NASA SP-7500 (04)

MANAGEMENT

A CONTINUING LITERATURE SURVEY

– With Indexes –

NASA SP-7500 (04) Management JUNE 1970

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

This issue of MANAGEMENT (NASA SP-7500) incorporates for the first time a section devoted to material selected from the files of the Defense Documentation Center (DDC) of the Department of Defense.

Grateful acknowledgement is made to Dr. Robert B. Stegmaier, Jr., Administrator of the DDC, and his staff for their cooperative contribution, which should clearly enhance the utility of this bibliography as a management information tool.

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NASA SP-7500 (04)

MANAGEMENT

A CONTINUING LITERATURE SURVEY

– With Indexes –

A selection of annotated references to unclassified reports and journal articles entering the NASA and DoD information systems in 1969.

Scientific and Technical Information Division
OFFICE OF TECHNOLOGY UTILIZATION
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JUNE 1970
Washington, D. C.

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INTRODUCTION

Management is a compilation of references to selected unclassified reports and periodical articles on the subject of management. This publication assembles groups of citations formerly announced in separate journals, *Scientific and Technical Aerospace Reports (STAR)*, *International Aerospace Abstracts (IAA)*, and *U.S. Government Research and Development Reports (USGRDR)*, together with other reports included in the NASA system but not previously announced.

The three earlier issues of the survey covered references to material from both NASA and non-NASA sources that entered the NASA information system during the period 1962 through 1968. The present issue covers 1969 material and follows the same basic pattern but its scope has been enlarged to include references provided by the Defense Documentation Center. Abstracts for these references, and for all items of Defense origin, are grouped together in the section headed "DDC Entries" with cross references from the other sections where they may also be cited.

For greater convenience the selected items are grouped in nine categories as indicated on page vii. The categories bear no relationship to those in *STAR*, *IAA*, or *USGRDR* but have been specifically chosen for this publication. Three indexes are provided: subject, personal author, and corporate source.

Items concerning management in the fields of reliability and quality assurance have for the most part been excluded. Such items appear in *Reliability Abstracts and Technical Reviews (RATR)*, a monthly journal prepared by the NASA Scientific and Technical Information Facility from input provided for the National Aeronautics and Space Administration by the Research Triangle Institute, Durham, North Carolina.

Many of the abstracts included in *Management* have been reproduced from those appearing in *STAR*, *IAA*, and *USGRDR*. This procedure, adopted in the interests of economy, has introduced some variation in size, style, and intensity of type.

AVAILABILITY OF DOCUMENTS

STAR Entries

All documents announced in the *STAR* section are available to the public as indicated in the citation.

NASA documents are identified by an asterisk (*) in the *STAR* section. NASA documents that have been microfiched [1] (identified by the # sign in the citation) are available on microfiche without charge to an organization that is registered with NASA to receive documents.

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To obtain microfiche, if you are registered with NASA and eligible to receive documents as described above, send a completed *Document Request* (Facility Form 492) to:

NASA Scientific and Technical Information facility
P.O. Box 33
College Park, Maryland 20740.

Please use the NASA accession number shown at the beginning of the citation when requesting these documents.

If you are not registered with NASA and wish to receive information concerning registration, request *Registration Form—Technical Publications* (Facility Form 713) from the NASA Scientific and Technical Information Facility at the address given above.

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Clearinghouse for Federal Scientific and Technical Information
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Springfield, Virginia 22151

Most CFSTI reports are sold for $3 in paper copy and 65 cents in microfiche. Publications with a SOD availability statement in the citation are sold in paper copy by:

Superintendent of Documents (SOD)
U.S. Government Printing Office
Washington, D.C. 20402

NASA documents available from the SOD are also available from CFSTI at the SOD price.

NOTE: Documents announced without specific availability statement may be requested from the issuing activity. Bibliographic information, e.g., report number, author, and/or issuing organization rather than the NASA accession number, i.e. N69-12345, should be provided when requesting a document cited in the *STAR* section from an organization other than NASA.

European requesters may purchase facsimile copy or microfiche of NASA documents, those identified by both the # and * symbols, from:

ESRO/ELDO Space Documentation Service
European Space Research Organization
114, av. de Neuilly
92-Neuilly-sur-Seine, France.

