriented educational program at Drexel.

2. Community Development Workshop

This concept was developed in collaboration with colleagues at Node Four Associates, Inc., an urban planning, design and construction firm in Brooklyn, New York. It refers to a collection of ideas and techniques for increasing community participation in the planning process. These include computer simulation and gaming, various psychological techniques (such as "confrontation" and "Encounter Micro-labs") and creative problem solving processes. A paper, "The Community Development Workshop," was presented at the annual meeting of the Environmental Design Research Association, June 8 - 11, 1969, Chapel Hill, North Carolina, and is contained in Appendix B.

3. Compendium of NASA Management Technology

The Space Act of 1958 which established NASA provided for ". . . the widest practicable and appropriate dissemination of information concerning its activities and results thereof" (Sect. 203.A.3). As a result, the management literature contains a great number of articles and books describing various aspects of NASA management techniques and systems. Appendix C contains a summary of the published literature which categorizes NASA contributions to the theory and practice of management methods of conceiving, planning, administering and evaluating large-scale enterprises.

4. NASA Planning Process

NASA's process for planning was identified in the preliminary efforts of the current program and constitutes an addition to the NASA transfer technology literature.

The complexities of NASA, together with its far-ranging mission and lack of off-the-shelf technology, generated the need for an effective system of planning. NASA's initial planning system was "carried over from the previous government experience in NACA and DOD,"¹ and continued the previous concept of division of responsibility between planners and managers. A "Planning Group" of experts prepared plans for managers to critique and then follow. This proved ineffective in practice. NASA was to comment on these earlier planning efforts:

. . . there (was) little institutional planning . . . interrelationships, programs, plans and institutional consequences must be more effectively defined and understood.²

NASA's planning effort was redesigned to involve line personnel rather than to leave planning totally in the hands of a staff group. It was anticipated that this participative approach would be more effective, since the persons who would have to carry out the plan would be committed to it at the outset. It was also expected that better trade-offs among conflicting alternatives

¹Roskall, C. Administrative History of NASA. Washington, D.C.: NASA, 1958-1963, p. 69.

²Bingham, C. F. Office of Organization and Management, "Policy Profile Office of Organization and Management," Draft. 06-24-69, pp. 30-31.

would be made if the managers and engineers directly involved took part in the planning process.³

The redesign of the planning process took the following structure:

- Creation of Planning Steering Group.
- Formation of Planning Panels.
- Appointment of Advisors and Evaluators.
- Establishment of an Integration and Review Board.
- Establishment of the President's Space Task Force.

It was found that the "participative planning approach" functioned where the "expert planning group" had not worked satisfactorily. Appendix D contains a detailed discussion of the NASA Planning Process.

5. Commissioned Papers

The thrust of the NASA/Drexel program was basically from the technological and management points of view. To provide a balanced approach--and look for insights that a technologist or manager might miss--Drexel sociologist Arthur Shostak was commissioned to investigate public attitudes toward large-scale technological change and the specific tools of simulation and gaming. His findings in these areas are included in Appendices E and F respectively.

³Bauer, R. A.; Meyer, R. F., et al. "NASA Planning and Decision Making, Final Report." Harvard Graduate School of Business Administration, pp. 1-15.

SECTION II

ACTION RESEARCH DESIGN AND METHODOLOGY

BACKGROUND

The basic parameters for the NASA/Drexel Program in Technology and Management of Large Scale Programs included "action-oriented" studies¹ with provision for the University to ". . . assist in the transfer of technology and management methods from one large-scale program to another . . ." ² This emphasis on applied research was especially appropriate for three reasons: first, NASA had previously identified the need for experimental and demonstration programs for the application of the results of space research and development to urban problems.³ Secondly, Drexel University had a rich tradition through cooperative education and consulting programs emphasizing the applications of research. Thirdly, NASA had previously identified student Cooperative Programs as being effective links between theory and practice.⁴

¹NASA Grant First Semiannual Progress Report. Drexel University, Philadelphia, Pa., June 30, 1969.

²William W. Hagerty, Manuscript prepared for Panel Session G-2, "Large Scale Technology Management," at the National Conference on Public Administration, Miami, Florida, May 20, 1969, p. 2.

³Proceedings from the Conference on Space, Science and Urban Life, Donsmuir House, Oakland, California, March 28-30, 1963; NASA Document #SP-37, p. 241.

⁴Ibid., p. 166.

Thus, an action-oriented research design was selected with the goal of having the Research Associate function as a participant observer in some (to be selected) urban system. Known as "Action Research," the methodology was proposed to NASA,⁵ and received enthusiastically.⁶

ACTION RESEARCH DEFINED

The term "Action Research" was coined by the applied psychologist, Kurt Lewin, and defined as:

. . . a field which developed to satisfy the needs of the socio-political individual who recognizes that, in science, he can find the most reliable guide to effective action, and the needs of the scientist who wants his labors to be of maximum social utility as well as of theoretical significance.⁷

Figure 1 summarizes the Action Research Methodology as applied within the current NASA/Drexel program. Note that the Action Research Methodology stressed that research would be performed to meet the needs of a specific urban client system. Additionally, per Lewin's definition above, the researcher would aim his labors as well to be of theoretical significance.

⁵Second Semi-Annual Progress Report, Drexel University, December 31, 1969, p. 3.

⁶Personal communication between NASA Program Officer, Mr. Richard Stephens and NASA Research Professor, Dr. Edward Golden, Drexel University.

⁷Chein, A.; Cooke, I.; and Harding, J., "The Field of Action Research." American Psychological Bulletin, 3:43-50, 1948.

Figure 1. ACTION RESEARCH METHODOLOGY*

The Action Research Methodology can be summarized in five steps:

1. Initial Entry

Efforts were made to gain initial entry to a particular urban system by June or September, 1970. Sanction, and negotiation of terms of the relationships were agreed upon before final entry.

2. Orientation and Exploration

Once initial entry was agreed upon, a period of 2 to 3 months was used to study that particular client system in order to more fully understand how it functions and disfunctions. Furthermore, this initial explanation and orientation period served as a period of gaining wider acceptance and identification with that system. Finally, problem identification and definition were accomplished in this exploration period.

3. Action Planning and Intervention

Once problems were identified and agreement was negotiated with the client system, then each problem area was studied as to strategies, designs or methods to effect change or influence to a preferred state. Alternative methods were considered for each problem. Every effort was made to consider the behavioral and organizational consequence of every intervention so as not to upset the homeostasis of that system.

4. Action Evaluation

Concurrent with the action research, evaluations of the particular projects were made by the Research Associates and representatives of the client organization. All of these served as process observers of the action research and provided consultative assistance.

5. Termination and Description

Finally, upon successful accomplishment of the action research, a descriptive dissertation was presented with hypothesis, action steps, and consequences or results, with generalizations drawn from the research. Successful action research produced three basic outcomes: (1) the achievement of the planned change, (2) new knowledge, and (3) a manager of increasing professional competence.

*Summarized from an early NASA/Drexel Program Working Paper and included herein as Appendix G.

DISCUSSION

Action Research differs from other applied social research in the extensive involvement of the researcher within the action process. Some scientists, reviewing the historical application of action research, have called this". . . applied research with a client with a problem to be solved" and have called for increased attention to the ethics of the situation, the social scientist's (vis a vis the client's) interest in the research, and the possibility of location of initiative too exclusively with the client.⁸

Thus, the Action Research Methodology is unlike traditional research methodologies in several ways. That Action Research is performed in direct response to a perceived client problem is the first. A second is the concept of Participant-Observer. The specification of the researcher's participation is in contrast to the usual thrust to identify and minimize the so-called "experimenter effort."⁹

A third major difference is in use of the Case Study. Classic studies attempt to demonstrate statistically that study results are, within specified probabilistic limits, not due to chance. A single case study represents zero statistical degrees of freedom, and allows valid statistical criticism. There are two responses:

⁸Rappaport, R. N. "Three Dilemmas in Action Research, Human Relations, Vol. 23, #6, p. 499.

⁹Rosenthal, R. Experimenter Effect in Behavioral Research. New York: Meredith Publishing Co., 1966.

the first response is to follow the lead of the Tavistock Clinic and generalize not upon a single case, but on a series of cases. Called an "Ad Hoc Programme," Tavistock has been able to extract data using action research techniques.¹⁰

The second response is to use the case study "as a vehicle to enrich the development of new theory."¹¹

The application of NASA technology to urban problems falls within the development of new theory. The subtleties involved in researching new theory in the public arena were highlighted during a discussion of the current NASA/Drexel program at the 1969 Conference on Public Administration:

. . . it is interesting to consider why these large-scale problems are both interesting and difficult. I suspect that one of the reasons why academicians prefer a certain amount of detachment is that they can conceptualize and thereby handle an idealized problem much better than a real one. It can be kept simple, the number of variables reduced, and frequently some of the human factors eliminated altogether. In real large-scale problems, however, the sheer qualitative features are different from those of small ones.

. . . The human factors enter in a different way. The behavior of very large groups and the constituent subgroups are interlocked in ways which are numerous, complex and subtle. The magnification factor of any subtlety may make it very important in determining the success of a given project.¹²

¹⁰Rappaport, op. cit.

¹¹Walton, Richard, "Advantages and Attributes of the Case Study." Journal of Applied Behavioral Science, August, 1972, p. 73.

¹²Hagerty, op. cit., p. 5.

The clinical action research conducted in this program was designed to enrich the complex subtleties of new theory, and, hopefully, will provide a necessary link in an effort continued beyond the present limitations of time and budget.

SECTION III

SITE SELECTION, ENTRY AND PROJECT ASSIGNMENTS

OVERVIEW

This section reports the testing of the assumption that certain NASA Management Technology can be applied or adapted for use within an urban complex.

After intensive preparation and analysis of NASA Management, the decision was made to go ahead with the plans to test the applicability of the NASA techniques through "Action Research" within a particular urban system. The sociological technique of participant-observer would be used, with the added dimension that the members of the research team would take management responsibility within the system.

Subsequently, the research site was selected. Specific problem areas were then identified, evaluated and attacked with applicable NASA management techniques.

ACTION RESEARCH SITE

Selection of an action research site was critical. The "host" government would be expected to profit from the professional resources and NASA technology to be made available. But it ran the risk of having outsiders "meddle" with their situation, and, perhaps, create additional problems by their presence.

The Drexel Research Team articulated a set of criteria (hereto appended in Appendix H) which established the minimum conditions for a successful relationship and negotiated for entry to an urban system.

SITE SELECTION

Four possible sites were evaluated:

1. Trenton, N. J.

The newly elected Mayor, Arthur Holland, requested the services of the Drexel Research Team and members of the Rutgers Faculty as a "Transition Task Force." All city department heads were being replaced, and other major shifts in personnel were being implemented as the new government took over. Mayor Holland needed trusted professional assistance to maintain continuity of government. This effort was successful so the Drexel Team asked to maintain the relationship and use Trenton as the action research site. Negotiations extended for several months, and were, however, finally terminate when the Drexel Team chose New Castle County.

2. Washington, D. C.

Preliminary negotiations were held with representatives from the mayor's office in Washington, D. C. However, the Drexel Team elected not to pursue this site due to the extensive travel which would have been involved

3. Wilmington, Delaware

Through the services of the Greater Wilmington Development Corporation (GWDC), the Mayor of Wilmington was approached but following initial talks, decided not to use the NASA Research Team.

4. New Castle County, Delaware

Again, through GWDC, the County Executive was approached. After two months of negotiation, an agreement was made for the NASA Research Team to work as special assistants to the County Executive on projects to be selected by him. NASA techniques were to be applied as appropriate.

NEW CASTLE COUNTY, DELAWARE

New Castle County consists of the northern-most section of Delaware, one of the state's three counties. New Castle County has nearly seventy percent of the state population; and an estimated ninety percent of the income.

Within New Castle County are eleven incorporated areas--the City of Wilmington, the City of Newark, and nine small towns. Each incorporated area has its own first-level of government. For the unincorporated areas, the County Government is the closest government to the people. Table 1 summarizes population data.

The present organization of the county government was established by state law in 1967. A change was made from the so-called "Levy Court" system dating from colonial days to the establishment of an executive system with division of responsibility between the executive (administrative) and county council (legislative).

Table 1

POPULATION CHARACTERISTICS

	<u>Population</u>
State Population	500,000 (est.)
New Castle County	386,000
Incorporated areas	123,000
Unincorporated areas	263,000

The County Executive was elected-at-large, as was the County Council president. Six councilmen were elected from various districts.

The 1967 reorganization established functional responsibility:

County Council

County Council was made responsible for approval of financial operations, operating budgets, capital budgets, debt creation, bond issues and the setting of the tax rate. In addition, council established basic service functions (police, ambulance, trash, etc.), approved union contracts, employee pay plans; and maintained responsibility for approving and amending the zoning ordinances.

County Executive

The County Executive was given the broad responsibility for administering the County Government on a day-to-day basis. He was empowered to make appointments and remove appointed officials at his pleasure, prepare and administer budgets and services, and enforce laws.

The County Executive appointed a Chief Administrative Officer to assist him in the management of the government. At the time there were departments of:

- ° Public Works
- ° Parks and Recreation
- ° Development and Licensing
- ° Planning
- ° Finance
- ° Transportation
- ° Personnel

Each was headed by an official appointed by the County Executive. Department staffs were appointed under a civil-service merit system, although it was estimated that half the employees had received appointments through an earlier patronage system.

As the government was only two years old, the County Executive considered his tenure as a "shakedown effort" to establish a viable modern government in the fastest growing portion of the state. The five NASA/Drexel Research Associates were considered supplemental staff to the County Executive, and would work on mutually acceptable tasks, which would be identified in the "Orientation and Exploration" of Action Research.

ORIENTATION AND EXPLORATION

The Drexel team thus began in New Castle County in the fall of 1970. As had been agreed, a period of two to three months was planned to study the particular client system so as to more fully understand how it functioned and disfunctioned. Furthermore, this initial exploration and orientation period was to serve as a period of gaining wider acceptance and identification with that system and, finally, problem identification and definition were to be accomplished.

Two issues arose early in this phase of the project. The first was the difficulty in identifying particular projects for each of the five Research Associates. Each had chosen to work collaboratively with the others by entering into an Action Research project in the same organization. Nevertheless, there needed to be some differentiation if for no other reason than

each was bound to write a separate dissertation as a part of academic requirements.

The second issue was that the host organization thought of its problems in terms of specific projects which required immediate solutions. The Drexel team interest was stated as being the desire to assist the county in improving its own capability so that it would be able to meet such problems after the Research Associates had left.

The net result of these two conditions was that the Research Associates worked at different rates of speed, and attempted to compromise both their interests and the organization's needs by entering projects through what were called, at the time, "hands-on projects." Two examples illustrate this phase with its attendant differences.

The De La Warr Project

One particular problem area facing county officials was the use and disposition of an abandoned shopping center located in the Oakmont area, a low and middle-class black neighborhood located in De La Warr, south of Wilmington. Residents had become inflamed the previous summer when a vacant, cannibalized shopping center at the only entrance to their community was scheduled to be made into an automobile body shop. The citizens organized and petitioned the county to purchase and develop the property as a site for a satellite center of the new Delaware State programs for improved delivery of social services. Mr. Cadwell was asked to represent the County Executive in evaluating the problem and in participating in its solution.

Mr. Cadwell was willing to enter into this project in part due to his research interest in so-called "temporary systems." Temporary systems are new forms of organizational structure which theoretically have the advantage of meeting new needs not provided for in usual organizational structures, providing resources for temporary problems, and avoiding the continuation of a structure or organization long after it has outlived its useful function. Since the county government had no department with specific responsibility for development of social services, it appeared that this problem might be a good means to assist the government by setting up a temporary system.

The speed by which a project was identified for Mr. Cadwell's assistance may be contrasted with the difficulty in identifying a project for Mr. Orlando.

White Clay Creek Dam Project

Because of Mr. Orlando's considerable prior experience in electronic data processing, he was approached during the initial negotiations with the county about the possibility of his working in this area. The county was engaged with the city of Wilmington in a massive catch-up effort to install new equipment before their present equipment became unserviceable. Mr. Orlando began to delve into the situation, but it soon became clear to him that there was little he could do at that point in time which would be compatible with the county needs and his own interests in the organizational effects of automation.

Therefore, he had to turn elsewhere. County administrative and legislative officers had been trying to reach a decision on the proposed construction of a dam on the White Clay Creek since 1966. Since this was a leading concern of the County Executive, Mr. Orlando agreed to explore this problem and determine if it were acceptable to the University requirements on research, the county's needs for a decision, the need of the NASA team to work on the county's problems and his own interests.

DISCUSSION: VARIED FORMS OF ACTION RESEARCH STEPS

The contrast between the projects of Mr. Cadwell and Mr. Orlando demonstrated how the second step of action research may take varied forms and have an uncertain duration. (The projects of the other three members of the team will be presented to the reader in the following section to illustrate aspects of the third step of the team's methodology.)

The team felt pressure to move in quickly. At the same time, the team did not wish to engage in a process which would not advance knowledge in some way, nor did it wish to become such an integral part of the system that the county would become dependent upon its presence and thus not develop the capability to function more effectively following its withdrawal from the organization. Ambiguity like this gives rise, in different individuals, and in the same person at different times, to anxiety, anger, depression and the temptation to do anything rather than nothing.

It is in this connection that the team believed their efforts at collaboration and team building paid good dividends. One aspect

of the multidisciplinary effort is that each team member was able to provide not only expert support for one another in the work on specific tasks, but was also able to provide support through those times when morale was low.

ACTION PLANNING AND INTERVENTION

Once problems were identified, each problem area was studied as to strategies, designs, or methods to effect change or influence to a preferred state. Alternative methods were considered for each problem. Every effort was made to consider the behavioral and organization consequences of every intervention so as not to upset the homeostasis of that system.

The remaining projects undertaken by the NASA/Drexel Team were selected with less pressing time constraints (and incurred less pressure from the County Executive to take on the specific projects). These project assignments are described below and provide examples of preliminary action planning and intervention with the Action Research Methodology.

Housing Project

The County Executive expressed concern in meeting the housing needs of low and moderate income citizens. In addition, the County Council established a special citizen's committee to conduct a study of the recent failure of Operation Breakthrough, and the State had a recently established Department of Housing and hired a Director as of April, 1970.

Appointed to the position of Special Assistant for Housing to the County Executive, Mr. Annett began his assignment by surveying the situation through interviews with various people. About the middle of November, a Housing Cabinet was formed at his suggestion involving the Chief Administrative Officer, the Director of Planning and the Director of Development and Licensing with Mr. Annett as chairman. The cabinet was responsible for the following:

- A. Developing a comprehensive housing program to meet the needs of all citizens with an emphasis on low and moderate income housing.
- B. Preparing recommendations concerning new policies and legislation for consideration by the appropriate authorities.
- C. Developing a strategy for the implementation of a housing program and overseeing its fulfillment.
- D. Maintaining liaison with appropriate persons, groups and agencies related to the field of housing.

Mr. Annett's role included the following responsibilities:

- A. Coordinating the executive branch's diverse activities related to housing.
- B. Serving as Chairman of the Housing Cabinet, with an emphasis on facilitating and clarifying decision-making process.
- C. Serving as a liaison person with:
 - 1. City, state and federal agencies
 - 2. Civic groups
 - 3. Business groups

- D. Conducting research as needed.
- E. Overseeing related research projects.
- F. Seeking to develop support or at least acceptance among residents of neighborhoods where public housing will be located.

Internal Organization and Management Project

The final project is more general than any of the previous. Mr. Siegel and Mr. Michael collaborated on a project to develop the internal organization and management function of the New Castle County government into a more viable administration capable of defining and meeting the needs of its people. Using the classical principles of management (planning, decision-making, leadership, and communication) the Research Associates, because of their training in behavioral science, chose an organizational development model as the inclusive framework for implementation.

The nature of organizational development work called for a trusting and open relationship between the Research Associates and members of the host organization. Although the team members were officially assigned as special staff assistants to the County Executive working out of the Office of Organization and Management, no guarantee of the above described relationship was assured. Several crucial weeks were spent in personal meetings, conversations, interviews, and staff meetings in an attempt to get to know the organizational members, establish a high degree of visibility, and obtain a "feel" for the culture in which change was to be explored. A daily

diary of this period was kept to monitor the nature of responses on the part of both the Research Associates and the organization members.

Since the field of organization development is relatively new, much time was spent educating the host organization to the nature of these roles. Part of this involved the syndrome of disassociating themselves from the tradition of the consultant (who has been defined as someone who borrows your watch and then tells you what time it is).

The project was diagnosed quite similarly to any model of problem solving. Where are the problems and who is having them? Because a problem within an organization will eventually be felt in all of the functions such as planning, decision-making, communications, and leadership, it appeared to make no difference which function would be chosen first for exploration. However, since the Research Associates were personally interested in the theoretical implications of time, space, and the risk-taking characteristics of organizations, it was decided to explore the communication network of the organization. By asking who talks to whom, what media are used, where communication takes place, who initiates communication, what its nature is (i.e. for decisions, information, policy, etc.), the problems of the organization quickly came to light.

An in-depth, free-form interview with all department heads, the County Executive, and the Chief Administrative Officer was carried out. These interviews allowed for a continuation of personal relationships with all members in addition to the chance to gain valuable data. The very fact that each interviewee was called upon to take a hard look at his own individual communications

pattern results in direct feedback and as opportunity for insight into behavior patterns that he might take for granted and not even be aware of.

The interviews were analyzed and detailed communication patterns, data, and relationships were diagrammed to determine basic problem areas. Organization-sociometric models relating positive and negative relationships on both an interpersonal and substantive basis were identified. In some cases the data was fed back through subsequent feedback meetings to the applicable parties. In each case there was a high degree of receptivity. In two specific cases involving department heads a definite change in behavior was identified and well received by other members of the organization. The lasting effect was by no means assumed at this point, but it is reassuring that the culture indicated its willingness to change.

A definite problem area was defined involving the delineation of goals, responsibility, and decision-making among several key members of the organization. The first phase of feedback of this data resulted in a desire for a confrontation meeting between key personnel to resolve the issue.

At the same time that progress was made at the department head and executive level of the organization, there was an expressed need for the team to become involved within some of the departments where members felt that work efforts and changed techniques might be useful. This was most rewarding in that it pointed to a feeling of openness and trust on part of the particular department heads. At the same time it also pointed out the potential danger of spreading oneself too thin within the organization with a resultant loss of effectiveness and creditability.

SECTION IV

ACTION RESEARCH PROJECTS AND CLIENT FEEDBACK

The previous section presented research associate problem assignments, with emphasis on the initial stages of Action Research. This section describes the resultant action research efforts from two points of view: the researcher, and the client. The researcher's point of view is presented through extracts from each thesis. Each thesis was summarized and presented to the client after termination of the research efforts; their comments are included as the client's opinion.