[1] A microfiche is a transparent sheet of film, 105×148 mm in size, capable of containing up to 72 pages of information reduced to micro images (not to exceed 20:1 reduction).

IAA Entries

All documents cited in the *IAA* section are available from:

Technical Information Service
American Institute of Aeronautics and Astronautics, Inc. (AIAA)
750 Third Avenue
New York, N.Y. 10017.

Paper copies are available at $3 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents.

Microfiche of documents announced in the *IAA* section are available at the rate of 50 cents per microfiche on demand. Documents available in this manner are identified by the # sign following the accession number in the citation.

Minimum air mail postage to foreign countries is $1.

A number of publications, because of their special characteristics, can not be reproduced.

Please refer to the *IAA* accession number shown at the beginning of the citation when requesting publications from AIAA.

DDC Entries

Documents cited in the DDC section are available from CFSTI, unless another source is specified in the citation. Please refer to the accession number given in the last line of the entry when requesting publications in the DDC section from CFSTI.

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Defense Documentation Center
Cameron Station
Alexandria, Virginia 22314

SUBJECT CATEGORIES

Abstracts in the survey are grouped under the following categories:

M1 PROGRAM & PROJECT MANAGEMENT

Includes production management; systems management; logistics management; engineering management; management planning; marketing; resource and manpower allocation; program budgeting; decision making.

M2 CONTRACT MANAGEMENT

Includes contract incentives; contract decision making; procurement; subcontracts.

M3 RESEARCH & DEVELOPMENT

Includes research environment; R & D planning; R & D management; inventions and patents; research evaluation.

M4 MANAGEMENT TOOLS & TECHNIQUES

Includes program evaluation and review techniques (PERT); planning, programming and budgeting systems (PPBS); prediction analysis techniques (PAT); program trend line analysis; cost effectiveness; simulation; computers; operations research.

M5 PERSONNEL MANAGEMENT

Includes personnel problems; motivation; environmental problems; personnel development and training; recruitment; psychological studies; communication.

M6 TECHNOLOGICAL RESOURCES

Includes application of space technology and management techniques to social problems; technology utilization; technology assessment; public administration; urban planning and management.

M7 MANAGEMENT POLICY & PHILOSOPHY

Includes management concepts; policy studies; organizational studies and problems; social relationships and problems.

M8 ECONOMICS

Includes impact of federal expenditures and programs; government/industry relations; federal financing; federal budgeting; federal resources and urban needs.

M9 GENERAL

Includes conference proceedings; reviews; patent information; speeches; bibliographies.