These points of view will be compared and contrasted in Section V.

* * * * *

PROJECT: Housing

Research Associate: H. A. Annett

Thesis Title: The Adaptability of the NASA Planning Process to Planning for Urban Systems: A case Study of Planning for a Low and Moderate Income Housing Program in New Castle County, Delaware.

The County Executive, William Conner, expressed concern about meeting the well documented housing needs of low and moderate income citizens. There were approximately 6,900 dilapidated and deteriorated homes outside the City of Wilmington. Yet only the cities of Wilmington, with approximately 1,900 public housing units, and Newark, with about 75 units, had done anything in the area of public housing. Residents of the balance of the county

had vigorously resisted the introduction of even moderate income housing, to say nothing of public housing.

The area of Housing offered a multitude of possibilities for research. There was a whole set of interdepartmental relationships, plus the executive and legislative branch relationships. In addition, meeting the housing needs involved city, county, state and federal relationships. There were also the numerous sponsors of housing, and the business interests. The particular subject area chosen for study was the examination of the power and influence elements that surround decisions relating to establishing a low and moderate housing authority in New Castle County. These elements were identified and taken into account by the planning process.

This involved an examination of political relationships. Edward C. Banfield and James Q. Wilson observed the following in their book, City Politics:

Our government is permeated with politics. This is because our constitutional structure and our traditions afford individuals manifold opportunities not only to bring their special interests to the attention of public officials, but also--and this is the important thing--to compel officials to bargain and to make compromises. The nature of the governmental system gives private interests such good opportunities to participate in the making of public decisions that there is virtually no sphere of "administration" apart from politics.¹

The same authors also point out that "politics arises out of conflicts, and consists of the activities . . . by which conflict is carried on."²

¹ Edward C. Banfield and James Q. Wilson, City Politics, Vintage Books, New York, 1963, p. 1.

² Ibid., p. 7.

Mr. Annett assumed that the following processes are part of a continuum and are interdependent:

1. The planning process which is used to define future directions and plans for action.
2. The political process which is used to develop the necessary support for such directions and actions.
3. The administrative processes which are used to implement the decisions.
4. The group processes by which people work together.

Because the planning process is responsible for the definition of the new directions, it is crucial that its processes and procedures be designed and administered so as to be sensitive and supportive of the needs of the other processes.

The hypothesis tested is that the NASA planning process can be adapted to planning for urban systems because its basic principles and processes are comparable with the demands of the political, administrative and group processes.

The testing of this hypothesis was the utilization of the NASA planning process to develop a low and moderate income housing program for New Castle County, Delaware. The effectiveness of the NASA planning process was based upon a comparison with what happened to Operation Breakthrough in New Castle County during the spring of 1970 and subsequent events in the field of low and moderate income housing.

CLIENT FEEDBACK

The following comments concerning this project were obtained from various individual and group interviews with New Castle County officials in October and November 1972.

- ° "Much more time (was) devoted to solving the problem than can normally be spent on projects."
- ° "No new housing was produced--no existing rehabilitated or cleared. The program did not increase staff in the Department of Planning (but) provided the structure for an Action Program."
- ° "The project was primarily oriented towards policy (a communication and planning mechanism) as opposed to operational, and continues this way."

* * * * *

PROJECT: Management Effectiveness

Research Associate: Thomas Michael

Thesis Title: The Transfer of a Management System: A Case Study of the Transfer of the NASA Planning Process to New Castle County, Delaware.

A. Study Objectives

The primary objectives of this study grew from the items to which Drexel agreed in its Memorandum of Understanding to NASA (Appendix I). Particular emphasis was placed on the identification of a NASA element which might be transferred to other systems. A second emphasis of this study arose from the concern for increased knowledge, and involves an attempt to develop a theoretical framework for the study of organizations. Of additional importance is

the fact that the activity involved the attempt to assist the County of New Castle in the solution of a real-world problem through the use of both consultant skill and theoretical considerations.

The major hypothesis of this study was, "The NASA Planning Process of 1968-69 can be transferred to the County of New Castle, Delaware in order to improve the organizational planning of the total governmental system."

Common sense dictates that it is impossible to uproot any system from one organization and transfer it to another without change or adaptation. A secondary hypothesis, therefore was, "In order to transfer aerospace management technology from NASA to another system, there must be a planned program of organizational intervention involving consideration of the environment of the organization, the internal processes of the organization, and the structure of the organization." NASA is a very large "poly-organization" which at one time had over 400,000 in its employ. It is an agency of the Federal Government, and it is spread throughout the country with outposts throughout the world. By contrast, New Castle County employs about 1200 in a local service government with several other governmental units and municipalities overlapping its jurisdiction. Thus, there are considerable differences in the two organizations. Therefore, one must analyze the organizations in order to make those adaptations and modifications which will result in successful transfer. An illustration of this point is the analogy of the organ transplant from one human being to another. Despite the fact that physicians attempt to obtain donor organs from

individuals similar to the recipient, they are required to take powerful measures to insure that the immunity system of the body does not cause rejection of the donated organ. It was the assumption that there is an analogous "immunity system" in organizations which resists introduction of new procedures and systems.

The role of Mr. Michael, therefore, was not just to study the organization, but also to intervene in its activity. To understand what to do and why to do it, it was posited that intervention must take into consideration the environment, structure, and processes of the organization.

B. Study Results

The specific activity through which this study was conducted involved the Research Associate in a program to improve organizational functioning through the proposal, introduction, and partial operation of an Office of Program Development for New Castle County. This office was developed using the NASA Planning Process of 1968-69, with modifications suitable to the County.

The second result was a planned organizational intervention involving consideration of environment, structure and process.

A third result is the proposal of a theoretical framework for organizational intervention. Based mainly upon Parsons and H. A. Innis, this framework posits four action systems of human action which are present in all organizations. These are the cultural system, the social system, the personality system, and the

behavioral organism.¹ Within each of these systems there must be a concern for the control of space, the control of time, and causation.² These three latter dimensions are proposed as corresponding to the concern within an organization for structure, process and environment.

This proposed framework for theory is by no means fully developed. It is rather a proposed direction for future research activity. As such, it may be viewed as a tentative reformulation of the intervention hypothesis.

CLIENT FEEDBACK

The following comments concerning this project were obtained from various individual and group interviews with New Castle County officials in October and November 1972.

- ° "We had a good briefing on our failure to communicate, cooperate and coordinate. Results have not occurred. We are doing better in limited areas but generally seem more bogged down than ever."
- ° "We had a one-day seminar involving Management by Objectives aimed at improving management in the Personnel Department. The program was very helpful in solidifying a method of management. In total it was very helpful and I use the system now."
- ° "Since we did not know what the NASA Planning Process was, it is difficult to analyze the effectiveness and success of the transfer."

¹Talcott Parsons, Societies: Evolutionary and Comparative Perspectives, Foundations of Modern Sociology Series (Englewood Cliffs, N. J., Prentice-Hall, Inc., 1966), p. 7.

²Harold A. Innis, Empire and Communications (Oxford: At the Clarendon Press, 1950), p. 7.

We were encouraged to pursue the management training program in which 26 key staff people participated but none of the planning was done by Tom Michael."

° "I felt like we were being used in a kind of experiment rather than an attempt to improve through an action oriented process. The Personnel Department did get acquainted with the management planning process, i.e., goal setting as a result of the Drexel program, but I saw little else. Also, we had one session on role playing, sensitivity and individual relationships. My feeling is that the Drexel program did not have a major impact on this component. Perhaps though there are intangible results that I am not aware of."

° "The project had a high probability of accomplishing the stated goals, but I believe it failed. The interview process led me to the conclusion that vehicles or methods for improving communications between affected agencies and expediting the problem solving capabilities of (the) county would be enhanced. This has not occurred (because):

- a) Frustration is at the highest level ever among management at least so far as my experience here would indicate.
- b) Formal communications have not deteriorated--they have expired.
- c) 'Feedback' up or down is nonexistent."

° In general county officials felt:

- They were getting a study that did not bear much relation to trying to improve the overall effectiveness of county management.

- They did get better acquainted with each other through sensitivity training.
- They were not fully aware of what the Drexel team wanted to accomplish.
- They did not know what goals were until the program was finished.
- Departmental day-to-day routine kept them too busy to get involved in the program.
- Those who took part in the management game were very confused about what was supposed to happen.

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PROJECT: Water Management

Research Associate: J. A. Orlando

Thesis Title: A Study of the Impact of Technological Change in Organizational Processes in New Castle County, Delaware.

The Study Objectives

During the 18-month application phase, Mr. Orlando tested two hypotheses. These are:

- That aerospace management technology and specifically the NASA Planning Process could be successfully transferred to an urban system.
- That the impact of technological change could be utilized as a force for the achievement of planned organizational change.

Although NASA is large and complex, an organization of 420,000 people, and had many problems with the planning process, it was felt as a first hypothesis that the same principles of planning

could be applied to an organization of less than one thousand that was responsible for governing 380,000 people.

A major effort under this study was the application of the NASA Planning Process to the water management problems of New Castle County.

A second hypothesis was that the impact of technological change could be used as part of an Organization Development (OD) Program. Technology is growing so rapidly that it is having an effect on all organizations. There are some technologies where the changes are so rapid that they have the effect of causing major structural and procedural changes in the organizations with which they interface. Many of these changes are undesirable. OD is the science of planned change to increase organizational effectiveness. The OD practitioner may have much to offer: first to avoid the undesirable effects of technological growth, and then to make use of the force of technological growth for change as a catalyst to achieve planned positive organizational changes.

Principal Results

The major findings of this study were that:

- ° The NASA Planning Process could be adapted to large urban systems.
- ° Rapid technological change could cause major changes in an organization.
- ° The force behind this change process could be utilized to accomplish specific planned changes.

The planning process which was developed in New Castle County for water planning was considerably smaller and less complex than the

process developed in NASA. The County process also made more use of higher level management in the working groups than did the NASA Planning Process. Both of these factors were significant to the success of the County water planning process.

The rapid development of water technology had a marked effect on the performance of one of the county's departments. The department was moving toward a decrease in effectiveness as a result of a lack of capability to evaluate and utilize recent developments in water technology. Mr. Orlando was able to reverse this situation by reversing the direction of change brought on by this technological impact.

A major cause for ineffective decision-making has been the use of techniques which are inappropriate for that particular decision situation. This is particularly true in situations characterized by rapid technological change and was very evident in water planning in the County. Decision makers were unaware that the nature of the problem was changing, and were therefore still using techniques which were useful in earlier decision-making situations, but were no longer appropriate in the new situation.

CLIENT FEEDBACK

The following comments concerning the project were obtained from various individual and group interviews with New Castle County officials in October and November 1972.

° "Hypothesis: water resources management, fact: sewer management."

- ° "Water and sewer management office and panel are not being established. It is too early to evaluate effectiveness of organizational changes. However, a water plan is now being developed with Chester County."
- ° "The (Drexel) project was the catalyst for forcing county action. The validity of the results will be measured by future actions."
- ° "Goals: any reasonable planning process could be applied to establish this office. Results: the goals were achieved."
- ° "This program resulted in some good recommendations and should provide excellent future results if carried out as suggested."
- ° When asked how coordination between existing departments and the structure which NASA Planning provided to attack the water resources problem worked, several officials pointed out that, as usually is the case, only a very few individuals actually did the work but that enthusiasm and commitment were generated and relationships between the people involved were improved.
- ° It was also pointed out that when the emphasis of the water resources panel was shifted from a specific solution (building a dam - which had produced conflict with Chester County) to the generic problem of water needs, the group was able to involve other resources in other geographic areas in the search.
- ° One member of the water resources panel said that he failed to see how the NASA Planning Process was transferred and, in fact, was not aware of any special planning technique being used.

* * * * *

PROJECT: Management Effectiveness

Research Associate: S. Siegel

Thesis Title: Subjective Risk within the Group Decision Making Process.

The current movement towards group decision-making, largely a result of the technology explosion, has stimulated the need for research directed at a better understanding and prediction of the way such groups function. The major emphasis of documented research in decision-making has been in the area of the rational components of decision acts such as expected payoffs, probabilities of outcomes, utility functions, profit maximization, and other variables which are more appropriate to individuals engaged in choice points and not groups working as a unit. This project attempted to analyze the internal dynamics of a group as it engaged in the process of decision-making. The particular focal point is the relationship between the risk-taking characteristics of the group and its resultant performance as a decision-making unit. Risk-taking was explored as a function of the group's willingness to engage in conflict and strive for synergism instead of more traditional modes of behavior, such as suppression and avoidance of threatening situations.

Representative groups from industry and government agencies were tested to determine their risk indices. Utilizing MISPA, a simulation of a typical management group responsible for the evaluation of information and the allocation of resources, the performance

of groups over a two- to three-year period was analyzed for significant relationships with their group risk indices.

Several groups with known low-risk characteristics were subjected to lengthy intervention sessions in an attempt to modify their risk patterns and improve their performance as decision-makers. Finally, the basic research findings were introduced into the management system of the executive branch of the New Castle County government.

RESEARCH RESULTS

Results of the research showed a significant correlation between the group's risk-taking propensity and its performance in decision-making. Higher risk groups out-performed the lower risk groups. The learning curves for low-risk groups seldom increase with time at the same rate as higher risk groups, and the learning function greatly determines the group's subsequent performance levels. The possibility of modifying the risk characteristics of a group to improve its performance was clearly demonstrated.

While it is too early to evaluate fully the results of the transfer of these research findings into the urban system, there were definite indications that the key executives were experimenting with new forms of behavior. Conflict situations were openly recognized, and attitudes and feelings were shared a little more freely as the organization engaged in its decision-making process.

CLIENT FEEDBACK

The following comments concerning this project were obtained from various individual and group interviews with New Castle County officials in October and November 1972.

° "I participated in the risk management game. It was interesting, effective and helpful. I'd like to see a follow-up with participants outlining what the objectives of this study were, and the results."

° "Overall Management Effectiveness--I don't feel this was as effective as stated."

° "I didn't know this project was included (in the Drexel program). All county elements are communicating better but we are far from the end state on an every-day basis."

° "Some progress has been made but there still appears to be a lack of effective cohesiveness, sense of direction, and positive leadership."

° "As an observer: This program opened some communication between previous County Executive and Chief Executive officer but failed to clarify division of responsibility. (The program had) little organizational impact."

* * * * *

PROJECTS: De La Warr Social Service Center

Belvedere Community Relations

Research Associate: G. Mason Cadwell, Jr.

Thesis Title: Intervention into a Turbulent Urban Situation: A Case Study

The premise of the NASA/Drexel Program was that management technology developed for the space program could be utilized or adapted for application to urban problems.

A clinical methodology, "Action Research," was adopted to guide the operational implementation of selected technology to solve specific problems in the De La Warr and Belvedere areas of New Castle County. Within the conduct of the program it was found that the management philosophy which guided NASA in development of specific management tools to meet their problems had relevance to this researcher's efforts. Thus, the scope of the program was expanded to evaluate the utility of NASA's philosophy and approach to management as well as the application of specific management tools to meet specific assigned problems.

Conclusions drawn from this study are drawn from several points of view:

- ° Action Research Process
- ° Philosophy of Management in a Turbulent Environment
- ° NASA Management Technology
- ° Achievements in New Castle County

ACTION RESEARCH PROCESS

The Action Research Methodology provided that action-interventions be planned and taken in response to needs of the client system; and that these needs would be identified during the clinical phase of the NASA/Drexel Program. Thus, the Action Research Methodology had an important impact: issues of problem selection, identification of aspects of the environment which were of concern,

pin-pointing the relevant phenomena, etc., were not determined in advance. They were determined in conjunction with the client in response to his particular problems. And these issues are the specific issues of decision-making within a Turbulent Environment.

PHILOSOPHY OF MANAGEMENT

A "turbulent environment" is one in which the dynamics arise from (1) interaction among organizations within the environment, and (2) discontinuities with past experience; that is, additional factors and the multiple character of causal interconnections require that effort be invested in the determination of relevant factors and their impact on problems at hand prior to the application of some tool or technique which may have been effective in the past.

Elements of the NASA Management philosophy were specifically applicable in a turbulent environment. Their application in the action research phase led to several concepts which appear to have general application within an urban environment.

1. The concept of turbulence led to a specific program of identification of forces, issues, problems, etc., relative to the situation at hand. It is this researcher's conviction that the reliance on history, and an inattention to discontinuities in the present, lead to Huxtable's ". . . theories and presentations that seem so intellectually compelling (but which) go up in smoke when faced with the human and political equation . . ."*

* Ada Louise Huxtable, New York Times, Nov. 19, 1969.

2. Psychological and sociological concepts were used operationally to guide action. The identification of black rage, psychological feelings of impotence, an inability to impact the "system" except in violence, appear to be general problems facing those responsible for management in the public arena. These were approached in this Action Research effort through the mechanism of a participative planning panel.

3. The relationship of information availability and flow to a problem-solving effort are important. Additionally, the participative planning process led to a shift in attitude, which appears to be a controlling factor in the perception and use of communicated data. Thus, the concept of meta-communication, or attention to the forces which govern communication, is considered to be of the utmost importance.

NASA MANAGEMENT TECHNOLOGY

NASA Planning Panel

The NASA Planning Panel provided a process for participative planning of the De La Warr Social Services Center. Due to the turbulent environment, the relevant aspects of the problem had to be defined before beginning to approach solutions. The planning panel established in De La Warr brought together those closest to the problem--representatives of the needs (the community) and resources (government and private social service agencies)--in a long-term cooperative problem-solving effort. The Planning Panel also provided a base for attack on other problems, such as black identity and competence, group to group relationships (both black-white

and citizen-bureaucrat), and provided a non-violent means for having the governmental system respond to community needs.

Additionally, in response to a shooting crisis, a one-day workshop in Belvedere successfully telescoped the long-term De La Warr process.

ACHIEVEMENTS IN NEW CASTLE COUNTY

1. De La Warr Social Services Facility

Groundbreaking ceremonies for the De La Warr Community Center were held on Saturday, October 14, 1972. This social service facility, with its broad definition of social and health (as contrasted with medical) services, together with the planning process which brought together needs and resources in a cooperative effort, were heralded on the occasion as a "prototype" for a newly conceived federal program for establishing federal centers for the advancement of human potential.

2. Establishment of Planning Panel

The Ad Hoc Committee had provided an excellent mechanism for channeling divisive picketing into constructive problem-solving efforts, and developing commitment towards the superordinate goal of social services for the area. The thrust of the Ad Hoc Committee was continued beyond its original charter by using its members as the basis for a citizen's Advisory Board to oversee the completed Social Services Center and its programs.

3. Communications and Coordination

Participation in the planning process enabled increased communications and coordination of various levels of government and private effort towards both the De La Warr and Belvedere areas.

Once established, the integration of efforts was continued, both formally and informally (and subsequently was expanded to other problems of joint interest as diverse as dance theatre for teens, increasing the tax base, and "turn in a pusher" programs).

Additionally, the need to enhance communications and coordination within the County Government resulted in the establishment of an interdepartmental planning group which is responsible for internal coordination of departments and linkage with outside organizations as needed for specific projects and problems.

CLIENT FEEDBACK

The following comments concerning the project were obtained from various individual and group interviews with New Castle County officials in October and November, 1972.

De La Warr Social Service Center

° "The process as outlined was followed and I believe a lessening of tensions was obtained. However, this may be a temporary and not a lasting accomplishment. Why?

- a) Community leadership could not be identified with any accuracy.
- b) County doesn't impress me as sincere in their commitment to the program.
- c) Followthrough, in an action sense, is not a real possibility.
- d) The Drexel team was received as a passing phenomena and was not taken seriously by the county department heads."

° "Failed to build a support group within county government. Only county executive and researchers were informed of events."

- ° "I agree with results but communication with some agencies, that should have been involved, was non-existent for the most part."
- ° "The need for this project is honesty, the people of this development must do something to earn it, not just stand by and ask for it and expect it to be done."
- ° "Result: county government is pursuing path to integrate various departments to involve them in community services, but I think the process needs better supervision, better inputs, etc."
- ° General agreement that communications were made better.
- ° Most department heads complained that they were not informed of progress on this project and that it had been taken out of their hands, but that the results show that leadership was developed.

Belvedere Community Relations

- ° "Activity did involve city staff and responsibilities are underway."

* * * * *

CLIENT FEEDBACK: OVERALL

The following general comments concerning the overall effectiveness of the NASA/Drexel program goals were obtained from various individual and group interviews with New Castle County officials in October and November 1972.

- ° "Till today I didn't understand who all those in the project were."
- ° "There was not sufficient consideration given to the problems each department was suffering in growth. We were so busy putting out brush fires, understaffed, that we didn't have time to even try

to understand what you (the Drexel team) were telling us--we were listening, but we didn't always hear you."

° "At the start of the program we were all asked whether we thought it would be valuable to us to have the Drexel people here in the first place. We said we thought it would and listed topics where you might be assigned. That was the end of it. All of a sudden you were out there working and nobody really knew what was going on unless one happened to be a part of that particular project. Even in our own staff meetings we kept asking for reports but never got any."

° "The County Executive never used his department heads as a team. Most were new and primarily concerned with getting their shops in order. Therefore, the combination of the County Executive's working style and the urgency of department heads to master their own departments made it very difficult to work an integrated team approach."

° "In my two years here I've never known the goals of the County Administration."

° "In my brief experience with the Drexel Group, I believe the general goals have been met and are definitely a positive step towards better local government."

° "I did not know nor was it apparent from the presentations made that the members of the (Drexel) team had any expertise at all to accomplish what they had set out to do."

° "I think this Drexel team did bring people together to talk. Maybe the total problem was so great that it could not be accomplished

in two years, but certainly the openness with which we are talking right now lends some kind of proof to the results of this (Drexel) team."

° "Goal setting and setting priorities is really what has been accomplished. This is an outgrowth of the (Drexel) team that we didn't have before."

° "Certainly there has been some positive result to this whole (Drexel Team) approach, even without knowing exactly what we were doing. I feel that I've seen some positive changes and the door has been opened--we are sitting down and talking to one another so there is only one way to go, and that's up."

When county officials were asked if there was a way that they could institutionalize this process, two significant replies were received:

° "I don't think we can predict that sitting here today because we now have a new administration to get used to."

° "We now have a sound base to do something on--how much is continued is pure conjecture. But, without that base we couldn't have had the conversation that went on here today. We wouldn't have had department heads and others sitting together talking frankly, so there certainly is room to go ahead."

SECTION V
CONCLUSIONS

The conclusions drawn from this total research effort and from the five specific projects which made up that effort are discussed below from two points of view:

- NASA GRANT OBJECTIVES
- NEW CASTLE COUNTY ACHIEVEMENTS

I. NASA GRANT OBJECTIVES

The basic objectives of this research effort were threefold:

1. To demonstrate the applicability of the NASA organization and management experience to the solution of large-scale public administration problems;
2. To expand the curriculum, faculty competence and research capability of Drexel University; and,
3. To determine the applicability of similar programs to other large-scale problems of concern to the nation.

A. Application of NASA Experience to New Castle County

The NASA organization and management experience was applied in New Castle County to meet specific client problems in two specific ways at both the management tool and the conceptual problem solving levels:

1. NASA Participative Planning Process

The tool of planning developed by NASA--the NASA Participative Planning Process--was applied in several instances to enable the development of viable plans for action.

- ° In Housing the NASA Planning Process provided a vehicle--The Housing Cabinet--to enable diverse governmental groups to focus on housing problems confronting the county.
- ° In Water Resources Management the Planning Process provided the structure upon which a team could be assembled from members of involved governmental departments to explore the County's needs, resources and the impact of technological advance in water technology upon decision making within the organization.
- ° In Management Effectiveness the NASA Planning Process allowed the county management to recognize the need for, and subsequently to establish, a Program Planning and Development Department.
- ° In De La Warr the NASA Planning Process was used as a model for involving community representatives with local and state officials in an Ad Hoc Task Force involving needs and resources in joint problem definition and exploration of action programs. The result of this effort channeled community violence into constructive problem solving.

The usefulness of the NASA Planning Process as a general tool for planning within an urban environment was therefore clearly established.

2. Management within a Turbulent Environment

The NASA Management concept which recognizes that specific attention must be given to the need for identification of new factors, processes, hazards and opportunities, etc., was also used. This concept recognizes that in a rapidly changing world it is often inadequate to apply yesterday's solution to today's problems even though the problems are similar. Therefore, attention was given to the process of identifying and evaluating new factors and interdependencies:

- ° In Water Resources Management the problem of building a dam was redefined to obtaining a needed resource: water. And thus opened the door for consideration of advances in technology and elicited the cooperation and support of individuals and groups who had previously been hostile to the dam proposal.
- ° In Management Effectiveness the concept of turbulence was used to point toward the need for specific action concerning integration of the various departments and divisions in order to meet a changing environment.
- ° In De La Warr the mechanism for meeting newly emergent factors such as Black Rage and the perceived inability to impact government except in violence were identified and established. The NASA Planning Process was used as a device within a turbulent environment for focusing all interested persons and groups toward problem-solving in an orderly fashion.

B. Expansion of the Drexel University Research Capability

The NASA/Drexel program served as a pilot project in the University's effort to develop new educational programs to provide both relevant training and experience. The Center for Urban Research and Environmental Studies (CURES), described in Appendix J, was instituted and represents the University's commitment to continually explore how to relate the University's resources in a creative and realistic way to today's urban problems.

The objectives of CURES have been:

- ° To enrich the educational experience of both undergraduates and graduate students by means of research and study oriented to the environmental and urban problems of society, and
- ° To enhance and encourage communication among scholars in the various academic disciplines at Drexel so that the full force of faculty and student capabilities in the arts, engineering, and physical, social and life sciences may be brought to bear on societal problems.

CURES not only uses resources at Drexel, but where appropriate joins with other institutions in joint studies. To this end a continuing arrangement has been made with the Franklin Institute to jointly conduct research activities in the areas of mutual concern. CURES also participates in projects through the University City Science Center, and Drexel through CURES is a participant in the Mid-Atlantic Consortium for Air Pollution Control, an unincorporated association of universities. In other instances, cooperative

agreements are made directly with other educational institutions and with government agencies and private organizations.

C. Applicability to Similar Large-Scale Problems

The applicability of the NASA/Drexel program to other large-scale problems of concern to the nation has been approached in several ways:

1. Dissemination of knowledge.

In May 1972 Drexel University conducted a symposium on The Application of NASA Management Technology to Urban Problems.* Key-noted by Dr. James Webb, past Administrator of NASA, the program was well attended by public administrators and university teaching and research personnel.

2. Establishment of CURES.

The establishment of the Center for Urban Research and Environmental Studies (CURES) and increased competence within the Drexel community will continue to disseminate knowledge through the teaching of future public administrators and the availability of Drexel's professional consulting capability.

3. Subsequent Activities of Research Associates.

The experience gained by the Research Associates on this project is currently being applied:

- ° Continued consulting association with New Castle County;
- ° University teaching in management and organization behavior;
- ° Consultation in Decision Sciences;
- ° Planning and implementing New Towns and Communities.

*Symposia proceedings available from Drexel University.

II. NEW CASTLE COUNTY ACHIEVEMENTS

From the New Castle County (client's) point of view the following achievements were gained as a result of the NASA/Drexel program.

A. County Organization

- ° Establishment of the Program, Planning and Evaluation Department.
- ° Establishment of Inter-departmental staff meetings.
- ° Establishment of the Housing Cabinet.
- ° Establishment of the Water Resources Office.

B. County Organizational Effectiveness

- ° Increased problem-solving through better communications and management by objective.
- ° Increased awareness of new problems facing urban government (Black rage, advanced technology, etc.) with participative planning mechanisms to help meet them.

C. Hardware

- ° The Whitney Young Center for Human Potential under construction in De La Warr.
- ° The New Castle County Housing Authority (viable until the HUD freeze of 30 December, 1972).

III. SUMMARY

It is clear that the NASA/Drexel project resulted in a new look at problems within one critical urban center--New Castle County, Delaware.

Using concepts of turbulence, the project used the NASA Planning Process as a device to expose, analyze and evaluate critical factors and to develop a base of directed problem-solving effort through the participative elements of the process.

While many gained from this effort, it is clear that elements of the client system were not aware or were unwilling to face the demands of new perceptions and knowledge of a changing world during the program. It is interesting to note, however, that those who found fault with the individual projects during the evaluation, which took place for the preparation of this report, are the same people who pointed out:

"Goal setting and setting priorities is really what has been accomplished . . . we didn't have (that) before."

"(The NASA/Drexel Team) brought us together. We never talked like this before."

The cumulative effect of the various projects yielded a thrust toward communications, facing problems and setting priorities. Thus, the Action Research program achieved its goal of leaving behind a much more viable government--able to cope with today's needs--than was found when the program began.

APPENDICES

APPENDIX A

"BUILD" --A Community Development Simulation Game

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Gaming and simulation have a long tradition as tools for policy making professionals. War games, logistics games, and business games are examples. The advent of the digital computer greatly enriched the possibilities, and there has been a proliferation of simulation games in the last ten years. A recent development is the appearance of computer based urban decision-making games. These include the Cornell Land Use Game (CLUG) created by Allan Feidt; METRO, by Richard Duke of The University of Michigan; GSPIA Decision Game by Hendricks and Rogers of The University of Pittsburgh; and CITY by House and Patterson of Envirometrics, Washington, D. C. The emphasis in these games is on technical decision making about the incremental development and expansion of a real or hypothetical city. A game experience typically introduces the participant to the richness and complexity of urban decision making and to phenomena of group interaction such as value conflicts and clashes of personalities.

It is obvious that the urban system is quite different from the directly competitive nature of warfare and business. The "enemy"

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is a collection of economic, technical, political, social and other constraints rather than a collection of other players seeking the well defined goal of "winning." Of course, players in the real or simulated urban world often decide to act competitively from narrow economic or political bases. This fact of life, along with the relatively non-heirarchical decision-making structure shifts the emphasis in urban affairs toward negotiation and compromise away from the structured decision-making found in military and business operations. It is our position that these facts have not been adequately recognized in urban simulation and gaming and that the method has not yet extracted itself from the older tradition. In addition the techniques associated with computer implementation appear to incorrectly present the urban problem as a primarily technical and managerial one, rather than a political, social, psychological, and even cultural one. In addition, we find that existing games tend to be heavily oriented toward management by professionals of large-scale established urban complexes rather than redevelopment of existing small communities by the members themselves, an increasing real world trend. Starting from this background our specific goals in writing BUILD were the following:

1. To allow maximum expression of value positions by participants through resolution of intense, task-oriented conflicts.
2. To heuristically gather information on both the technical and social functioning of the city through feedback from participants.

3. To provide community participants with access to technical expertise in urban decision making, and to expose professionals to the value positions of the community.
4. To lay the groundwork for eventual development of an actual policy making tool. Considering the present state of our knowledge this goal appears somewhat distant. We have, however, structured the game so that it can be made specific to a given area through incorporation of local data. Thus, the theoretical potential exists for decision makers themselves to use this tool as a supplement to the conventional ones of staff studies, memoranda, committee meetings, and so forth.

We have found that aside from stating a general position as above it is relatively ineffective to talk about a game. Like sex, it is an intense experience which can only be truly appreciated by doing it. Hence, the remainder of this paper consists of a brief description of the roles, sample input/output formats, an initial scenario, and information on accessing the game through a time-sharing system. BUILD can presently be played from any telephone using a teletype unit and acoustic coupler. Some of the future technological steps which suggest themselves are to utilize low-cost video terminals and graphic display of layouts. No amount of exotic space-age gadgetry, however, can substitute for the realization of human values by actual humans. The dangers of becoming fascinated by technique are real and ever present. Despite some

opinion to the contrary we feel that computer-based simulation gaming has humanizing potential. When this ceases to be true it will be time to change to another game.

ROLES

Mayor - the mayor must set tax rates and department budgets for each year. He is responsible for all borrowing decisions. The mayor can also change the tax rate on any particular business property.

Zoning and City Planning - The department is responsible for construction of highways, piers, parks and playgrounds. It can set all zoning requirements and must approve development plans. Zoning and City Planning must also maintain a city map.

School Board - The school board can increase or decrease the size of the teaching staff as well as teacher salary. It is responsible for pre-school and adult education programs. The school board can construct schools as needed.

Health and Welfare - This department sets the payment schedules for the employed, and dependent children allowances. It also is responsible for job training programs. Health and welfare can construct community health service centers or clinics.

Police - The department sets the size and salary of police force. It is also responsible for construction of new stations.

National Business - National business can invest either in the city or the outside economy. It can invest in production, technical, warehouse, or office units. It can sponsor job training programs and elect to use lower skilled community labor on the work force.

Local Business - Local business can only invest in the community, and only in either retail or service establishments.

Planner - the planner is responsible for developing land development plans for community people.

Agitator - the agitator applies whatever pressure he can to better the position of community people.

People - the people (Parents & Labor) must use whatever influence they can to control the city redevelopment as they want it.

SOCIAL PARAMETERS REQUESTED BY 'MAY'

CRIME RATE IS 17 CRIMES/1000 PEOPLE.
A TOTAL OF 1241 CRIMES WERE REPORTED.

SCHOOL DROP OUT RATE IS 17%.

SCHOOL TRUANCY RATE IS 9%.

AVERAGE EDUCATION LEVEL IS 8.4 YEARS.

PER CAPITA INCOME IS \$1025.

UNEMPLOYMENT RATE IS 13.0%.

A TOTAL OF 0 JOBS ARE AVAILABLE.

GENERAL MAINTENANCE LEVEL IS FAIR.

74% OF PEOPLE ARE REGISTERED TO VOTE.
58% ACTUALLY DID VOTE.

NET MIGRATION FOR THIS YEAR IS 3900 INTO NEIGHBORHOOD.

POPULATION DENSITY IS 19109 PEOPLE/SQ. MILE.

MEDIAN AGE IS 25 YEARS.

AVERAGE FAMILY SIZE IS 5.6 PERSONS.

WORKING DATA FOR MAYOR

ESTIMATED TAX BASES FOR YEAR 1971

TOTAL EXPECTED TAXABLE INCOME IS \$ 120000000
 TOTAL SALES EXPECTED IS \$ 75000000
 TOTAL TAXABLE PROPERTIES VALUED AT \$ 725000000

ESTIMATED INCOME FOR NEXT YEAR

\$ 3600000 FROM INCOME TAX
 \$ 4500000 FROM SALES TAX
 \$ 14500000 FROM REAL ESTATE TAX
 \$ 12000000 FROM FEDERAL GOVERNMENT
 \$ 34600000 TOTAL

ACTUAL EXPENSES FOR YEAR 1970 WERE \$ 23281000
 ACTUAL INCOME WAS \$ 22600000
 DEFICIT FOR YEAR IS \$ 681000

BORROWING DATA

AUTHORIZED BORROWING LIMIT IS \$ 25000000
 \$ 12000000 BORROWED TO DATE

BORROWING COSTS

PRINCIPAL, \$ 480000
 INTEREST, \$ 600000

PLEASE INPUT PLAYER ID?MAY

INPUT TAX RATES FOR THE YEAR 1973
SALES TAX RATE IS (%)?6
INCOME TAX RATE IS (%)?3
PROPERTY TAX RATE IS (%)?2

INPUT DEPARTMENT BUDGETS FOR YEAR 1973
ZONING AND CITY PLANNING BUDGET IS(\$)?265000
SCHOOL BOARD BUDGET IS (\$)?8100000
HEALTH AND WELFARE BUDGET IS (\$)?9500000
POLICE BUDGET IS (\$)?5100000
ARE THERE ANY PROPERTIES WHOSE TAX RATE IS TO CHANGE?
ANSWER 'YES' OR 'NO'?YES

PRODUCTION

INPUT NUMBER OF PROPERTIES TO BE CHANGED?1
INPUT LOCATION AND TAX RATE?E 9 1

TECHNICAL OPERATION

INPUT NUMBER OF PROPERTIES TO BE CHANGED?0
WAREHOUSES

INPUT NUMBER OF PROPERTIES TO BE CHANGED?0
OFFICE BUILDINGS
INPUT NUMBER OF PROPERTIES TO BE CHANGED?0

WORKING DATA FOR ZONING AND CITY PLANNING

APPROVED BUDGET IS \$ 241000

LAND USE SUMMARY

RECREATION	3%
HOUSING	62%
INDUSTRIAL	16%
GOVERNMENT	6%
VACANT	12%
OTHER	1%

COST OF HIGHWAY CONSTRUCTION IS \$ 750000 PER MILE

COST OF MAINTAINING 2 MILES OF HIGHWAY AT \$5500 PER MILE
IS \$ 11000

EXPECTED CONSTRUCTION COSTS FOR NEXT YEAR.

COST OF FIRE STATION IS \$ 400000
COST OF POLICE STATION IS \$ 650000COST OF A HEALTH CENTER IS \$ 1210000
COST OF A HEALTH CLINIC IS \$ 475000COST OF A PLAYGROUND IS \$ 230000
COST OF A PARK IS \$ 295000

COST OF PIER RECONSTRUCTION IS \$ 3100000 PER BERTH.

LOCATION OF PIERS

B- 9

C- 9

PLEASE INPUT PLATER ID?ZD

IS ANY HIGHWAY CONSTRUCTION BUDGETED?
ANSWER 'YES' OR 'NO'?YES
INPUT NUMBER OF MILES OF CONSTRUCTION?2

ARE ANY PIERS TO BE BUILT?
ANSWER 'YES' OR 'NO'?YES
INPUT NUMBER OF PIERS TO BE BUILT?1
INPUT LOCATION?D 9

ARE ANY PARKS TO BE BUILT?
ANSWER 'YES' OR 'NO'?NO

ARE ANY PLAYGROUNDS TO BE BUILT?
ANSWER 'YES' OR 'NO'?YES
INPUT NUMBER OF NEW PLAYGROUNDS?3
INPUT LOCATION?B 1
INPUT LOCATION?J 9
INPUT LOCATION?J 2

WORKING DATA FOR SCHOOL BOARD

APPROVED BUDGET IS \$ 7700000

THERE ARE 610 TEACHERS
AVERAGE TEACHER SALARY IS \$ 8100THE NUMBER OF CHILDREN IN PRE-SCHOOL TRAINING IS 250
AT A COST OF \$1500 PER CHILD

NUMBER OF ADULTS IN SCHOOL IS 50 AT A COST OF \$ 750 PER PERSON

TRUANCY RATES
LOWER SCHOOL 6%
MIDDLE SCHOOL 9%
HIGH SCHOOL 13%

DROP-OUT RATE IS 17%

COST OF A LOWER SCHOOL IS \$ 2970000
COST OF A MIDDLE SCHOOL IS \$ 6200000
COST OF A HIGH SCHOOL IS \$ 14430000

REQUIRED MAINTENANCE COSTS \$ 2350000

COST OF BUSSING 0 CHILDREN IS \$ 0

LOCATION	CAPACITY	ENROLLMENT	TYPE	MAINTENANCE LEVEL
A- 1	960	900	LOW	GOOD
A- 4	960	1000	LOW	GOOD
C- 2	960	1100	LOW	FAIR
B- 8	960	1200	LOW	FAIR
D- 5	960	1200	LOW	FAIR
G- 3	960	1100	LOW	FAIR
G- 6	960	1200	LOW	POOR
A- 2	1650	1750	MID	GOOD
D- 3	1650	2050	MID	FAIR
B- 6	3500	3900	HIGH	GOOD

PLEASE INPUT PLAYER ID?SCH

DO YOU WANT TO CHANGE THE NUMBER OF TEACHERS?

ANSWER 'YES' OR 'NO'?YES

ENTER THE CHANGE IN THE NUMBER OF TEACHERS' 6

DO YOU WANT TO CHANGE TEACHERS' SALARY?

ANSWER 'YES' OR 'NO'?YES

ENTER NEW SALARY (PER YEAR)?8550

HOW MANY CHILDREN IN PRESCHOOL PROGRAMS?

INPUT NUMBER?350

HOW MANY ADULTS IN SCHOOL?

INPUT NUMBER?150

ARE ANY SCHOOLS BUDGETED FOR CONSTRUCTION?

ANSWER 'YES' OR 'NO'?YES

INPUT NUMBER?1

INPUT SCHOOL LOCATION?E 7

ENTER SCHOOL CAPACITY?1650

ENTER SCHOOL LEVEL

LOWER='LOW'

MIDDLE='MID'

HIGH='HIGH'?MID

ANY SCHOOLS BUDGETED FOR PLANNING?

ANSWER 'YES' OR 'NO'?YES

INPUT NUMBER?2

WORKING DATA FOR HEALTH AND WELFARE**APPROVED BUDGET IS \$ 9750000****NUMBER OF ADULTS RECEIVING PAYMENTS IS 3403
NUMBER OF CHILDREN RECEIVING PAYMENTS IS 1950****COST OF JOB TRAINING IS \$ 750 PER PERSON****PARK LOCATIONS****A- 7****PLAYGROUND LOCATIONS****B- 1****B- 3****F- 7****HEALTH CENTER LOCATIONS****B- 3****HEALTH CLINIC LOCATIONS****D- 9**

PLEASE INPUT PLAYER ID?HW

DO YOU WANT TO CHANGE UNEMPLOYMENT PAYMENT RATE?

ANSWER 'YES' OR 'NO'?YES

ENTER NEW WEEKLY PAYMENT?48

DO YOU WANT TO CHANGE CHILD ALLOWANCE?

ANSWER 'YES' OR 'NO'?YES

ENTER NEW ALLOWANCE PER CHILD?11

HOW MANY PEOPLE WILL BE ON JOB-TRAINING PROGRAMS?

INPUT NUMBER?150

ARE ANY HEALTH CENTERS TO BE BUILT?

ANSWER 'YES' OR 'NO'?YES

ENTER NUMBER OF NEW HEALTH CENTERS?1

INPUT LOCATION?I 8

ARE ANY HEALTH CLINICS TO BE BUILT?

ANSWER 'YES' OR 'NO'?NO

WORKING DATA FOR POLICE CHIEF**APPROVED BUDGET IS \$ 4510000****POLICEFORCE CONSISTS OF 360 MEN
AVERAGE SALARY IS \$ 9200****REQUIRED MAINTENANCE COSTS \$ 1200000****LOCATION OF POLICE STATIONS****C- 5****J- 5**

PLEASE INPUT PLAYER ID?POL

DO YOU WANT TO CHANGE THE NUMBER OF POLICE?

ANSWER 'YES' OR 'NO'?YES

WHAT IS THE CHANGE?

INPUT NUMBER?-60

DO YOU WANT TO CHANGE POLICE SALARY?

ANSWER 'YES' OR 'NO'?YES

ENTER NEW SALARY?9850

ARE ANY POLICE STATIONS TO BE BUILT?

ANSWER 'YES' OR 'NO'?YES

ENTER THE NUMBER OF NEW STATIONS?2

INPUT LOCATION?A 8

INPUT LOCATION?G 9

WORKING DATA FOR NATIONAL BUSINESS

TOTAL ASSETS ARE NOW \$ 35000000
 \$ 77500000 INSIDE CITY
 \$ 272500000 OUTSIDE CITY

RETURN ON INVESTMENT

6% INSIDE CITY
 9% OUTSIDE CITY

\$ 19000000 AVAILABLE FOR INVESTMENT NEXT YEAR

BUILDING COSTS

PRODUCTION PLANT	\$	22500000
TECHNICAL OPERATION	\$	25000000
WAREHOUSE	\$	500000
OFFICE UNIT	\$	10000000

SKILL LEVEL OF COMMUNITY LABOR IS 56

	BUSINESS LOCATION	SIZE
PRODUCTION PLANTS		
	E- 9	1500
	H- 9	750
NO TECHNICAL OPERATIONS		
WAREHOUSES		
	C- 8	50
	E- 6	20
	E- 8	30
	H- 5	40
	F- 1	60
NO OFFICE UNITS		

SIZE OF STANDARD BUSINESS UNITS

750 PRODUCTION
 500 TECHNICAL OPERATION
 10 WAREHOUSE
 500 OFFICE UNIT

PLEASE INPUT PLAYER ID?NBUS

DO YOU WANT TO FINANCE A JOB TRAINING PROGRAM?

ANSWER 'YES' OR 'NO'?YES

HOW MANY PEOPLE ON THE PROGRAM?250

HOW MUCH ADDITIONAL IS TO BE INVESTED INSIDE THE COMMUNITY?25000000

DO YOU WISH TO BUILD ANY PRODUCTION PLANTS?

ANSWER 'YES' OR 'NO'?NO

DO YOU WISH TO BUILD A TECHNICAL OPERATION SITE?

ANSWER 'YES' OR 'NO'?YES

HOW MANY PLANTS?1

ENTER LOCATION AND SIZE?F 8 500

DO YOU WISH TO BUILD WAREHOUSES?

ANSWER 'YES' OR 'NO'?NO

DO YOU WISH TO BUILD OFFICE BUILDINGS?

ANSWER 'YES' OR 'NO'?NO

DO YOU WISH TO USE COMMUNITY LABOR?

INPUT % OF WORKING FORCE FROM LOCAL COMMUNITY?20

WORKING DATA FOR LOCAL BUSINESS

TOTAL ASSETS ARE \$ 3300000

RETURN ON INVESTMENT IS 4%

\$ 55000 AVAILABLE FOR INVESTMENT NEXT YEAR

BUILDING COSTS

RETAIL UNIT \$ 250000

SERVICE UNIT \$ 150000

	BUSINESS LOCATION	SIZE
RETAIL ESTABLISHMENTS		
	C- 1	25
	D- 5	15
	I- 6	20
SERVICE ESTABLISHMENTS		
	E- 2	10

SIZE OF STANDARD BUSINESS UNITS

5 RETAIL

5 SERVICE

PLEASE INPUT PLAYER ID?LBUS

HOW MUCH ADDITIONAL IS TO BE INVESTED INSIDE THE COMMUNITY?0
DO YOU WISH TO BUILD RETAIL UNITS?
ANSWER 'YES' OR 'NO'?NO
DO YOU WISH TO BUILD SERVICE UNITS?
ANSWER 'YES' OR 'NO'?NO

WORKING DATA FOR PLANNER

COST OF FIRE STATION IS \$	400000
COST OF POLICE STATION IS \$	650000
COST OF A HEALTH CENTER IS \$	475000
COST OF A HEALTH CLINIC IS \$	1210000
COST OF A PLAYGROUND IS \$	230000
COST OF A PARK IS \$	295000
COST OF PIER RECONSTRUCTION IS \$	3100000 PER BERTH

SAMPLE INITIAL SCENARIO

"River City" is a four square mile section of one of the oldest East Coast metropolitan areas. It is bounded by a major river along which are found a large number of vacant or run-down factories and warehouses. The southern portion is what is often called a "slum," although the people who live there are proud of their home, and intensely interested in improving conditions. The northwest corner is a stable middle class community of long standing. River City is now deeply troubled over three major issues:

- De facto segregation of schools.
- A proposed East-West expressway.
- A proposed industrial park along the river bank.

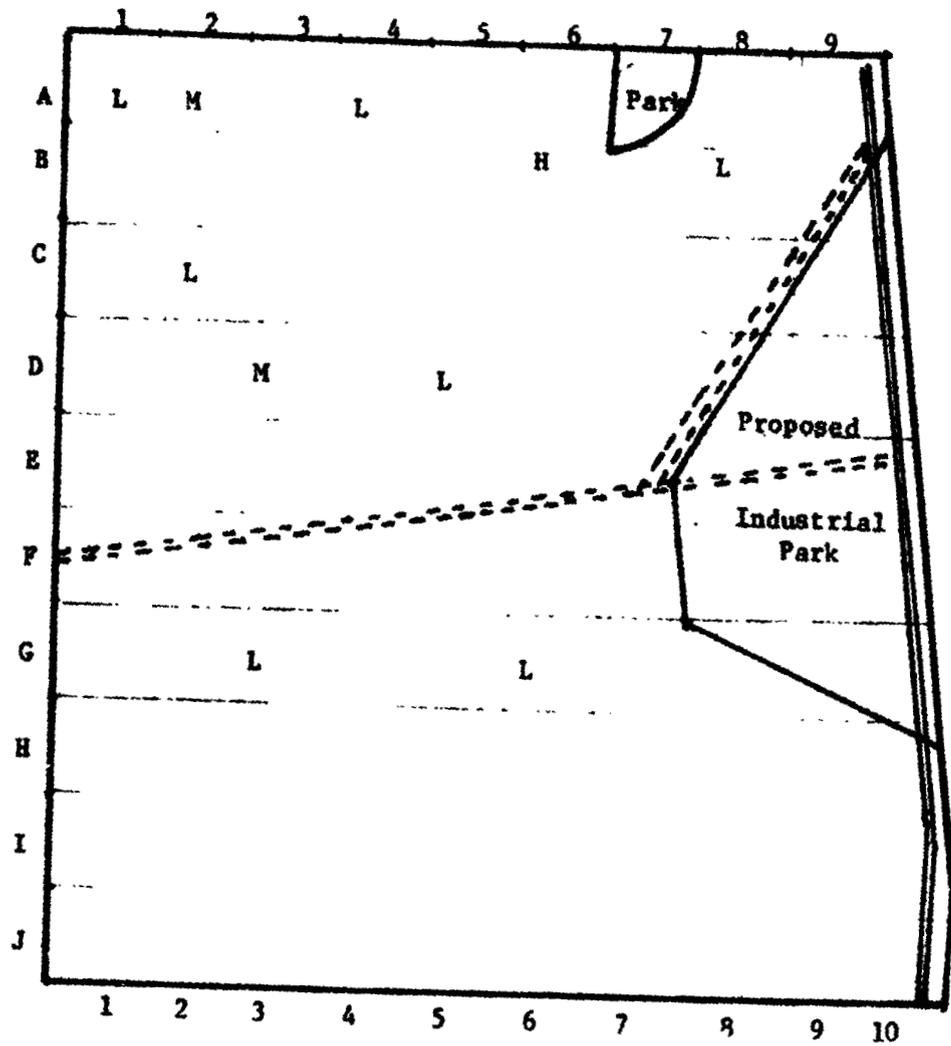
In addition, a large block of Federal money has just become available for redevelopment. As the game begins the Mayor is under pressure to develop a program which can unify the community.

COMPUTER IMPLEMENTATION

BUILD is presently available on the General Electric Mark II time sharing system. It can be accessed from any standard teletype unit through the telephone system. The simulation itself consists of 15 programs totalling 100,000 words and utilizes chaining. Once the Executive Program is executed no further program calls are required. All player decisions are made directly to the computer via the teletype. Program tapes and further information are available from the authors on request.

ACKNOWLEDGMENT

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RIVER CITY

Schools L = Low
 M = Middle
 H = High

==== Highway
 - - - - Proposed Highway

Scale 1" = .4 mile

1774-1007

APPENDIX B

THE COMMUNITY DEVELOPMENT WORKSHOP

by
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Introduction

There are encouraging trends in our society toward expanded individual participation in decision making processes. The decentralization of business operations, the complexity and diversity of governmental structures, and more recently the demands for student participation in shaping educational programs are all symptoms. Perhaps the most significant of all is the assumption of responsibility by residents of urban communities for decisions affecting their own environment. These developments represent a revitalization of democratic principles and hence are greatly to be welcomed. Two great dangers exist, however. One is that the complexity and specialization of tasks in a technological society will prevent a true participatory community from emerging. Democratic forms flourished primarily in agrarian societies. Many people have taken the pessimistic position that democracy and freedom are inconsistent

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with an industrial civilization, and have proposed either accepting such a situation and learning to live with it, establishing small communities employing primitive technology (Skinner's Walden Two, for example), or violently destroying the present economic base in hopes that somehow a more humane political structure will emerge from the ashes. We reject all of these.

Another obstacle to the development of a more participatory society is the great difficulty of communication among various subgroups. This is particularly true with regard to emotional polarizations concerning race, class, and lifestyle, and also over the traditional issues of economic and political power. Again, the pessimistic position asserts that communication is fundamentally impossible on these questions, and hence that some form of passive or active despair is necessary.

We also reject this position, but fully recognize that the pessimists may be right. There are certain problems for which no solution exists. The disadvantage of pessimism, however, is that it has a tendency to be self-fulfilling, i.e. the predicted and feared catastrophic outcome tends to come true through the prediction and fear itself. A realistic optimism, on the other hand, leaves two alternative futures open: failure, in which case we are no worse off than before, and success, in which case we are much better off. Hence, we have chosen to take the optimistic position. This paper describes some experiments designed to help overcome the two obstacles to realization of a humane, technologically based society which were stated above:

- (1) The obstacle of technical complexity
- (2) Emotionally based obstacles to communication.

The Community Development Workshop

The Community Development Workshop (CDW), now in its formative stages, is the name we have given to a collection of techniques designed to implement participation in the planning process. It is an eclectic approach, making use of current work in the psychology of groups, mathematical modeling and systems analysis, simulation gaming and other techniques. Hence, the CDW is more an attitude and orientation than a specific technical method. The following outline for one session indicates some of the psychological techniques employed, i.e. Confrontation, Synectics, and Encounter Micro-Labs.

COMMUNITY DEVELOPMENT WORKSHOP

Outline for February 22-23, 1969

Tarrytown House
Tarrytown, N. Y.

1. Format: Weekend marathon, 30 hours, noon Saturday to 6 P.M. Sunday.
2. Participants: up to 24 people drawn from Node Four Associates, Drexel Institute of Technology, and the future Marcus Garvey Gardens community.
3. Purposes:
 - (1) For the above to establish a working relationship.
 - (2) To develop new mechanisms for goal-directed group effort.
 - (3) To develop a proposal for financial support of the same.
 - (4) To develop specific task assignments in planning, technology, management, etc. for the community.

(5) To have fun.

4. Schedule (approximate):

1 1/2 hours. Lunch and socializing.

2 1/2 hours. Confrontation.

1 hour. Coffee break and party.

2 1/2 hours. Encounter Micro-Labs.

1 1/2 hours. Dinner and socializing.

1 1/2 hours. Synectics Groups.

1/2 hour. Music break.

1 hour. Art break.

1/2 hour. Snack and socializing.

2 1/2 hours. Confrontation.

3 hours. Sleep break.

1 hour. Breakfast and socializing.

1 1/2 hours. Synectics groups.

1/2 hour. Music break.

1 1/2 hours. Proposal and assignment writing.

2 1/2 hours. Encounter micro-labs.

1 1/2 hours. Lunch and socializing.

2 1/2 hours. Confrontation.

2 hours. Review and evaluation, written and oral. Party.

CONFRONTATION

Rule 1: No physical violence or threat of physical violence.

Background: Rule 1 above is superficially very simple, yet when explicitly stated becomes a powerful psychological mechanism for inducing "confrontation," i.e. a high degree of honest communication. The emotions involved may be hostile or cooperative. By explicitly recognizing the latent potential for violence in even the most "civilized" setting, and then overtly and emphatically ruling out such behavior small group interaction takes on many new dimensions. For this reason it is desirable that such a group contain several members with prior experience in Confrontation.

Note: It has been found that 12-15 participants is about optimum, and that 2 1/2 hours is a reasonable length of time for a session.

SYNECTICS

The Synectic process:

- (1) Making the strange familiar (fact gathering and analysis).
- (2) Making the familiar strange (creation).

Operational mechanisms:

- (1) Direct analogy.
- (2) Personal analogy.
- (3) Symbolic analogy.
- (4) Fantasy analogy.



Background: Synectics is a creative problem solving technique developed by William J. J. Gordon, President of Synectics, Inc. of Cambridge, Mass. The word "Synectics" was coined from "synthesis" and "eclectic" which refers to the creative technique involved, i.e. the synthesis of eclectic ideas. The concept is that creation implies the combination of diverse (and apparently improbable) ideas. The "operational mechanisms" above are designed to stimulate creative activity on the part of task-oriented small groups.

Note: A Synectics Group could range in size from three to about ten or twelve, depending upon the nature of the problem. Two and a half hours is a reasonable time for one session, but this can be quite flexible.

ENCOUNTER MICRO-LABS

Representative Experiments:

Physical unlocking, milling, blind walk, falling, lifting, stretching, pushing, breathing, association, fantasy, doubling, role playing, dyads, introspection, essence game, wordless meeting, inclusion/exclusion, verbal encounter, physical encounter.

Background: Encounter micro-lab exercises emerged out of the work of a number of groups including Esalen Institute, Big Sur, California; Orion, Tarrytown, New York; National Training Laboratories, Washington, D. C. and Bethel, Maine and others. They have been applied in a number of contexts and for a variety of purposes

ranging from psychotherapeutic to management development. The central theme is that of exploring alternate mechanisms for thinking, feeling, and relating.

Note: There is no specific group size or time period indicated.

The emphasis will be on trying a variety of exercises under carefully controlled conditions.

Another major ingredient of the Community Development Workshop concept is technical gaming - the use of computer-based simulation games to enable planners, architects, engineers, government officials, and members of the community to work together. Although a game situation is necessarily "unrealistic" to some degree it does provide a very useful vehicle for communication on a variety of questions ranging from the concept and philosophy of technical projects to detailed resource tradeoffs. Preliminary experience of this type has been gained with the game "City I" developed by Peter House, Phillip Patterson and their associates at the Washington Center for Metropolitan Studies (now established as Envirometrics, Inc., Washington, DC). A description of City I follows.

CITY I

City I is played by nine teams with three to five members per team who act as entrepreneurs in a partially urbanized county divided into four political jurisdictions. The playing board is divided into 625 square miles most of which are unowned by the teams at the

beginning of play. These land parcels may be purchased and developed by the teams during the course of the game. There are nine types of private land use which the teams can develop on a parcel of land: heavy industry, light industry, business goods, business services, personal goods, personal services, high-income residences, middle-income residences, and low-income residences.

Each of the nine teams is elected or appointed by elected officials to assume the duties of one of nine governmental roles, which are played simultaneously with the entrepreneurial functions common to all teams. The elected officials (the County Chairman and the Central City Council) must satisfy the electorate (the other team) in order to stay in office each round. The Chairman team appoints other teams to play the roles of the School, Public Works and Safety, Highway, Planning and Zoning, and Finance departments. The two residual teams play the Mass Media and Citizen's Organizations. The governmental departments build schools, provide utilities, build and upgrade roads and terminals, maintain roads, buy parkland, zone land, and estimate revenues.

Teams set their own objectives for both the public and private actions they undertake. Team decisions are recorded each round (approximately two hours in length) by a computer, which acts as an accountant and indicates the effects of the teams' actions on one another and on the county itself. The interaction of public and private decisions and their influence over time is illustrated by regularly provided computer print-outs. Even though conflicts may develop between urban and suburban interests, among businesses,

and among governmental departments, teams often find that cooperation is equally as important as competition in fulfilling their objectives.

Participants of a play of City I receive a comprehensive view of central city and suburban growth and development. Teams are free to try alternative solutions to problems created within the model by their own actions in previous rounds. The governmental, economic, and social systems of the model are defined broadly enough so that they may be altered by a team majority vote. Through their own actions players become aware of the interrelation of public and private decisions, the interdisciplinary scope of urban problems, and the effect over time of public and private decisions.

Another game, called "BUILD," specifically oriented toward local community development within the urban context is now under development at Drexel Institute of Technology. The prospectus for BUILD follows.

BUILD

BUILD will be both a mathematical model and a role-playing computer game designed to assist in advocacy planning of new communities within the city. The model will be designed to represent the typical situation of extreme deterioration of housing, services, and economic activity in an urban area designated for rapid physical transformation, but with a major emphasis on

preservation of community values. It is intended that the game itself will provide a communication medium among community members and outside professional planners.

The structure will be simple and yet will provide the minimal framework which still typifies the political/social/economic interactive nature of the "ghetto." The model roles are broadly divided into three classes - business, government, and people (residents). The residents are further divided into the roles of working force, agitators, and parents. Business roles include both national and local business interests, and the builders, developers, or planners. Government roles include the local Mayor's office, Police Force, Board of Education, Health & Welfare, Zoning & City Planning, and the Social Planners' Office. This list identifies twelve distinct roles which broadly covers the community structure. It is easy to identify many more roles, however, this list represents a compromise between accuracy and size.

The model will include the detailed functions and interactions, both dollar flow and communication, of each of these roles.

Conclusion

As indicated above the Community Development Workshop is a set of techniques designed to enhance community participation in the planning process. It is an experimental and formative state. As time goes on we visualize the establishment of additional activities of the general type described above. These would be made available to the community on an essentially continuous basis. Preliminary experience with these methods has strengthened our

original optimism. We hope that by this time next year it will be possible to report definitive positive results. Meanwhile, we would welcome comments and suggestions on any aspect of these proposals.

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APPENDIX C

NASA MANAGEMENT TECHNOLOGY*

PURPOSE

This compendium summarizes the relevant literature and identifies management technology which prior research efforts have specified as applicable to other endeavors.

SUMMARY OF THE RELEVANT LITERATURE

The political impact of the orbital flight of Sputnik in 1957 was to "shake the U. S. nation to its very core and develop the urgency . . . to marshal and organize quickly the vast intellectual, technological, physical and managerial resources required of man to venture into unexplored space."¹

The response is now well-known. Disparate resources were mobilized and organized; material and social technologies were invented and expanded; and managed effectually to achieve the well-documented achievements of the Mercury, Gemini, and Apollo programs.

Acting on the conviction that the practice and innovations of NASA ". . . could be transferred by imitation, extrapolation or analogy to urgent problems facing other sections of the society"²

* Prepared by Research Associate G. Mason Cadwell, Jr.

NASA defined and sponsored research into specific candidates for management technology transfer.

This effort was directed toward identification and dissemination of advances in knowledge and practice from the space program to other private and public endeavors. Commencing in 1961, NASA sponsored a series of major studies of . . . aerospace-contributed innovations in management technology which may be useful to other sections of economic (and governmental) activity."³

This compendium is drawn from the published literature, and is included here (a) as a review of management technology which has been previously identified for transfer; and (b) to define and reference for the interested reader a comprehensive set of technologies, all of which did not find application in the action-research phase of the current study.

PUBLISHED RESEARCH

Published research categorizes NASA contributions in the theory and practice of management by their experience in evolving and innovating advanced methods of (1) conceiving, (2) planning, (3) administering, and (4) evaluating large-scale enterprises.⁴ Each of these categories is described, defined, and summarized below. Special attention is given to current and past applications which will aid in the identification of techniques applicable to client problems to be defined in the action research phase of the study.

CONCEPTUAL CONTRIBUTIONS

The conceptual contributions reported in NASA management technology transfer literature include methods of anticipating the future and methods of conceiving the large-scale endeavor.

1. The Future

There are two basic underlying conditions governing anticipation of the future: either the future will be continuous with the past (that is, the causal variable system can be projected or extended in some way); or the future will be discontinuous with the past (that is, the relevant causal variables will themselves shift). NASA extended knowledge in both areas.

A. A Continuous Future

In the first area--the extension of the past--NASA developed a highly sophisticated technique for including probabilistic estimates of equipment reliability and maintainability. By considering these factors in the early stages of program development, it is possible to estimate and manage time, cost and resource constraints before the critical date development and production stages.

Reliability Analysis is based on extension of known data and included in Table 1 together with references to specific current transfer applications. While current applications are in areas of hardware development, and appear on the surface to have limited utility for the practitioner of planned urban change, the concept of use of probabilistic estimates should not be lost. Often, when a complex system is composed of many individual probabilistic

Table 1

CONCEPTUAL CONTRIBUTIONS

Contribution	Definition	Initial Source	Current Application	References
TECHNOLOGICAL FORECASTING	Anticipation of Technological invention and change; i.e., prediction of new inventions, new techniques and directions in which current technologies are developing	Military	Private Industry	5, 6, 7, 9
		Weapons Systems Contractors	International Consortia	9
			Government Policy	10, 11
			Military Weapons	12
ENVIRONMENTAL FORECASTING	Extension of Technological forecasting into projections of market and economic trends	RAND	Aerospace Contractors	13
			Private Industry	14
	NOTE: Current literature does not include obvious applications in areas of political environments, societal values, etc.			
DELPHI TECHNIQUE	Technique for prediction under unknown conditions and constraints. Uses "informal intuitive judgment" of panel of relevant experts with recycle and feedback to resolve differences of opinions	RAND for U.S. Air Force	Aerospace Contractors	15
			Social Areas Testing Concepts Limited Practice	16
			State and Local Governments	17, 18
			Urban Applications	19
			Medical Systems	20

Table 1 (Continued)

Contribution	Definition	Initial Source	Current Application	References
SYSTEMS ANALYSIS	Concept of Inter-relationships and interfaces of systems and sub-systems	Initial source unknown-- NASA-related activities developed sophisticated of approach	Extensive applications of systems techniques are reported generally in Management and Operation Research Literature	21, 22
MISSION ANALYSIS	See discussion elsewhere in this report		For a brief overview of NASA-related specific applications	
RELIABILITY ANALYSIS	Consideration of type and incident of breakdown together with cost estimates of repair, downtime, lost services, etc.	Industry	Weapons Systems Industrial Systems	23

factors, the pyramid or assembly effect of the individual factors taken together provides an overall result which is counter-intuitive.

B. Discontinuous Future

NASA's critical need, however, was the capability to predict the future when the relevant variables shifted and accurate probabilistic estimates were not available. Only through future projections could informed management decisions be made concerning the allocation of limited resources (time, talent, budget, etc.) toward the most effective approaches to NASA's goals.* There were three contributions to forecast of a discontinuous future: Technological Forecasting, Environmental Forecasting, and the Delphi Technique. Each is summarized with references in Table 1.

2. The Large-Scale Endeavor

The "systems approach" enabled a comprehensive analysis of a large-scale endeavor which included concepts of interrelationships and interfaces of systems, subsystems, and metasystems (that is, the realization that there are levels of systems, and that every system can be treated as a subsystem in some other higher level system). Table 1 includes references to current transfer literature. Most discussions of "systems analysis" center upon techniques developed in practice. The discussion of the "systems philosophy" is in response to the technique bias of current literature in

* One characteristic of NASA is that NASA functioned with clearly specified goals. This may not be true of management within an urban complex.

anticipation that the concept is relevant for management within an urban large-scale system.

PLANNING CONTRIBUTIONS

To design is to plan; that is, design is the process of making decisions before the situation arises in which the decision has to be carried out. It is a process of deliberate anticipation directed toward bringing an expected situation under control.⁵

NASA planning contributions centered upon extension of the conceptual contributions into Ackoff's concept of "deliberate anticipation." There are two main thrusts in current literature:

1. The use of a planning tool to anticipate the overall impact of the totality of the relevant factors of the organization. "Systems Design" and "Planned Program and Budgeting System" are specific examples of tools designed to coordinate the system as a whole.
2. The use of a planning tool to manipulate a large number of variables in an effort to establish the impact of varying a single variable or specified variable set. "Computer Aided Design," "Simulation," and "Heuristics" are examples.

Table 2 contains a summary of current literature with reference to specific applications.

ADDITIONAL CONTRIBUTION--THE NASA PLANNING MODEL

An addition to the planning contributions identified during the course of the current study was NASA's Process for Planning. NASA developed a "participative planning model" to involve line management in planning when the initial "expert staff" prepared

Table 2

PLANNING CONTRIBUTIONS

Contribution	Definition	Initial Source	Current Applications	References
SYSTEMS DESIGN	Application of Systems Analysis to Design. See "Systems Analysis."			25
COMPUTER-AIDED DESIGN AND SIMULATION	Man-Computer design interaction with real-time computer processing and feedback of results of design decision according to preformatted instructions		Engineering Applications Simulation and Gaming Social and Urban Simulation	26 27 28
PLANNING, PROGRAMMING, AND BUDGETING SYSTEM (PPBS)	Allocation of Resources Technique for evaluating multiple program outputs against multiple goals	Dept. of Defense	Federal Services State and Local Governments	29
HEURISTICS	Use of instinctive judgments or "rules of thumb"		Decision Theory in Complex Enterprises Production Control Portfolio Selection	30 31 32

plans proved inadequate. The NASA Planning Model is covered in detail in Appendix D.

ADMINISTRATIVE METHODS

The Administrative Methods NASA designed or developed to deal with the complex requirements of the space program include the greatest number and variety of aerospace contributions to management. These techniques are defined and described in Table 3, and include technological administrative devices (such as CPM, PERT, etc.); new organizational concepts (Matrix Organization, Functional Management, Modular Planning and Production, etc.); and legal innovations (Quasi-Public Government Corporations). Certain NASA techniques, such as Configuration Management, overlap single categories.

EVALUATION METHODS

Established in 1963 by presidential directive, the Interdepartmental Committee on Economic Impact of Defense and Disarmament established with the federal government a concern with the interrelationships and impact of federal programs upon the country. NASA designed an approach, Environmental Impact Analysis, to assess the impact of the space program on society.⁷

Subsequently the approach was extended by the Department of Health, Education and Welfare to other areas of interest.⁸

Table 4 summarizes the extant transfer literature with reference to current applications.

Table 3

ADMINISTRATIVE METHODS

Contribution	Definition	Initial Source	Current Applications	References
MODULAR PLANNING AND PRODUCTION	Shift from traditional fixed position production layout to "assembly stations" to maximize integration of production and design		Weapons Shipbuilding	34 35
CRITICAL PATH METHOD	Use of Network Decision Techniques for Analysis and Control	Polaris Missile System	Private Industry PERT PERT/TIME PERT/COST SECP, etc.	36 37, 38, 40
CONFIGURATION MANAGEMENT	"Configuration Management" was NASA's "strong integration function": a management technique for controlling the interdependencies of design and design changes among the various hardware and software systems.	NASA	"Adaptive Automation" for Industry	41
Remote Systems			Computer Management	42
Retrofit Management				
Modification Management	Key interdependencies contained in the program: Configuration Management Requirements			
	1. Performance and design requirements.			

Table 3 (Continued)

Contribution	Definition	Initial Source	Current Applications	References
CONFIGURATION MANAGEMENT (Continued)	<ul style="list-style-type: none"> 2. Definition of major elements (equipment facilities, personnel, technical documents). 3. Definition of major project and system. 4. Performance requirements (both for) operating and logistically supporting. 5. Design constraints, standards, compatibility. 6. Primary and secondary functional areas...principal (sic) interfaces. 7. Performance budgets 8. Contracts 9. Government furnished property 			
MATRIX ORGANIZATION STRUCTURE FUNCTIONAL MANAGEMENT PROGRAM MANAGEMENT ADMINISTRATIVE/DIRECTION MANAGEMENT REPORTING	The assignment of personnel to multiple "temporary project systems" with multiple reporting levels and responsibilities		MATRIX	43, 44, 45, 46

Table 3 (Continued)

Contribution	Definition	Initial Source	Current Applications	References
GOVERNMENT/ PRIVATE CORPORATION	Use of quasi-private corporation in monopoly market position to service consumer	COMSAT	Post Office	47
CONTRACTING	Various techniques for inducing fair-profit time and cost-conscious relationships	DoD	Various	48
INCENTIVE				
RISK				
SERVICES				
SUBCONTRACT MANAGEMENT				
MATERIAL				
NEGOTIATION AND ADMINISTRATION				

Table 4

EVALUATION METHODS

Contribution	Definition	Initial Source	Current Applications	References
ENVIRONMENT IMPACT ANALYSIS	Analytical Technique to measure the social and economic and ecological impact of technological changes	Air Force	Design of Socia-Indicators Dyna-Soar Project	51 52
TECHNICAL EDUCATION			Supersonic Transport (SST)	53
			Fishery Catch	54
QUALITY ASSURANCE			Land Values	55
			Economic Impact Analysis	56
			Farm Price Subsidy	57
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APPENDIX D

THE NASA PLANNING PROCESS*

A. Background

It is to state the obvious to say that any organization as large and complex as NASA needs to have an effective system for planning. In the case of NASA its initial planning of 1958-1959 was determined by programs inherited from NACA and the Department of Defense.¹ In 1960 the first formal attempt at long range planning came with the establishment of the Office of Program Planning and Evaluation. With President Kennedy's and Congress' commitment in 1961 to a manned moon landing by the end of the decade, a basic strategic decision was made which shaped NASA's future. That decision, coupled with a commitment by NASA to support a wide range of other research and development activities at various centers, meant that much of NASA's planning activities were at the operational level.

In 1965 NASA, as well as other federal agencies, were directed by President Johnson to use a planning-programming-budgeting system (PPBS). This triggered the beginnings of a more formal agency-wide planning system. But this process had only minimal impact on NASA. "Because of their preoccupation with the Apollo Program, it was difficult to get senior administrators involved in long range program

* Extracted from the Ph.D. Thesis of H. A. Annett, "The Adaptability of the NASA Planning Process to Planning for Urban Systems," Drexel University, June, 1972.

and project planning."² A staff report of the Office of Organization and Management dated June 24, 1969 stated the following:

Institutional Planning - while every effort is made to do institutional planning in field installations, because of the importance of these issues, there is little advanced institutional planning done for the agency as a whole. All institutional planning suffers from the fact that it is a function of and must follow after program planning. The interrelationship between program plans and institutional consequences must be more effectively defined and understood, and enough institutional planning and forethought done at Headquarters on a NASA-wide basis to at least furnish some guidelines to the field establishment.³

After a decade of tremendous effort that concentrated on the dramatic Apollo program, which is nearing completion and success, NASA needed to make some post-Apollo strategic decisions. The planning process that it used to make some fundamental decisions about the reusable space shuttle and the orbiting laboratory is outlined next.

B. Basic Principles and Design of the NASA Planning Process⁴

The basic principles and design of the planning process used to make strategic decisions were established during 1968. The stated purpose of the planning process was as follows:

- a. To develop an integrated long range planning process for NASA that includes continuing participation at each organizational level and from each organizational segment.
- b. To expand throughout the agency the awareness of the opportunities, options, and tradeoffs inherent in long range technical program planning and their relationship to national issues and decision-making.
- c. To provide a ten- to fifteen-year projection of potential aeronautics and space accomplishments to guide on-going activities and to provide a background

against which to develop shorter term program budget recommendations for presentation to the Executive and the Congress.

The organizational arrangements for carrying out the planning process were as follows:

1. The overall planning process is guided by a Planning Steering Group (PSG), chaired by the Associate Administrator and including the Deputy Associate Administrators of the four line offices (Manned Space Flight, Space Science and Applications, Tracking and Data Acquisition and Applied Research and Technology) as well as staff officers. This group of Headquarters personnel was charged with formulating both a NASA Long-Range Plan for the period through 1985 and an agency position for the Fiscal Year 1971 budget decisions. The Planning Steering Group identified major program areas of additional study and planning.
2. Twelve Planning Panels were established in the following program categories: Earth Orbital Manned Space Flight, Lunar Exploration, Astronomy, Planetary Exploration, Space Physics, Space Biology, Communications and Navigation, Earth Survey, Space Technology, Aeronautics, Aerospace Medicine, and Tracking and Data Acquisition. Each Panel is chaired by a senior program management official from NASA Headquarters. The Panel membership is drawn from both Field Centers and Headquarters and includes persons with specific expertise as well as coordination across organizational and program lines.

Within its programmatic category each Panel was directed to devote its efforts to three levels of planning:

- I. Alternative projects or activities proposed for consideration in the budget-year program formulation.
- II. Projects of activities not timely for commitment consideration in the current budget year, but which will be appropriate for consideration during the runout time period encompassed by the on-going and new budget-year activities.
- III. Future mission possibilities, still in conceptual form, having initiations at some indefinite time in the future.⁶

The Panels were therefore charged with immediate, intermediate and long range planning. Each Planning Panel had an overseer, the administrative line boss of the panel chairman. The overseer was to make sure that the chairman worked on assigned tasks.

3. Planning staff services from the Office of Organization and Management were provided to both the Planning Steering Group and the Planning Panels. These planners were to assist the various groups in developing their own plans. While the planners served as facilitators of others to plan, they did provide the Associate Administrator, to whom the planning staff reported, an alternative source of information about the progress of the panels. These planners were also requested to prepare their own recommendations for consideration by the Associate Administrator.
4. In addition to the staff planners assigned to each Panel, Bellcomm (AT&T) had a contract to observe the process.

5. Advisory groups of scientists and other people outside the NASA organization were also used as sources of ideas.
6. A Planning Review Group, composed of Headquarters Program Office Directors and Center Directors, was created to review the proposals coming out of the Planning Steering Group.
7. The recommendations emerging out of this planning process go to the Administrator of NASA. It is his responsibility to relate to the White House and Congress. The key link with the White House is through the President's Space Task Force which includes the Vice-President, the Secretary of the Air Force, the President's Science Advisor and the Administrator of NASA.

Some observations on the utilization of the above outlined planning process⁷ by NASA are as follows:

1. The twenty year planning span was useful since it placed particular projects within the range of feasibility and shifted the arguments from questions of technical feasibility to questions of the value of achieving the objectives.⁸
2. Most of the work in the Planning Panels was done by Headquarters staff and the new ideas were generated by Advisory Groups of outside experts. Because Headquarters staff members of the Panels did most of the work, the recommendations concentrated on short and intermediate range objectives (one to six years).⁹
3. The Panel chairmen and Planning Steering Group members are all representatives of and deputies of the Headquarters'

Program Offices. "As may be seen in this bypass of center opinion the PSG's primary structural flaw is its inability to coordinate Agency-wide planning activity."¹⁰

4. The study by Bauer and Meyer made the following summary comment about the Panels:

Our observations indicate that members charged with looking at well-defined program categories (e.g. Astronomy) tended to support the panel concept; while those panel members concerned with loosely structured program categories (e.g. Space Technology) tended to be less than enthusiastic. Secondly, center representatives dealing with projects involving strong center director preferences invariably understood that trade-offs could not be accomplished at such low levels. Consequently, they participated in less than an enthusiastic manner.¹¹

C. Application of the NASA Planning Process to Urban Systems

The NASA planning process is not, in and of itself, unique. However, the basic elements and principles, when combined, form a useful planning approach for solving urban problems. The basic elements and principles of this process are as follows:

1. Those responsible for the planning have the full backing of, and access to, the top executive of the organization. At the local or state levels this would mean the chief executive of that government. The chief executive assumes the responsibility for relating to the legislative branch.
2. Those responsible for making plans - short, intermediate and long range - will be the heads of the units responsible for implementing them. (This is a variation of the NASA planning process where Center Directors had a secondary and review role compared to Headquarters personnel.)

3. The function of planning specialists to (a) facilitate the planning by operating personnel, (b) coordinate diverse planning efforts, (c) be channels of communication about planning efforts to the chief executive, and (d) develop alternative proposals if needed.
4. The utilization of planning panel type groups of specialists with needed skills across departmental lines to accomplish well defined tasks.
5. The chairman of the panel type group is held accountable by his superior for the effectiveness of the panel.
6. The utilization of advisory groups of persons outside the organization to generate a broader base of support and use of expertise not immediately available within the organization.
7. The assignment to those involved in planning the responsibility for both short and long range planning.
8. The solid support of the highest executive and heads of the operating units of the recommendations developed.
9. The development of clear goals and objectives which stimulate public understanding and which serve as focal points for coordinating the diverse skills of various departments.
10. The development of a means of communication with and of coordination of efforts with other agencies outside the immediate control of the chief executive of a particular governmental unit.

The basic strengths of this planning model are as follows:

- a. It involves the implementers of plans as the planners and uses the planners as facilitators of others. This cuts down the difficulty of having implementers resisting plans made by planners. It also simplifies later administrative decisions since administrators of the plans participated in making them.
- b. It establishes clear lines of communication and decision making within a participatory framework.
- c. It allows for the building of political support through the use of advisory groups.
- d. It strengthens the hand of the chief executive of a governmental unit in negotiating with the legislative branch by having a well-developed proposal for them to respond to.

Planning for NASA's future is, to be sure, appreciably simpler than planning for complex societal problems. There are no voters on the moon and other planets; there are few vested interests in maintaining space as it is. Even those who want to cut back the space program do so not because they think space exploration is bad, but because other societal needs have higher priorities.

NASA is not, however, a technical organization entirely free from political pressures. There are internal political pressures generated by the various centers and Headquarters units; the contractors have Congressional friends; the scientific community makes its demands; Congressmen and Senators have their own ideas; other federal departments have carefully guarded jurisdictional boundaries

and Congressional allies. This is to say that the NASA planning process has been tested by an organization that had to deal with many difficulties similar to those confronting governmental units seeking to deal with complex urban problems.

NASA PLANNING - ADDITIONAL DISCUSSION

For additional information in the development of planning within NASA the study by Bauer and Meyer, "NASA Planning and Decision Making," is a useful document in terms of both a general history and a series of case studies. In order to see how the planning process fitted into NASA's overall pattern of operation, Managing Large Systems by Leonard R. Sayles and Margaret K. Chandler, sets the NASA planning process in context. An interesting example of the evolutionary shift from planning being a headquarters-staff function to greater involvement, primarily through the planning panels, of various levels of NASA is found in the article, "Long-Range Planning in the National Aeronautics and Space Administration," by Addison M. Rothrock, Associate Director, Plans and Program Evaluation, for NASA in 1963.¹²

NASA has been characterized as a "polyorganization." Many large corporations and governmental units could be characterized in the same way. They also face similar types of problems in terms of doing both strategic and operational planning. It is interesting to note that the planning processes used by NASA for its post-Apollo planning are consistent with the guidelines and principles that have evolved out of the experiences of many large and multinational corporations.

Four such basic guidelines are as follows:

1. In keeping with the advisory and coordinate nature of the task, a planning department should be relatively small. The real planning spadework, requiring many man-hours, is usually better performed by people in the operating units. This prescription is particularly valid when applied to strategic planning . . .

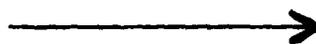
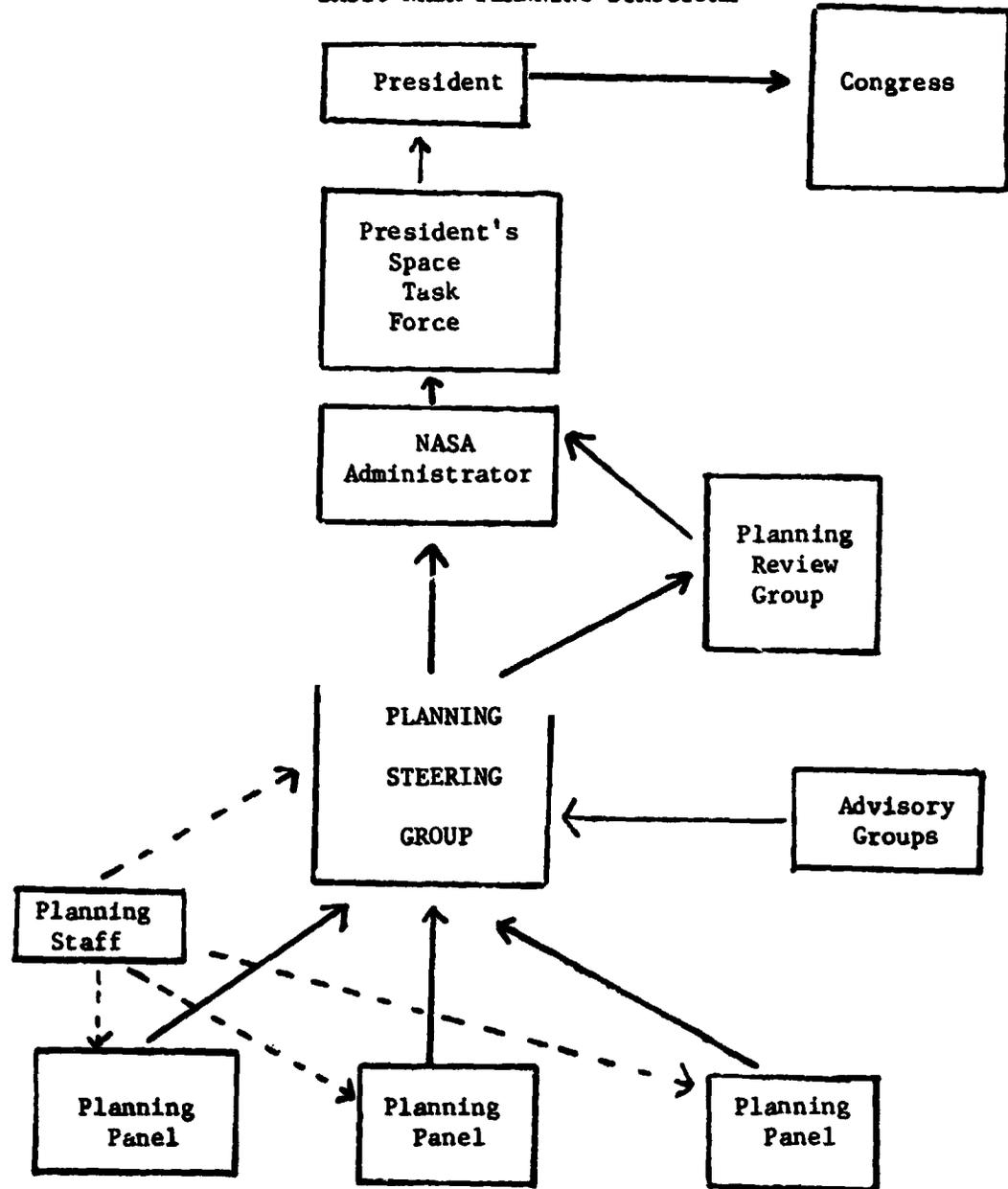
2. Again in keeping with the advisory and coordinative nature of the task, a planning department should act largely in a staff capacity.
3. Regardless of his final position between staff and line, the planning executive remains part of the decision-making process
4. Finally, a well-developed strategic planning system for a multinational corporation is usually uniquely designed for the specific situation and circumstances which exist for that company Strategic planning is still too much an art to be amenable to any simple, cookbook approach.¹³

While strategic planning should be organized on a formal basis, it should not be isolated from short-, intermediate-, and long-range planning.¹⁴ In addition it is recommended that a planning system extend down the management hierarchy as far as possible.¹⁵

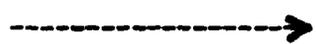
The NASA planning model under study measures up quite well in terms of the above guidelines. Again, while the NASA planning model could not be applied without modifications to business organizations, or any other large-scale organizations, it offers a potentially useful model for consideration.

Chart 1

BASIC NASA PLANNING STRUCTURE



Information Flow



Planning Staff Services

FOOTNOTES

1. Robert L. Rosholt, Administrative History of NASA 1958-1963, NASA, Washington, D. C., 1966, p. 69.
2. Raymond A. Bauer and Richard F. Meyer, NASA Planning and Decision Making, Final Report. Contract NGR22-007-163 with Harvard Graduate School of Business Administration, (undated although their research was done during June - September, 1969), p. I-9.
3. C. F. Bingham of Office of Organization and Management. "Policy Profile Office of Organization and Management," Draft, 06-24-69, pp. 30-31.
4. For additional discussion see Appendix D.
5. "The NASA Planning Process," Code P,4/22/68, included as Appendix A.
6. "Planning Panel Guidelines and Instructions," prepared by NASA and included as Appendix B.
7. See Appendices A, B, and C for more detailed descriptions of the process.
8. From an interview with Milton Rosen, Office on External Affairs, on October 10, 1969.
9. From an interview with William Fleming, Office of Program Plans and Analysis, on October 3, 1969.
10. Bauer and Meyer, p. II-6.
11. Ibid., p. II-10.
12. Addison M. Rothrock, "Long Range Planning in National Aeronautics and Space Administration," Managerial Long-Range Planning, George A. Steiner, McGraw-Hill, 1963, pp. 274-288.
13. Francis J. Aguilar, "Organization for Corporate Strategic Planning: Western Europe and the United States," Multi-national Corporate Planning, George A. Steiner and Warren M. Cannon, eds., MacMillan, New York, 1966, pp. 58-59.
14. Ibid., p. 53-54.
15. Ibid., p. 54.

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APPENDIX E

Public Attitudes Toward Programs
of Large-Scale Technological
Change: Some Reflections and
Policy Prescriptions

by

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How ready is the public for the implementation of large-scale programs of technological change? Assuming that national priorities soon make possible the undertaking of such major projects as the "rebuilding of the cities" or the rapid conversion from systems of small neighborhood schools to systems of large educational parks, is the public likely to welcome or reject such bold new ventures?

During the Summer of 1969, while focusing largely on a project involving the development of computer-based "games" for urban studies, I researched some selected dimensions of the public/planned change issue. What follows below are some first-reflections on four vital aspects of the entire issue, or, the ways in which the public mis-perceives the change process, the ways in which recent history impacts on public attitudes, the ways in which the public divides among itself, and finally, the fundamentals of public attitudes toward change.

While my research project is both young and still very much underway it is nevertheless possible in this interim report to share some tentative early findings, and explore some of the more provocative implications thereof. By design this essay is brief, pointed, and occasionally opinionated; should this design underline the considerable significance and potency of the study of change-readiness it will justify its lack of fuller discussion, its disinclination to cover everything, and its sometime controversial abandonment of a (sterile?) value-free objectivity.

Popular Mis-Conceptions. A major influence on public readiness for change efforts is available in various widespread mis-conceptions about planned change.

Many people, for example, believe a product or process will succeed on its own merits. All that is necessary is to produce a solid research report that contains clear action implications, and this will convince the client system of the wisdom of adopting the stated or implied action. But this is not true, and has never been true. Information alone is not sufficient for change; at best, it meets the cognitive-rational needs of the client system, but such needs are only one component of a vast matrix of needs that include emotional, psychic, and other complex matters. It is not fair, accordingly, to judge a change-project an early failure if the public cheers are not deafening when the project is announced; acceptance involves much more than knowledge of the merits of the proposed innovation.

A second mis-conception goes to the other end of the change process. It holds that the introduction of an innovation is a final act, and no further attention is required. Nothing could be farther from the truth. Veterans of T-Group training, for example, regularly slip away from the insights earned unless aided through systematic re-learning efforts. Expensive and sophisticated training aids and devices are today, gathering dust in storerooms everywhere. Over and over again the change process makes plain the need for ceaseless scrutiny and unhampered reinforcement. Public notions of self-enactment are mis-guided in the extreme.¹

Until these, and numerous other public mis-conceptions of the change process are identified and addressed by a corrective, effective campaign of public re-education it is clear that public attitudes toward large-scale change processes will contain an extraordinary amount of dysfunctional and ever-hazardous fantasy.

Historical Impact. Perhaps nothing so much shapes the attitudes of those over 40 toward planned change as does the Depression of the 1930's. Change-agents cannot over-estimate the significance of this traumatizing event; they ignore it in their efforts to win public endorsement of the new change programs at enormous hazard.

Writer David Cort maintains that "probably nobody can understand America, or hence himself, if he does not understand the Great Depression."² Another close student of the subject, writer Caroline Bird, suggests that the Depression "packed a bigger wallop than anything else that happened to America between the Civil War and the Atomic bomb:

. . . it had more far-reaching consequences . . . than either of the World Wars. Nobody escaped . . . The twelve years in between (1929 and 1941) were filled with lower-case tragedies: mean stratagems, inspeakable petty economies, lost time, lost hope, lost opportunities, monotony, envy, and bitterness . . .³

With dreams shattered, skills gone rusty, and children undereducated and therefore unlikely to achieve much more than their fathers, Americans suffered much.

Many have taken away from the Depression decade a deep-set cynicism concerning the built-in, structural deficiencies of society. Many still distrust policy-makers, and live arrested back at a time when "there were no neutrals . . . (it was) a landscape blighted more than anything else by the absence of pity and mercy."⁴ Many remain nostalgic for a mythical past rich in what the English economist C. F. Schumacher has called "an economics of permanence," or livelihood rooted in long-term symbiotic relations. Such men suspect and resent efforts at large-scale planned change; while the passage of time lessens their number, their rise to positions of power presently swells their impact and influence. For some years to come, we will continue to live in the shadow of the Great Depression, which, while hardly "great," has long since depressed the American spirit.

Typological Approach. The point cannot be made too strongly that refinement of the concept of "American public" adds much to any discussion of public readiness for change projects. To generalize for 200 million Americans is to attempt a quality of social analysis and insight hardly supportable by today's primitive social science tools. Much more plausible is the slow and test-based development of 4, 6, 9, or 15-fold typologies of relevant kinds of Americans.

Consider, for example, a cross-classification scheme which links the variables - "Previous Personal Experience with Large-Scale Change Projects." Dealing just with the polar extremes a useful 4-fold scheme is available:

	PPE	EPI	PPE	EPI
1	+	+	+	-
3	-	+	-	-
			2	
			4	

The diagram above helps us delineate Americans who have positive past associations with planned-change efforts from those who do not, and, Americans who have positive expectations of future change efforts from those who do not; what is even more, as basic as the 4-fold scheme is, it nevertheless combines types in a potent new way.

Cell 1, Americans are the real constituency for massive change undertakings. Who are they? How is their number and influence changing over time? How can they be helped to convert more Americans to their persuasion? Cell 4, Americans are the real opposition. Who are they? How is their number and their influence changing over time? How might they be helped to move into cell 3, at the very least, or perhaps even Cell 1?

Each of the Cell-types has a different elasticity for "reaction." Each for example, makes something else of the same presidential speculation about a possible role for NASA in urban social issues. Each has different anxieties that must be quieted, needs that must be variously met, and questions that must be answered. Understanding

the internal divisions that sort-out 200 million Americans appears then an indispensable first-step in a truly valid and useful analysis of public change notions.

Psycho-Analytic Formulations. An undervalued influence, undervalued for being too seldom articulated, is conspicuous in fundamental models of man endorsed by change-agents. This is to say that public attitudes toward change appear significantly shaped by the attitude change-agents have in turn toward the public.

Significant here, accordingly, is the model of the public that reflects the dominant school of thought today in American social sciences: As society is thought to move only toward equilibrium, it is assumed that man, too, moves only or especially toward equilibrium. Change-agents who consciously or otherwise subscribe to this conception of man have transformed man into an anemic, "milk toastish" creature. The normal man in such a theory is not a stress-seeker, but is rather anemic, except when he is anomic. Change-agents who believe this minimize the public's readiness for managed change endeavors, and read every sign in a grim, bleak, change-discouraging way.

Overlooked in the matter is the growing body of evidence and interpretation that sharply challenges the "go slow" model of man. This material argues that man is made of sterner stuff, and actually desires stress-seeking options. Man is envisioned as hungry for premiums in his otherwise humdrum life, and as needful of opportunities for personal self-expression. Change-agents who subscribe to this view of man read the signs of public readiness for change

quite differently from those who endorse the over-socialized conception of man.⁵

Erich Neumann, for example, reminds us in his Origins and History of Consciousness that in almost all the mythologies of the ancient hero, such as Oedipus, there comes a time when the youthful hero's fate hangs on his violating the two central taboos of every culture: the murder of the father and incest with the mother. If he fails, he is doomed to madness or sterility.

The point of these strange myths is to be found by interpreting the hero as the ego, or consciousness. To gain maturity the hero must embrace change, must "grow up," must "kill the father." Since the father represents the cultural cannon, morals, justice, reason, and consciousness, the hero must develop the courage to stand against these if they violate life as he has come to understand it. Union with the mother represents his entering into his unconscious and getting in touch with his anima, his feminine shadow. Such union links the hero with the new out of which a vital wholeness and more complete individuation and civilization may emerge. Only by this killing of the father (breaking with the old canons) and merging into the mother (re-exploring his creative unconscious) can a man reach true fulfillment.

Does man, in fact, need change? It would appear indispensable - if man is to become a hero, the hope of mankind.

Can man thwart his own destiny? Of course. A popular distortion is what Neumann calls the "Isaac Complex" - the temptation to play it safe, avoid confrontation of the father and just repeat the

past. A second, and increasingly popular distortion, is to remain the "Eternal Son" - the permanent revolutionary, carried away with the killing of the father.

Analysis here gets ever-more complex and provocative, the "death-of-God" movement being seen, for example, as the mythical killing of the trans-personal father, the cosmic symbol of all morality and justice - the declaration of the mass hero that something totally new is coming in mankind. Similarly, the next cultural steps in terms of the mythical union with the mother seem plain: They include the concerns of many youth with the drug scene, the taking of trips into the unconscious, the exploration of outer reaches of the mind and the depths of the self, and efforts to merge into the totality of nature through Eastern religions and mysticism.⁷

Is the public ready for large-scale programs of planned change? This line of analysis suggests the public is always in flux, seeks change in order to grow, and can be perceived as initially receptive to the efforts of planners. Zoologist Desmond Morris interprets the imperative to change in this way:

While organizers struggle to encase human behavior in a more and more rigid framework, other trends work in the opposite direction. . . . the steadily improving education of the young and the growing affluence of their elders both lead to a demand for more and more stimulation, adventure, excitement and experimentation . . . If they feel themselves trapped in a planner's prison they will stage a prison riot. If the environment does not permit creative innovations, they will smash it in order to be able to start again . . ."⁸

Men must change to grow, must grow to live, must live to change.

The playful inventiveness of men, their tenacity and ingenuity, and,

above all, their forced-choice between self-renewal or self-sterility, encourages optimism where the public and its likely reaction to planned change is concerned.

Summary. As I reflect on the material above it seems to me that the prospects for public acceptance of large-scale programs of planned change have seldom been brighter - provided, that is, that change-agents do not blunder their way into chaos.

Securing change is not the problem. Niehoff, among others, has long since provided clear guides in this matter, eg., the transfer of an innovation is most likely to be successful if -

- Innovations are selected which tend to be compatible with the cultural patterns of the recipient group.
- Innovations are selected which will meet existing or felt needs of the recipients, preferably those which they have tried to solve through their own efforts.
- Innovations are selected which will provide practical benefits in this world as perceived by the recipients, usually by improving their economic position.
- The strategy of introduction will involve adapting to and working through the local cultural patterns, particularly the pattern of local leadership.
- Channels of communication are established by the change agent which provide an efficient two-way flow of information. Especially vital will be feedback channels from the recipients to the change agent.

- The recipients are involved in the introduction process through full participation. Of most significance will be their contribution of planning, material goods, time, or labor.
- The change agent is flexible in his strategies, altering them to meet unforeseen circumstances.
- The change agent establishes patterns of maintenance among the recipients so that the innovations can be continued when his influence is withdrawn.⁹

Similarly, technology is not the problem. Rather, the problem is one of helping change-agents accomplish two enormous tasks: First, the sorting out of their own values. Second, the securing and maintaining of a deep respect, or better yet, love for the men and women involved as clients in the change process.

Critical in the years ahead will be the clarity and yet, flexibility, that characterizes the change-agents' maintenance of the values which animate his actions. Does he really know why he champions the changes he does? Has he really thought through and "felt-through" the many implications of the changes he champions? Is he himself able to change as new data and the flow-of-events makes such change advisable?

Critical also is the fundamental issue of agent-client relationships. If the change-agent has a "them/us" or "we/they" attitude he is likely to slip into an arrogant, even fascistic elitist frame-of-mind. Only as he has a deep identification with, even a passion for the participants in the change-process can he be trusted -

by them, and by other change-agents. The times demand, for example, that the truly-worthy "teacher" abandon a perspective which sees teachers here and students there in favor of a perspective which draws all together under the rubric "learning partners." Similarly, the times demand, or, at the very least, urge on us a new perspective which has change-agents respect the psycho-dynamic need men have to change, respect the blighting effect that some facets of recent American history have had, respect the many misconceptions about change that confuse the scene, and respect the significant differences among Americans that divide them where change is concerned.

Indispensable, all this respect, but still inadequate: The times go further to demand a co-identification with the "learning-partners" in a change-process. What the poverty war designers called "maximum feasible participation," what the ghetto spokesmen call "a piece of the action," and what the young define as "a say" is what really matters: Nothing is so critical in the 1970's to securing public approval for large-scale planned change projects as is securing the approval by change-agents of the public. It is in dialogue and joint planning, in genuine consultation from the very inception on through the much-later follow-up exercises that the hopes for planned change lay. Only as change-agents change to welcome the public into the change process will be possibly secure the quantity and quality of planned change we so urgently need.

FOOTNOTES

1. Excellent in this connection, and of value to my entire essay, is William A. McClelland, "The Process of Effecting Change," unpublished paper presented as the Presidential Address to the Division of Military Psychology, Division 19, of the American Psychological Association, at the Meeting in San Francisco, September 1968.
2. David Cort, "The Money that Money Can't Buy," The New York Times Book Review, March 24, 1968, p. 38.
3. Caroline Bird, The Invisible Scar (New York: McKay, 1966), pp. XII, XIV, XVII.
4. Murray Kempton, Part of Our Time: Some Monuments and Ruins of the Thirties (New York: Delta, 1967), pp. 1, 11.
5. Especially useful here is Samuel Z. Klausner, ed., Why Man Takes Chances: Studies in Stress-seeking (New York: Doubleday, 1968).
6. Erich Neumann, The Origins and History of Consciousness (New York: Harper & Brothers, 1962).
7. See in this connection, Edward V. Stein, "Guilt and the New Man," Humanities, Fall, 1969, pp. 205-218.
8. Desmond Morris, The Human Zoo (New York: McGraw-Hill, 1968).

APPENDIX F

DREXEL INSTITUTE OF TECHNOLOGY

NASA Grant--Technology and Management of Large-Scale Programs

Urban Simulation and Gaming:Preliminary Experience and Perspectives

by
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If, as Jacob Riis observed years ago, "the slum is the measure of civilization," our post-industrial, neo-cybernetic futuristic American civilization is seriously jeopardized by its own persisting contradictions.² We advance unevenly and haltingly, our record in urban reform lagging far behind our achievement record in scientific and technological matters. Invaluable, accordingly, is the concrete demonstration of interest in urban reform possibilities evidenced in recent years by the National Aeronautics and Space Administration.

With the financial and intellectual aid of NASA a team of student researchers assisted Drexel sociologist Arthur B. Shostak in a three-month, Summer 1969 exploration of gaming as applied to urban problems. What follows hereafter is a report of the Summer's work, and a series of recommendations that may help guide the

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warranted efforts of others in and outside of the NASA network to further explore the application of scientific gaming to the solution of some of America's urban problems.

The report takes the form of answers to these three questions:

1. What do we mean by "simulation" and "gaming?"
2. What can one learn from conducting a typical urban affairs game?
3. What kinds of improvements are usefully introduced into a typical urban affairs game?

It cannot be stressed too soon or too often that this is an interim report of a research endeavor the end of which is nowhere in sight. While the primary investigator, Dr. Arthur B. Shostak, author of this report, has returned to his full-time teaching responsibilities he continues his research and field experiments into the subject, and looks forward to the time when he may again work full-time on the subject.

I. Gaming and Urbanology. Evident in a wide range of applications (role playing, economic modeling, scenario construction, contingency planning) is the effort men make to turn the symbolic into the iconic, thus giving form and substance to what is illusive and invisible. We seek bridges to help us move from the simple, the concrete, and the specific, to the complexities and abstractions with which we wish to grapple. We find, in our simulations and games, the tools most appropriate to these conversion-and-bridge needs of ours.

A simulation is a special kind of model, a dynamic kind that incorporates not only a model of system structure but also system processes. We build simulations for reasons that have to do with economy, visibility, reproducibility, and safety. Still other reasons for using simulations involve the quality of heightened involvement of the subjects, and the opportunity simulations offer to stage "future events" so that they may be analyzed and "played through."

Simulations today are "in" for several good reasons:

Greater emphasis on rationalized decision-making procedures;

Dramatic advances in machine computational and analogizing capabilities;

Increased recognition that understanding social phenomena requires examining complex systems of interaction rather than isolated entities;

A growing tendency to approach problems from the perspective of several disciplines simultaneously; and the -

Increased popularity of a philosophy of the social sciences that insists on multi-variate analysis, rigorous specification of assumptions and relationships, and theories that are temporally dynamic rather than static.³

Social scientists also value simulations for their ability to serve as an "early warning system" a cheap form of experiment to help alert us to the implications of theoretical and applied undertakings. Progressive teachers value simulations for their ability to "turn students on," even as men in general welcome simulation as an activity offering an intellectual challenge second to none, a gripping, exciting, and enthralling activity.

The "gaming" approach to simulation, the approach that occupied the Drexel research team, is one sometimes referred to as "messing

around" in science, a legitimate approach thought by some sounder and potentially more productive than the more traditional approaches. In this approach there is considerable leeway with respect to analogical consistency and strictness. The rules for translating "real life" variables into simulation variables are less demanding, and researchers can "play around" a bit and "make do."

As might be anticipated by now, a game, per se, is a special kind of simulation. The more informal and tentative the model, and the more it relies on human participants as an intrinsic component in its operation, the more likely the model will be called a game. Games in turn can be used as "pre-simulations"--as a means of elaborating and refining theory that can then be embodied in a more formal and explicit simulation devoid of human participants--o.; games may be used as a laboratory for studying the behavior of human subjects.

At Drexel this past Spring we were interested in using social science games for both purposes--to develop insight into urban affairs, and to shed light on the behavior of urban actors (in their primary urban, as well as in their "put-on" game-playing roles). We were committed to the free-wheeling gaming approach, in part out of our brash newness to the subject field, and in part out of our conviction from research in related efforts that the approach actually worked! Overall, we looked forward to the eventual development--through a beginning in gaming--of a "gaming simulation," or, the merger of a game with computer simulations in one vehicle.⁴

It was our tentative hunch at the time--and is our established understanding today--that such an exploration of gaming would add

substantially to our efforts as urbanologists. That is, we saw gaming as a critical breakthrough in our focus on the urban milieu, its social structure, its main drift, and how we might get leverage on that drift for planned social change. Our Drexel research team especially sought new insights into the interaction of policy decisions, public programs, and social forces.

Our position in this regard has been put most competently by political scientists Ray and Duke:

1. The scope of urban problems is so vast that a major coordinated effort must be made to get people who can define them in such a way that they are soluble problems;
2. These problems can be well represented in gaming simulations;
3. The current technological revolution, which promises much for urban affairs, has left most decision-shapers far behind so that their skills must be extended (with gaming being one of a battery of techniques) to administer radically new approaches or to evaluate their effectiveness.⁵

Believing this we sought a test case, or a typical urban affairs game, to experiment with, and went on to secure the results discussed below.

II. Methodology and Lessons. Available to the Drexel research team from the outset was a very popular, inexpensive (one dollar), readily learned and played game called "The Cities Game" (Psychology Today Magazine, July 1968, by David Popoff). The Game defines itself as follows:

The Cities Games is a game of negotiations. There are four power roles - Business, Government, Slum Dwellers, and Agitators. The object of the game is to acquire as much money power as possible. . . . Like it or not, the

players are a coalition. They must cooperate if the city is to be rebuilt. The alternatives are riot or unpredictable change. . . . The interplay is terrific and exciting. In the early stages of the game, most of the negotiations are likely to be conducted openly. As the game progresses, secret deals become more prevalent. Under the table payments will be made. A player may double-cross his partner for a bribe. Promises to pay later will be broken. But throughout it all, the players bargain, argue, threaten, and eventually reach some agreement - just as in life.

The Game was played on six occasions, each playing occupying three hours, and involving six to sixteen players. Students and urban affairs professionals (such as staff members of the Philadelphia Council on City Planning) were drawn in as players, as were also members of both races and both sexes.

Six insights, or lessons, especially stand out:

Conservatism comes increasingly to characterize the strategy of all players as the conclusion of the Game (the 10th round) approaches. However, "radical" the political philosophy and related negotiations of a team at the Game's outset the acquisition of "wealth" during the Game's progress, and the onrush of the Game's explicit end encourages ever-safer and more modest ways of playing.

Inflexibility and Confusion ensue when a stereotyped team (such as "Agitators") regularly digresses from the conventional behavior expected of it. In one game, for example, "Agitators" gave all winnings immediately to "Slum Dwellers;" the teams representing "Business" and "Government" were dumbfounded and angered by this unswerving altruism. Rigidities in role expectations and responses run deeper than research team members had realized.

Ignorance of one another's urban reality is dramatically underlined by the play of any random collection of urbanites. Few game players can demonstrate anything but stringent and hackneyed familiarity with the bargaining goals, rhetoric, and practices of different types of urban agents.

Cynicism is more rampant than many members of the research team had suspected. The goal of "Future City" has very limited drawing power as many game players find it hard to take seriously the prospects of a New Dawning for the city. Similarly, the savage distrust of other teams is quickly

and firmly established, the game players finding little odd in the Game's description of urban reality in terms of a fierce jungle of atavistic animals.

This is perhaps, to swell on the bleaker side of our learning gains, and two more positive lessons should be cited to correct somewhat this imbalance:

Prejudice proved susceptible to sharp reduction in the "heat and noise" of the game itself. Race and sex differences seemed to scale back insignificance as game players related to one another both as players and as incumbents of new roles ("Business," etc.)

Inventiveness about the immediate environment (the Game), if not inside of Game roles, characterized every round of play. Ideas for improvements in the Game, and often, for related improvement in real urban life, came from nearly every game participant - and impressed all involved with the wellsprings of creativity that gaming can readily tap.

The Drexel research team continues to sift through field notes and observers' reports in its effort to draw still additional insights from the six Summer playings. Additional playings of the revised Game described below will enable the team to further test and refine these preliminary findings.

III. Reforms in the Cities Game. The usefulness of a particular game for a given research purpose can be judged by four criteria:

1. The game provides a realistic environment in which to place the subjects for research.
2. The game is based on structural assumptions that conform to accepted theory or real-world data.
3. The game induces processes from participants that conform to accepted theory or real-world data.
4. The game can be used either to recapitulate historical events or to predict the future.

Similarly, the usefulness of a particular game for a given teaching purpose can be judged by two criteria:

1. The game enables students to more readily grasp more or less abstract concepts.
2. The game helps students gain insights into complex relationships.

Drexel's research team found the Cities Game seriously deficient on all counts, and recommends accordingly, the consideration of the following reforms by would-be designers of urban affairs games.

Expansion of Roles. As the Cities Game limits itself to four roles (Business, Government, Slum Dwellers, and Agitators) it was soon apparent that this particular abstraction from reality was too self-limiting and restrictive. The Game suffered from the danger of what political scientist John Raser calls the "excluded variable." He warns that such errors arise, not because the scientific process is weak, but simply because the human and social pressures to take the easier path are great. With characteristic levity Dr. Raser observes that "if you have neglected important variables, the outcomes of your simulation are apt to be absurd."⁷

We undertook to expand the number of roles operating in the Cities Game. After considerable review of the literature on political decision-making processes the research team proposed that our revised formulation of the Game include the following new roles:

Mass Media
 "Do-Gooders"
 Whites of the "Silent Majority" Variety
 Organized Labor
 Organized Religion
 Young Adults

It was further proposed that the existing role of "Business" be split into two roles - "Finance" and "Industry," and, that the

existing role of "Agitator" be split into four roles - "White Separatist," "Black Separatist," "Left Extremist," and "Right Extremist."

As was anticipated the unfolding of four roles into 14 altered the character of play considerably. While we made only a brief, tentative effort to play with enlarged numbers the research team was almost immediately set back by the near-geometric increase entailed in significant inter-relationships among players. The "din and roar" of the "buzzin' confusion" that is reality rushed like a tidal wave into the Game Room, and figuratively drowned all present.

We recommend the further development of many-role games. Techniques are available to prevent game-operators and players alike from being overwhelmed by the intricacy of negotiations involving large numbers. We also recommend, however, that both would-be operators and novice players alike undertake an apprenticeship in gaming before venturing into the "deeper waters" of many-role games. Such an apprenticeship might profitably begin with the original four-role design of the Cities Game, and only later proceed, a step at a time, into more complex, if more accurate, re-creations of the many-role urban world we inhabit.

Contingency Provision. In short order it was clear to the research team that the Cities Game was too pat and predictable. It was seriously weakened by what political scientist Matthew Holden, Jr., calls the fallacy of static pluralism. He points out that a pluralistic politics does not have to be static, but may be extremely volatile: He warns model builders against an approach to urban politics, and therefore to the simulation of urban political decisions,

that disengages urban political analysis from the ultimate and fundamental problem of politics: chaos, disruption, violence, and turmoil.⁸

We undertook to include the phenomena of chaos, disruption, violence, and turmoil within our revised formulation of the Game. To this end we prepared dramatic contingency cards the application of which to a round of negotiations was arbitrarily determined by a roll of a die. The die also determined whether or not the contingency card contents would be known to the negotiators before or after the period of negotiations. A typical card read - "Dr. King has been assassinated; the black urban ghetto is wracked by grief and chaos; the negotiating strength of the "Slum Dwellers" is now twice that of other game rounds."

To our surprise and dismay the new contingency cards did not have the desired results. The die often ruled out the use of a contingency card at the very start of a round; the cards often did not upset pat bargaining postures with anywhere enough impact.

We recommend the further development of life-like, contingency-introducing, game-jarring innovations. Other games employ alarmist "newspaper" editions, sudden "radio" announcements, and pre-cast actors: Details to one side it is vital that the contingency factor figure into the game often and with brow-arching (if not "blood-drawing") impact.

Diversification of Rewards. Unfortunately as originally designed, the Cities Game poses a single monetary reward structure in which success is measured by the accumulation of wealth throughout

the Game play. This is to ignore what political scientist Norton Long calls the "ecology of games," wherein strategies and payoffs shift in and out of contact, and where the rewards and penalties of one player are often in a different coin than those of another.⁹

We undertook to expand the range of rewards - and penalties - possible in the Game, so as better to approximate reality. To this end we proposed that each of the 14 roles we were including in our revised formulation of the Game have separate, role-specific goals, eg., "Finance" might seek a profit on loans, while "Do-Gooders" could be rewarded by pledges of friendship from once-distant or even hostile fellow-teams. Finally, experience with the Game suggested the usefulness of a new post for a Game Referee, or someone who might set penalties for common derelictions of game rules and norms (such as bargaining after the permissible time period has past).

While the Summer passed before we were able to undertake the enormously complex task represented alone by the notion of separate reward and penalty matrices for 14 different teams, we nevertheless believe this a promising avenue to pursue. Details to one side the game of urban affairs must catch up with the multiplicity of gains and losses ever possible in the game-like reality of urban life.

Miscellaneous Reforms. Space limitations discourage all but brief mention of the following:

Role versatility, if a goal of the game managers, can be promoted by having actors switch roles after X number of rounds.

Longevity, if the experience thereof is a goal of the game managers, can be "promoted" by introducing the idea that each round represents the passage of a decade.

Planning, if the experience thereof is a goal, can be "promoted" beyond its present one-round-at-a-time orientation. This can be accomplished by distributing not three cards as at present, but ten cards to each team, thereby making possible the long-term, calculated re-distribution of power. Teams can buy or earn desirable cards, looking ahead to their strategic use in far-off rounds of negotiations.

Another reform that occurred to the research team involves the use of technicolor slides and sound effects to dramatically underline the implications of a round-outcome (such as the ensuing urban "riot," or, "police action").

This, of course, remains illustrative, and is by no means exhaustive of the improvements one can undertake in the Cities Game. The point has never been exhaustiveness; rather, the goal here is to demonstrate the distance we have still to go - and can readily go - in our effort to improve gaming as a tool for urbanologists.

Summary. Gaming, in Raser's inspired terms, is a "research technique that accidentally turns out to capitalize on man's desires for situational involvement for its own sake, for the construction of esthetically satisfying systems, for the joy of unearthing compelling symbolisms; and on man's delight in the creation of elaborate analogies."¹⁰ It is a particularly promising way of linking such diverse areas as:

social psychological theories of decision processes and attitude formation,

theories of optimal decision-making, and

models of large-scale social structures

all linked so as to enable the research on each to feed into the others.

Gaming is among the most powerful of that critical class of vehicles that balance off mechanistic macro with micro models of attitude and behavior change. Accordingly, we cannot afford anything but an all-cut, large-scale joint effort by academics and urban activists to develop the rich potential of scientific gaming - unless, that is, we are willing to risk having the slum that Riis refers to become not only the measure, but the very undoing of our civilization.

FOOTNOTES

1. Appreciation is owed to the following members of the Drexel Research Team of student volunteers assembled by me this past summer: undergraduate Lyle Wolf, and graduate students Bob Plater-Zyberk and Lou Malfara. Two NASA project colleagues, Joe Orlando and Dr. James Pennington, were especially helpful, as were also three staff members of the Philadelphia Council on City Planning - Director Ed Folk, and staffers Roslyn Watson and Elaine Blair. None of these individuals participated in the writing of this report, and I am solely responsible for its various shortcomings.
2. As quoted by George Seldes, in The Great Quotations, New York: Pocket Books, 1968 ed., p. 172. See also E. K. Faltermayer, Redoing America: A Nationwide Report on How to Make Our Cities and Suburbs Livable, New York: Harper & Row, 1968.
3. John R. Raser, Simulation and Society: An Exploration of Scientific Gaming, Boston: Allyn and Bacon, 1969, p. IX. This is undoubtedly the wisest, most thoroughgoing short (157 pp.) book on the subject; I lean heavily on it in this paper. See also Ira R. Buchler and Hugo G. Nutini, Game Theory in the Behavioral Sciences; Pittsburgh: University of Pittsburgh Press, 1969.
4. See in this case, the writings of the concept's authors, Paul H. Ray and Richard D. Duke, in "The Environment of Decision-Makers in Urban Gaming Simulations," in Simulation in the Study of Politics, edited by W. D. Coplin, Chicago: Markham, 1969, pp.

- 149-176. See also Harold Sackman, ed., Computer, System Science, and Evolving Society: The Challenge of Man-Machine Digital Systems, New York: John Wiley & Sons, 1969.
5. Paraphrased, with editorial revisions, from Ray and Duke, ibid., pp. 175-176. See also Harry H. Fite, Computer Challenge to Urban Planners and State Administrators, New York: Spartan, 1965.
 6. Raser, op. cit., pp. 133-157. See also S. S. Boocock and E. O. Schild, eds., Simulation Games in Learning, Beverly Hills: Sage, 1968.
 7. Raser, op. cit., p. 28. See also T. H. Naylor, et. al., Computer Simulation Techniques, New York: Wiley and Sons, 1966.
 8. M. Holden, Jr., "Comments on Ray and Duke's Paper," in Coplin, op. cit., p. 177.
 9. Norton Long, "The Local Community as an Ecology of Games," American Journal of Sociology, November 1958.
 10. Raser, op. cit., p. VIII. See also Johan Huizinga, Homo Ludens, Boston: Beacon Press, 1950.

APPENDIX G

WORKING PAPER ON ACTION-RESEARCH FOR NASA/DREXEL GRANT*

The NASA-Drexel Ph.D. Grant is based upon a number of assumptions. First, NASA has developed valid management technology in the process of achieving its organizational objectives. Secondly, that NASA's Management Technology, though honed and refined in clearly defineable terms for outer space objectives, is applicable for the management of large-scale and socio-technical urban problems. Thirdly, that the NASA-Drexel research associates and investigators will attempt to test out the transfer of NASA's Management Technology to urban problems. Finally, such a transfer to any urban client system must, of necessity, involve an Action Research Methodology.

Doctor Paine, Chief Administrator of NASA, has described NASA as a "digital" social system where the objectives were clearly defineable and the major problems were scientific. But Doctor Paine also described urban systems as "Darwinian" or evolutionary where many human factors impacted and could not be as controlled as in a "digital" system. Therefore, the problem of achieving a resolution of critical urban problems is fraught with social and political uncertainty and demands a different management and research capability.

* NASA Grant, Third Semi-Annual Progress Report, June 30, 1970, Section 2.4.1. Authored by Dr. Edward Golden.

The NASA Research Associates have identified NASA's planning process, configuration management, information systems, and simulation as generically invaluable and applicable to some urban problems. Therefore, an urban social system should be found where these specific management technologies could be tested out for their transferability and resolution to critical urban problems. In order to insure the successful accomplishment of this transfer the client or urban environment in which the NASA Team would work must of necessity have problems which match the possibility of transferring these management technologies. Sanction must be obtained from the highest governing unit in order to have authority to work within a particular system on a particular urban problem.

The key aspects of the model are the development of diagnostic skills, data gathering, feedback to the client group, data discussion and work by the client group, action planning, and action. Naturally this is a cyclical process involving the manager and those with whom he collaborates in studying the existing situation, state, or problem. But managers are not only interested in understanding what is but also in what should be the preferred state. The question then becomes how to reach that objective through what kind of alternative interventions or strategies.

Action Research should be considered the science of design where courses of design or action are aimed at changing existing situations into preferred ones. In the example of the NASA Research Associates, they will be dealing with live, critical problems in a complex urban setting, attempting to design actions or

interventions to correct or change situations or people to a more preferred state of function in accord with the goals of the responsible authorities.

The Action Research Design and methodologies would serve as strategies for the Research Associates in Public Administration. The change problems in real urban situations to which they will address themselves will serve as the laboratory where they will learn and test out their expertise. The dissertations will be scholarly descriptions of their analysis, designs, interventions, and evaluations of their efforts to change an existing situation into a preferred one. There will be developed a methodological framework and a theoretical base in order to provide a systematic way to understand and keep track of the impacts of the significant variables.

However, action research is just not an attempt to enter a particular client system as an expert, apply a known body of knowledge or skill, and exit. It is rather the effort to assist those within a particular system to develop the skill and knowledge to manage their system or problems on their own with greater expertise. Being multi-disciplinary in their training, the NASA Research Associates will make every effort to assist those within the particular client system to be responsible for changing and managing their own system in a more professional manner.

The Action Research methodology will proceed in the following manner:

1. Efforts will be made to gain initial entry to a particular urban system by June or September 1970. Sanction, and negotiation

of terms of the relationships should be agreed upon before final entry.

2. Once initial entry is agreed upon, a period of two to three months should be utilized to study that particular client system in order to more fully understand how it functions and disfunctions. Furthermore, this initial explanation and orientation period should serve as a period of gaining wider acceptance and identification with that system. Finally, problem identification and definition would be accomplished in this exploration period.

3. Once problems are identified and agreement is negotiated with the client system, then each problem area will be studied as to strategies, designs or methods to effect change or influence to a preferred state. Alternative methods will be considered for each problem. Every effort will be made to consider the behavioral and organization consequence of every intervention so as not to upset the homeostasis of that system.

4. Concurrent with the action research, evaluation of the particular projects will be made by the Associate Investigators, and the organizational preceptors. When appropriate, some of the preceptors may serve as adjunct professors. All of these will serve as process observers of the action research and provide consultative assistance.

5. Finally, upon successful accomplishment of the action research, a descriptive dissertation will be presented with hypothesis, action steps, and consequences or results, with generalizations drawn from the research. Successful action research should produce three

basic outcomes: (1) the achievement of the planned change, (2) new knowledge, and (3) a manager of increasing professional competence.

The problem to which the NASA Research Associates will address themselves must be doable within a time span of eighteen months, in order to terminate the action-research and accomplish the objectives of the Ph.D. degree. Finally, the client system in which the NASA Research Associates will function must provide a responsible official from within the system who will serve as a preceptor for the NASA Research Associates as they study and assist in resolution of particular problems.

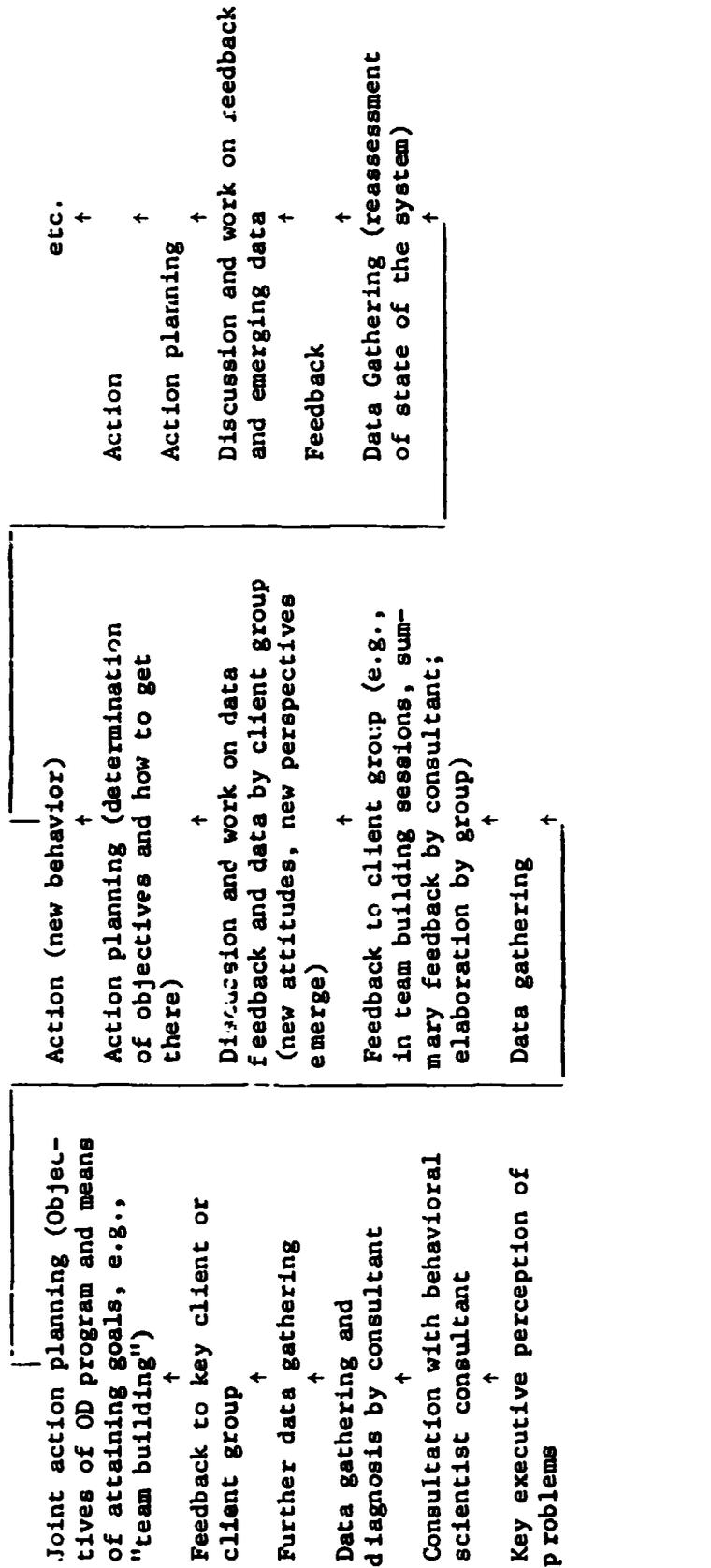
This NASA-Drexel Action Research can be considered then as management problem-solving in complex urban social systems, where the action focuses not only on observing, but on the effective change, or transfer, of management technologies to the resolution of urban problems. Each Research Associate will call upon his increasing knowledge in technology, management science, behavioral science and public administration in the resolution of the particular problem, and he must also perform professionally, as a change agent in order to achieve his Ph.D. . . .

Action Research Definition and Theory

A major strategy and focus in urban government management will be to the action research model. Behavioral scientists involved in organizational development and change are convinced that this model is most valid for learning in such a rapidly changing society as we have created. This model has been described by William Foote Whyte as "a continuous factoring and analysis of human relations research

data and the feeding of the findings into the organization in such a manner as to change behavior." The following figure summarizes some of the essential phases of the action research model.

Figure 1
 An Action Research Model for Organization Development¹



¹Wendell French "Organization Development Objectives, Assumptions & Strategies" from California Management Review, Winter/1969/Vol. XII/No. 2.

APPENDIX H
CRITERIA FOR SELECTION OF
ACTION RESEARCH PROJECT
FOR DREXEL-NASA TEAM

Action research is the vital link in the testing of the transferability of NASA's technology to solving urban problems. The selection of the appropriate location and the related project or projects is therefore crucial.

The basic criteria for the selection are as follows:

1. The invitation should be approved by the highest governing unit to which the project is related.
2. The inviting unit should have adequate resources (legitimate authority, financial resources or political influence) to carry out the project.
3. The inviting group should be able to provide or arrange for adequate financial resources to meet the local expenses involved in the action research.
4. The action research should focus upon the transfer of the planning configuration management process, information management and simulation.
5. There should be a reasonable chance of success in achieving the goals of the project.
6. The length of time for the action research should not exceed 15-18 months, depending on the starting date and should be completed by January, 1972, at the latest.

7. Preferably, the Research Associates should be able to function as a team of professionals in relation to the participants in a particular project.

8. Within the action research, the Research Associate shall be responsible for carrying out and reporting upon an identifiable aspect of that research. The resulting thesis based upon this research shall fulfill the academic requirements of Drexel University.

9. The project should have local participants with the competence and authority to see the project through to its completion.

10. The project should be of such scope as to involve the coordination of the efforts, resources, and approval of several governmental agencies and/or private agencies.

11. The project should be relevant to a major social issue.

12. The appropriate governmental authorities should approve in principle the planning of the particular project.

13. The planning for the particular project should include representatives of the persons or groups directly affected by the project.

14. The appropriate NASA authorities should be in agreement about the action research.

15. The location of the action research should be within a reasonable commuting distance of an hour or less from Drexel.

16. The host agency or agencies should appoint a preceptor from within their organization to whom the NASA Research Associates can report, test out hypothesis, and receive feedback.

APPENDIX I

MEMORANDUM OF UNDERSTANDING
BETWEEN
DREXEL INSTITUTE OF TECHNOLOGY
AND THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The Drexel Institute of Technology and the National Aeronautics and Space Administration are of the opinion that future developments in the fields of aeronautics and space technology will require improved understanding of large scale systems technology and management. We agree that it is in the national interest to develop greater competency in this field through expanded graduate education and research. This Memorandum of Understanding sets forth our mutual understanding and the guidelines that will govern our joint efforts to achieve this objective.

In expanding and developing this nation's scientific and technological capability to meet new requirements and new opportunities in aeronautics and space, the National Aeronautics and Space Administration has recognized a continuing need for persons who can work with the new and expanding dimensions of science and technology and who understand the broad administrative and management implications of the large-scale programs carried out by NASA. The success of future programs in aeronautics and space as well as in other areas of public concern which can use the management

methods and systems developed is dependent upon the education and training of such individuals.

Further, it is believed that NASA's organization and management experience over the past decade suggests that similar techniques might be used to realize other national goals of a large-scale and technology-based nature. We believe it is in the national interest to investigate these management practices and the relevant technology, to study possible transfers of this experience to other national problems, to increase research in the relevant systems management-related disciplines, and then to evaluate current graduate school knowledge in the light of the knowledge gained.

We believe that the facilities and managerial staff of the National Aeronautics and Space Administration offer many elements that may be thought of as a research laboratory to give investigators the opportunity to gain the data and experience necessary to form more knowledgeable judgments on the items cited above. Consequently, it is a basis of this Memorandum of Understanding that the National Aeronautics and Space Administration will open appropriate elements of its installations and activities and make appropriate members of its staff available to faculty and graduate investigators selected by the Drexel Institute of Technology.

We believe such NASA support and cooperation in research-oriented technology and administrative activity, in parallel with an energetic effort by the Drexel Institute of Technology to expand its research activity along with the strengthening of faculty and curriculum, can provide a combination of circumstances that will help

meet the need for broader gauged and more effective administrators of research and development efforts.

Therefore, the Drexel Institute of Technology and the National Aeronautics and Space Administration agree to establish a pilot program in graduate education and research reflecting a multi-disciplinary approach to administration, management, and the transfer of relevant technology. In recognition of their mutual obligations concerning the development and growth of this program, our two institutions agree to provide reciprocal support, advice, and assistance.

The Drexel Institute of Technology will, within budgetary constraints:

1. Offer a curriculum leading to a doctoral degree in public administration or related management disciplines that includes consideration of the elements and best practice in the management of science and technology programs and prepare students for careers either as scholars or administrators of public programs involving the interaction of science, technology, and management.

2. Endeavor to develop increased interest, competence, and knowledge in the graduate faculty and to encourage research in the rapidly advancing areas related to large-scale systems technology and public administration.

3. Through intensive study and evaluation, identify those elements in NASA's technology, organization, and management which may be transferred to other large-scale national problems.

4. Continually update curriculum and methods of instruction to assure that emphasis is placed on an early utilization of research

results and an effort is made to relate these to the real world problems administrators face in programs such as those carried on by NASA and other public agencies.

5. Endeavor to develop ways and means to stimulate use of the installations, activities and staff made available by the National Aeronautics and Space Administration, its associate contractors, or other governmental agencies by appropriate senior faculty and doctoral students working under their direction for systematic field research, analysis, and observation.

6. Encourage the inclusion of pertinent research material in the appropriate curricula of other Drexel schools and departments such as business, engineering, and the health professions.

7. Interrelate this program with other space research and educational endeavors at the Drexel Institute of Technology.

8. Observe pre-publication courtesies with respect to research findings permitting comment by appropriate NASA officials, which comment shall not be binding on the Institute.

9. Report semi-annually on the progress and development of the program to the National Aeronautics and Space Administration.

The National Aeronautics and Space Administration will, within the constraints of its operating budget:

1. Make available appropriate elements of its activities, facilities, and staff in the Washington Headquarters, field centers, and contractors' plants for use by investigators conducting research in this program.

2. Provide support to the Drexel Institute of Technology for carrying out its obligations noted in the above paragraph.

3. Recognize the right of the Institute and its faculty to publish research findings in any appropriate journal or other publication of its choice.

4. Monitor progress of the program in order to assure progress toward stated goals for both parties, and in order to determine the extent to which the program should be continued beyond the initial finding.

It is the purpose of both parties of the Memorandum of Understanding to so operate under it, that activities under it, will provide an enrichment of curriculum and strengthening of the faculty in a manner fully consistent with the goals, traditions, objectives, plans for development, prerogative, or freedoms of Drexel Institute of Technology.

Drexel Institute of Technology

Date 11 Aug. 1969

(original signed by)
William W. Hagerty, President

National Aeronautics and Space
Administration

Date 4 Aug. 1969

(original signed by)
Thomas O. Paine, Administrator

APPENDIX J

CURES

Institute of Urban Management

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PROPOSAL TO CURES FOR AN INSTITUTE OF URBAN MANAGEMENT

Preface

The subject proposal has been prepared in accordance with the guidelines suggested June 11, 1971 by a CURES subcommittee in a report entitled, "Formation of an Institute in CURES." The procedures delineated are being followed relative to the proposed and address the criteria and questions listed in aforementioned guidelines. Constructive suggestions are invited.

I. INTRODUCTION AND OBJECTIVE

Recent statistics indicate that "Government," Federal, State and local, now represents forty (40) percent of our GNP, in other words 400 billion dollars of goods and services are within the purview of the various government agencies. The growth in government is recognized as a continuing and perhaps accelerating trend. Further, the diversity and complexity of the products/services delivered and the societal needs addressed can best be described as challenging and awesome. The response has been a growth in the organized structures of government and its agencies and a corresponding concern with the management processes and techniques employed in discharge of the respective agency responsibilities.

Since many of the problems/needs addressed by government are a function of population densities, and the economic, social, etc.

characteristics that pertain, a natural resultant has been identification of the urban area--i.e. region, city, town, etc. as a natural boundary for identifying and attacking societal problems related to such areas as schools, crime, health, housing, etc. This in turn has placed great emphasis on developing in state, (local) and city government the managerial capabilities for dealing with such problems. The Intergovernmental Personnel Act of 1970 - i.e. IPA 1970 which provides funds for training state, city and local career managers and the concept of revenue sharing now under national discussion is consistent with the aforementioned emphasis.

Philadelphia, fourth largest city in the country is at once a miniature i.e. model of the national scene and consequently an operating system that requires enhanced managerial skills to successfully cope with its needs and problems. The seven county area has in short a need, not well addressed at this time for organized help in (a) developing its managerial resources and (b) applying the most modern techniques available to the resolution of such pressing problems as "drugs," and "traffic flow," and the organization of service agencies for the effective distribution of the services they provide. (It should be noted that the redirection of the Fels Institute Program at the University of Pennsylvania has accentuated the professional training, etc. vacuum existent in this area.)

Drexel University, a resident of the Philadelphia area has both the responsibility and the opportunity to participate in the efforts to satisfy the professional/service needs identified above. Such participation is consistent with a natural extension of Drexel's

image and posture as a technological university that is concerned with application of theories to the solution of practical problems. Indeed, there are specific, highly useful services that Drexel can provide based upon the experience and competence of its faculty/resources. These services would include but not be limited to the following general areas (described later)

Professional Education
Continuing Career Development
Consultation
Research

In each of these areas the required service is best provided by planned and coordinated multi-disciplinary - multi-college skills that are in fact available at Drexel. The use of multi-disciplinary teams for educational and research projects is also well established within the normal Drexel operating mode. An ideal vehicle for providing the direction and integration necessary would be a new Institute for Urban Management under the auspices of C.U.R.E.S. Leadership and direction of the Institute provided by an individual from the College of Business Administration, would insure the needed focus on Management Science; indeed the term Management Science has been employed to describe the basic need of governmental career executives. The Institute would also utilize an array of other skills, including Behavioral Science, Economics, Political Science, Urban Planning, Information Science, etc., from the selected resources of Business Administration, Home Economics, Humanities and Social Sciences, Engineering, Library Science, and general Science faculties. A reservoir of experienced and competent resources that can be selectively pooled to address alternatively existent general and/or

specific needs would be available. A historical perspective for the proposed Institute is presented in the next section. Then the modus operandi for the Institute of Urban Management is described in the succeeding parts of this proposal.

II. HISTORICAL PERSPECTIVE

The Environmental Engineering and Science Program was the first organized Drexel response to the many broad technological, social, economic, etc., problems existent in our society. Multi-disciplinary teams, primarily faculty members from the several colleges (but principally Engineering and Science) were formed to provide consultation and/or research services to governmental and industrial clients. A graduate curriculum was developed for the purpose of preparing professionals for careers/roles in resolving societal problems; - Areas of specializations like Health, Water, Air, etc., evolved to reflect the needs of students and interests and capabilities of the Drexel faculty.

The experience gained contributed to successful negotiations with NASA for a contract to study the transferability of the NASA Management System to the Urban Scene. Part of this contract was concerned with the development and implementation of a Ph.D. program in Public Administration (Five Ph.D. candidates were in the pilot group). The knowledge gained in this effort in turn underwrote the design of the MS Program (in Public Administration) proposed under "IPA70." A significant result of the NASA program was development of competence - faculty, courses, etc. - relative to governmental

management in the College of Business Administration. This College further increased its graduate competence by the design and implementation of Behavioral Science Program. Behavioral Science was an integral part of the NASA, Ph.D. Program and is a significant element in the new MS Program mentioned above.

Along this briefly outlined historical route the need for CURES became apparent - the objective was the coordination of all multi-disciplinary Drexel programs related to the Environmental and Urban problems. Needed specialization was achieved by the creation of Institutes. The result is a sound vehicle for efficient use of Drexel's many and diverse resources in broad and significant areas of interest and concern.

Simultaneously, other colleges - e.g. Humanities and Social Sciences, Home Economics and Library Sciences - were developing competence and conducting research and courses in areas directly related to Urban and Environmental problems. Indeed a perusal of the Drexel catalog reveals the existence in the many Colleges of many courses needed for the new MS Program. Correspondingly, there are experienced faculty members available not only for the existent courses but for the development of new ones and/or to conduct research and consultation projects. A preliminary listing in Section VI of potential faculty for the proposed Institute of Urban Management makes clear the depth of Drexel's experience and capability in this area

As stated in the IPA7⁰ proposal the new MS Program will be developed on the sound base of existing Drexel resources and courses;

as indicated above, this program is a natural, historical outgrowth of programs conducted at Drexel, past and present.

RATIONALE FOR AN INSTITUTE OF URBAN MANAGEMENT

The Institute would permit the focusing of multi-disciplinary Drexel resources on an increasingly significant urban area. Necessary faculty skills are available in all the colleges and a CURES Institute provides a time-proven mode of coordinating the skills to address some well articulated needs (See Section I) of the potential client group.

The development of an MS Program with a fall 1972 starting date is a reflection of the high priority placed on this one of the four (4) Institute-directed services by the clientele. However, it should be noted that the start of all the other services, e.g. Continuing Career Development, Consultation and Research, has been urgently requested.

The relationship of the proposed Institute with other CURES Institutes and programs throughout Drexel is a significant matter particularly with regard to the MS (and other) education programs. As indicated above, the Institute has a unique and useful contribution to make in terms of the organized coordination and direction of multi-disciplinary resources in a specialized (Urban Management) area not now specifically and totally approached by a Drexel unit. There are existent resources, i.e. faculty, courses and educational programs at Drexel, but the proposed integrating and focusing is both unique and necessary. There is a graduate program in Environmental Planning and Management that deals primarily with effecting changes to improve the quality of the environment; the focus tends

to be technological. In counter distinction the new MS Program is concerned with management and administration of a broad range of governmental agencies and the product/services they provide. The new MS Program will utilize some of the courses, faculty, etc. developed for Environmental Planning and Management programs while the latter will be enriched and enhanced by the courses, etc. developed by the creation of the Institute. The current program in Engineering Management which is not concerned with Public Administration could also benefit from the availability of elective courses offered in the Institute's MS Program.

The College of Business will also make significant resource-course contributions. However, alone this College cannot furnish all the diverse skills required. In addition, the College is currently assigning top priorities to redesign of its MBA and other education programs. The College of Humanities and Social Sciences does not now grant graduate degrees, but many members of its faculty give graduate courses in various Drexel graduate programs - e.g., Psychology, Sociology, etc. The resources, faculty, courses, etc., available are vital to the success of all programs/services to be furnished by the Institute. The other colleges including Library Science and Home Economics also have specific skills to contribute.

A CURES Institute is the most efficient Drexel vehicle for blending the areas of common interest in "Urban Management" that reside within the various colleges. In this way all colleges receive the stature. The cooperation of equals is the best operating mode for realizing the enthusiastic and creative participation the

area demands. How an Institute would operate to effectively discharge the responsibilities outlined in its initial charter definitions are developed more fully in the succeeding sections of this proposal.

III. PROGRAMS AND SERVICES

An informal survey of representatives of federal, state, and local governmental agencies and the constructive suggestions solicited and received from members of ASPA and the various Drexel facilities led to initial delineation of four (4) Institute Program Service areas. They are (as previously mentioned in Section I):

Professional Education
Continuing Career Development
Consultation
Research

Each of these areas will be described further below:

a) Professional Education

Continuous dialogue with Philadelphia area governmental executives and representatives of the United States Civil Service Commission and ASPA stimulated the development of a graduate program, (MS degree) related to public administration. The potential availability of funding under IPA 1970 led to formalization of a program design that was submitted in proposal to SEPARC the regional advisory board for IPA 1970. A copy of the proposal is included in the Appendix (Section VI) - the salient features of the MS Program, which would start in the fall of 1972, are described therein. The NA?A inspired blend of management, behavioral and technological sciences resulted in a distinct and unique graduate program that is

highly competitive vis a vis the programs at other (local) universities. However, it is important to note that the operating policies, etc. outlined in this document take precedence over the IPA proposal which was prepared prior to the decision taken to propose an Urban Management Institute under CURES.

Subsequently, it is planned to develop a Ph.D. program in this area and also to offer a Public Administration major in the B.S. degree Evening College Program administered by the College of Business Administration.

b) Continuous Career Development

The technologies applicable to the administration and management of governmental agencies, programs, etc. are undergoing dynamic and rapid change. Emphasis is placed on use of quantitative, computer, behavioral, environmental, etc. sciences to resolve the complex social and technological problems facing the career executive. Further, governmental directives like OMB A-11 which calls for use of "multiple linear regression in workforce estimating" are pressuring the agencies to use the new methods. "Operation update" is a common challenge facing governmental officials. A sound answer to this challenge lies in seminars and workshops varying in length from one (1) day to perhaps two (2) weeks dealing with subjects of immediate concern for example - Cost Estimating Techniques, Systems Analysis and Cost-Benefit Decision Making. A menu of courses will be developed via consultation with Philadelphia area government officials, SEPARC members and representatives of Civil Service Commission and ASPA. The conduct of such training programs would be

coordinated with the Drexel University Department of Continuing Education - scheduled start of the programs would be the winter of 1972/73.

While a principal focus of these training programs is the governmental manager, it is planned to open the courses to representatives of local industry. Indeed some of the courses now being planned like one on the area of "Environmental Law" would be pointed directly to the needs of industrial firms.

In addition it is planned to work with ASPA, AIDS and other professional societies to sponsor, develop and conduct meetings and seminars of more universal interest. Topics addressed would relate to such areas as Design and Delivery of Social Services, Nutrition Systems, Implementation of Program Budgeting Systems and Evaluation of Public Programs like low income housing.

For all offerings, but particularly with regard to the "meetings," the resources at Drexel would be augmented by the invited participation of other educators and senior governmental and industrial executives.

c/d) Consultation and Research

Many of the problems/needs of the (potential) governmental/ industrial clientele group of the Institute can best be solved by (1) "applying principles" at the operating site and/or (2) conduct of research to identify and conceptualize problems and test possible solution approaches. These services are most effectively furnished by coordinated multi-disciplinary skill teams composed of members of the various Drexel Faculties. Augmentation through use of

external resources from other universities, local consulting firms etc. may also be necessary. "Consultation" and/or "Research" are proper labels for such efforts. These activities would coordinate nearly with and enhance the professional and continuing education services outlined previously. Cultivation of governmental agencies regarding consultation and/or research possibilities has begun. Areas given high priority include Criminal Justice Systems, Urban Transportation, Economic Development and Planning, Housing and Urban Development - i.e. Low Income Housing and Model Cities. Priorities are reflections of client problem areas and the interests and skills of the proposed Institute faculty.

FACULTY AND CURRICULUM

IV. DEVELOPMENT OF INSTITUTE CAPABILITY

a) A multi-disciplinary (core) faculty will be "recruited" for the Institute. All Drexel faculty members will be appraised of the Institute through written announcements and bulletins and informal meetings will be held with college departments and requesting individuals to describe the Institute and its objectives, etc. Participating core faculty will be nominated by the Dean of the respective Colleges with concurrence of the appropriate department head (in Engineering College, Advanced Study Group) and faculty member. Such nominations, specifying the nature and extent of faculty members' commitment, will be reviewed and accepted by the Institute Director, and then approved by the Drexel Vice President for Academic Affairs. Core faculty members will continue to hold

academic appointments and be budgeted, etc. in their respective departments or advanced study groups.

The core faculty so comprised will be responsible for approving foundation requirements, curriculum design and courses offered by the Institute. The approvals of the graduate curriculum committee and the graduate dean are also required.

Initially, it is planned to utilize proposed and existing courses to the fullest extent possible, this policy makes use of existing faculty resources (including CORE faculty and other faculty members who will participate in teaching, research, etc., on occasion.) However, it will be necessary to develop new courses as per the above approved mechanism. In addition the selective use of adjunct professors from the local community of governmental and industrial professionals is contemplated. This will be particularly true during the early years of the program.

For the long term, faculty will be recruited to reflect research, consultation and training priorities that are identified during the initial operating period.

b) Special Programs and Seminars

An "internal" series of seminars will be conducted, perhaps weekly, to present to interested faculty members selected topics of general interest, research and consultation findings and opportunities, etc. Guest lecturers will be invited to participate in the series. The goal will be to identify areas where individual faculty members might participate in Institute programs and to stimulate such participation.

Institute members will be encouraged to participate, i.e. attend, present papers, etc., in professional meetings. This will provide useful exposure and development. It can also identify possible research and/or consultation areas and opportunities. As noted previously, the conduct of professional society meetings at Drexel is part of the Institute's agenda. Seminars of all types are a natural source of possible "additions to staff."

Drexel faculty members will be invited to submit ideas re: opportunities for training, research, consultation, etc. Meritorious proposals will be supported by released time and the efforts of other faculty members, so that proper agency consultation and proposal preparation can ensue. Experience makes clear that successful proposals are in the main the result of extensive long term dialoguing with the potential client. The Institute will seek to invest in the support of such activities to the fullest extent possible. Such investment via release time, etc. will of course, be negotiated with the appropriate faculty members, department heads, Advanced Study Group Chairmen and Deans.

c) Promotional Activities

A brochure describing the Institute will be prepared and disseminated. ASPA, Civil Service Commission and key governmental executives will assist in the dissemination of this document. The Drexel mailing list that includes other colleges, alumni, etc., will also be employed. The brochure will be a principal vehicle in the program to recruit students; SEPARC and ASPA have pledged support here. An Institute quarterly newsletter will be prepared to summarize

significant happenings, i.e. grant proposals, status, research findings, etc. Seminars conducted and participated in (described previously) enhance the Institute's image. Proceedings of seminars will be a part of Drexel Institute's faculty publications.

The internal seminar series (mentioned before) will also contribute to a better understanding of the Institute and its operations.

Releases to the press and other media will be made consistent with Drexel's policies in this regard.

d) Funding

There are two major sources of funds for the Institute, conveniently and easily labeled, internal and external. Internal funding will consist primarily of the "boot strap capital" of individual faculty members who wish to devote time to courses, problems, etc. of interest to them. Released time as available, will be employed to finance development of agency relationships, proposals, etc. where the probability of success and/or importance to the Institute makes it worthwhile.

External sources of funds include IPA70 and other governmental agencies, industrial firms like Sears Roebuck and General Electric and private foundations i.e., "Ford" and "Johnson." High priorities will be given to activities related to identifying available funds and preparing training, research, etc., grant/contract proposals. The need for comprehensive and extensive agency and industrial firm cultivation was previously described.

Funding under "IPA70 Grant" will provide some start in capital for the Masters Program. Grants will be made to a minimum of

fifteen (15) students for fall 1972. Additional training grant funds may be available from HUD - this possibility is being actively pursued. Student support is also available in "reimbursable training funds" in respective governmental agencies.

Another external source of funding will be the continuing career development seminars and workshops scheduled to begin in the winter. Anticipated "profit" will be used for such purposes as "travel" and participation in professional meetings. The goal will be a "seed money back" that can support efforts that will contribute to the objectives of the Institute.

V. ACTION PLAN FOR 1972

CURES: INSTITUTE FOR URBAN MANAGEMENT

The time table presented below summarizes the high priority action items pertinent to the remainder of 1972:

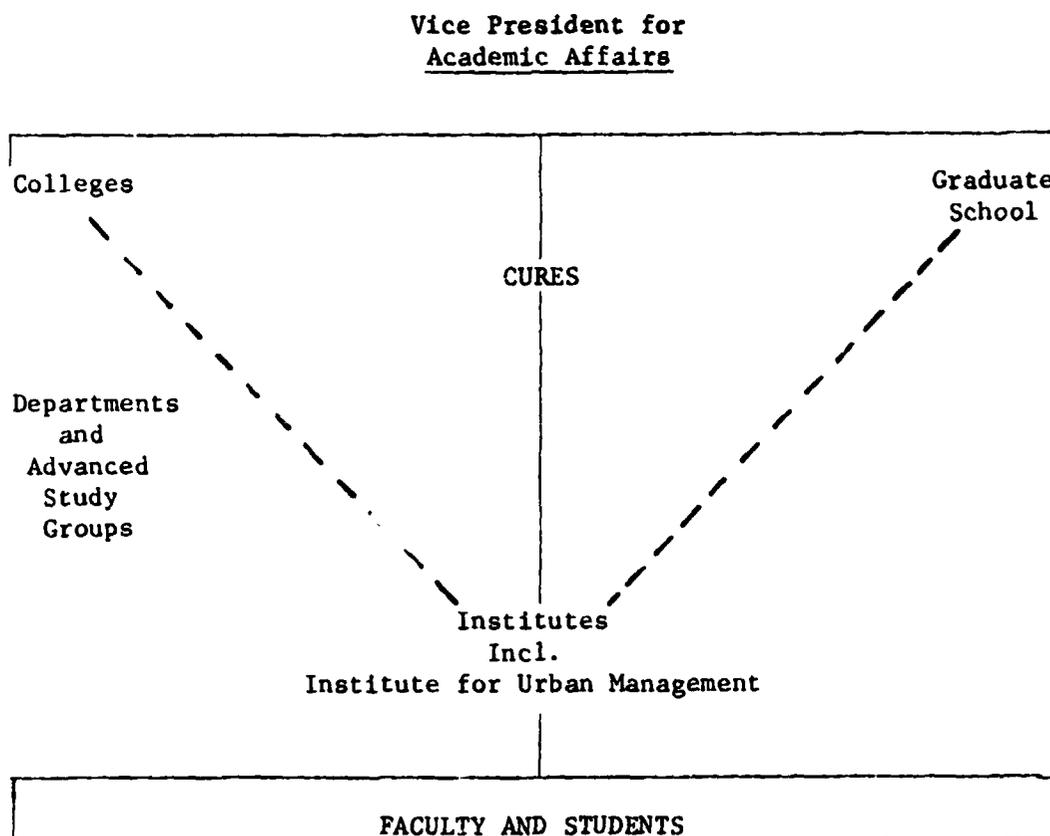
- . Obtain approval for Institute of Urban Management under CURES. Initiate program (s).
- . Start MS Program in Fall 1972 (See appendix for specific action items like Faculty recruitment, curriculum and course development, etc.)
- . Prepare brochure to assist in recruitment of students in cooperation with SEPARC - ASPA for Fall 1972 and future.
- . Initiate internal seminar series, quarterly newsletter.
- . Develop agenda of seminars/workshops in a continuing professional education series. Announce/conduct first workshop - cost-benefit analysis workshop.

- . Develop program for identification and cultivation of agency and industrial sources of "research," etc. funds. Priority to HUD, HEW, and Civil Service Commission within government.
- . Encourage participation of interested faculty members in Institute's activities. Obtain funding for professional meetings, proposal preparation to fullest extent possible.

VI. ORGANIZATION AND BUDGET

a) Organization Structure and Staffing Plan

The organization chart below depicts the initial plan for the Institute of Urban Management:



NOTE: Preliminary list of Potential Institute Faculty Members, classified by College, appears in part C below.

It is planned to take full advantage of existing Drexel services like Admissions, Comptroller, Continuing Education and Community Affairs. Further, the academic and operating policies of the University will also be adhered to. Core faculty will exercise jurisdiction over programs, curriculum and courses - again within the operating relationships existent in the various colleges, departments, etc.

The initial organization reflects a minimum cost start up operation. Expansion will be planned as the volume of services furnished warrants it.

b) Start-Up Budget (Academic Year 1972-1973)

Funding for the initial operation of the Institute will come from IPA70 Award - for Secretarial and Miscellaneous Expenses and Current Research and Release Time Budget of Vice President for Academic Affairs, School of Business, etc. for Director and Administrative Assistant (later). Student tuition will make the conduct of MS courses a better than breakeven operation.

An early objective will be to generate "seed funds" from Continuing Professional Education Workshops. However, pursuit of contract funds by individuals and/or teams of faculty will be the avenue that finally provides dollars to support research, consultation, and related activities.

VII. SECTION OF PROPOSAL TO IPA

DESCRIPTION OF THE MS PROGRAM IN PUBLIC ADMINISTRATION

1. General - The proposed MS Program in Public Administration would be governed by guidelines and rules established by all MS graduate programs at Drexel University. These guidelines appear in the Drexel University catalog and relate to such matters as admission regulations, transfer of credits, administration procedures, faculty, etc.

2. Characteristics of the Program

1. Three (3) year study program (part-time) with courses available in the evening. Full-time students could obtain degree in one (1) calendar year. (Special options described in D below.)
2. Course requirements fall into three (3) categories (see below)--Foundation, Core and Elective Concentration. Elective flexibility allows student to design a program consistent with his career plan.
3. Foundation and Core Courses, which are required of all students, provide a unique blend of traditional, quantitative, behavioral science and technology subject areas.
4. Program is interdisciplinary and involves faculties and courses from Colleges of Business Administration, Science, Engineering, Humanities and Social Sciences, Home Economics, and Library Science.
5. Action Research that is job-related or a multidisciplinary workshop seminar can be substituted for traditional Master's thesis.

3. Program Course Requirements

1. Each program must include forty-two (42) credits of advanced courses and six (6) credits of Thesis or Action Research Seminar or Multidisciplinary Workshop Seminar courses. Additional foundation courses may be required depending on the student's prior educational background and graduate program requisites. (See Section C below.)
2. Upon approval of the advisor, a maximum of fifteen (15) credits for advanced graduate courses may be transferred into the program from an accredited college.
3. Credit for foundation courses taken at an accredited undergraduate college or university can be obtained.
4. Program of study for each student will be an individual design worked out with an advisor designated upon admission.

4. MS in Public Administration Program Description - Courses and Sequence

A. Foundation Courses

The undergraduate credentials of each candidate will be reviewed in light of the candidate's career plans and proposed graduate study program. Necessary foundation courses will thereby be scheduled for each candidate on an "as required basis." Ordinarily, students will be expected to have some background in the principles of economics and public finance, statistics, computer programming, and the social sciences (sociology, political science, psychology).

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B. Advanced Courses - Required Core (30 Credits)

Management Information Systems	3 credits
Decision Sciences and Advanced Quantitative Analysis	6 credits
Political Science and Public Administration	6 credits
Behavioral Sciences	6 credits
Financial Management Systems	3 credits
Policy Implications of Technology and Society	3 credits
Urban Economics or Urban Sociology	3 credits
	<hr/>
Total Required Core Courses	30 credits

C. Elective and Concentration Areas (18 Credits)

Thesis or Action Research Seminar or Multidisciplinary Workshop Seminar	6 credits (required)
Sampling of Elective/Concentration Areas	
Environmental Sciences e.g., Health, Water, Air, etc.	
Personnel Management and Labor Relations	
Governmental Management Systems	
Policy Analysis and Planning	
Systems Analysis	
Financial Management	
Organizational Behavior and Management Systems	
Quantitative Analysis	
Operations Research	
Economic Analysis	
Legal Systems and Criminal Justice	
Nutrition Systems	
Urban Arts Administration	
Other Areas/Courses as approved by Advisor	<hr/>
TOTAL PROGRAM CREDITS	48 credits

5. Special Program Features

A candidate can elect, with approval of his advisor, to utilize the special course options described below in the design of his program of study.

1. Course(s) will be selectively offered during the summer so that a candidate can accelerate the fulfillment of his course requirements by attending class during this period.
2. Courses will be selectively offered on a concentrated basis within a two (2) week period as in the current MBA-Organizational Development Program. This too provides a convenient way for many career-minded candidates to accelerate the fulfillment of their respective course requirements.

Special Seminars and Workshops involving participants from all over the country will also be scheduled throughout the academic year to present to interested governmental career personnel topics of current and/or special interest.