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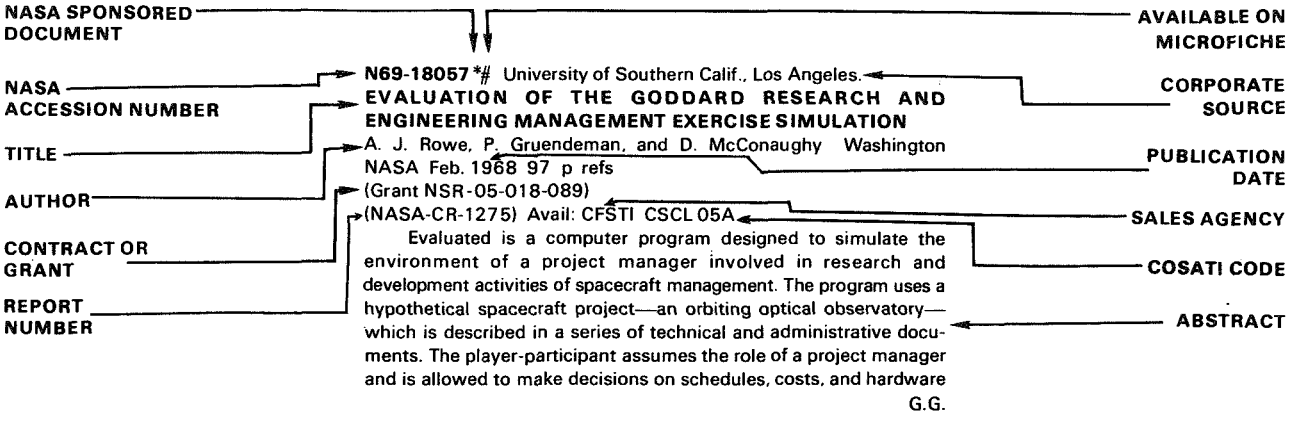
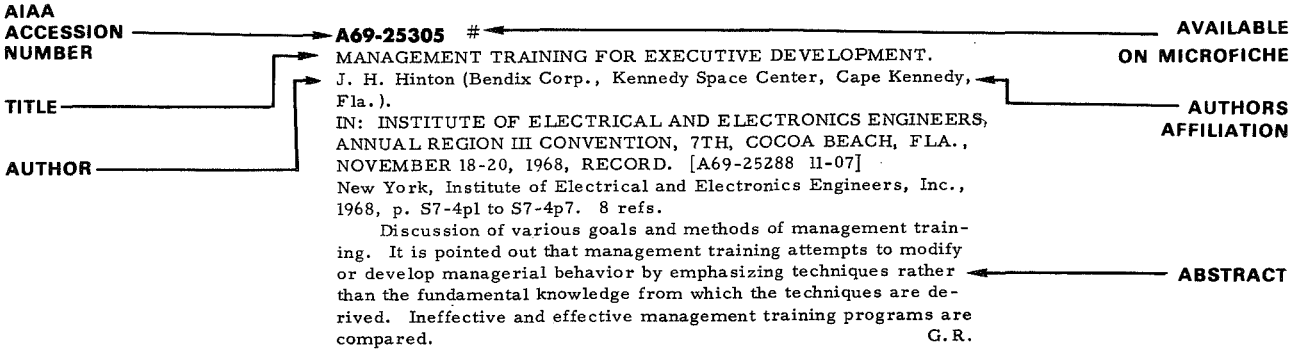
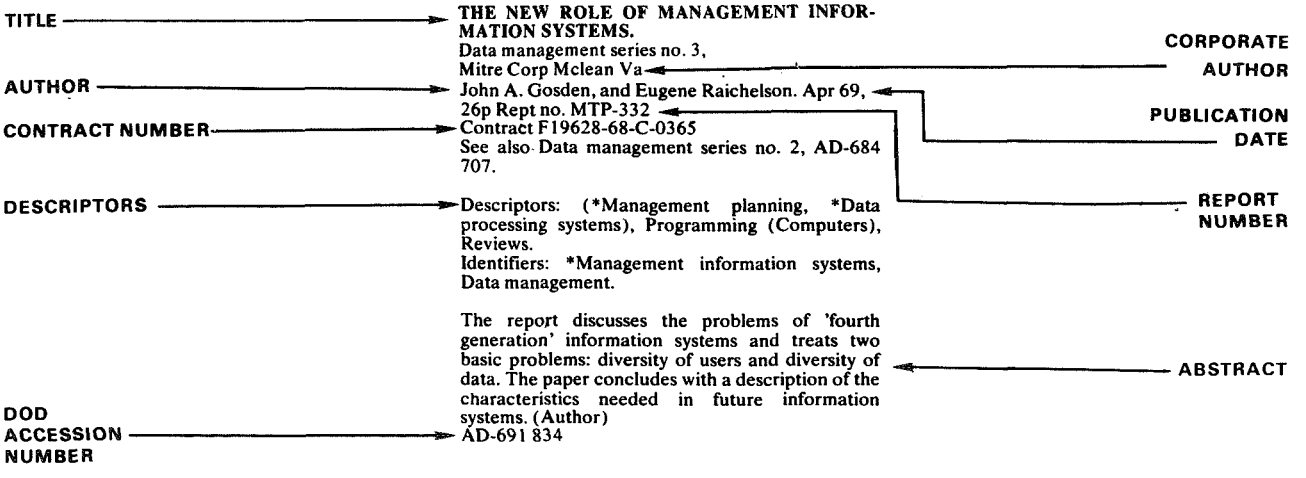
TYPICAL CITATION AND ABSTRACT FROM STAR



TYPICAL CITATION AND ABSTRACT FROM IAA



TYPICAL CITATION AND ABSTRACT FROM DDC



MANAGEMENT

a continuing literature survey

JUNE 1970

STAR ENTRIES

M1 PROGRAM & PROJECT MANAGEMENT

N69-80449# System Development Corp., Santa Monica, Calif.
THE TECHNOLOGY OF FORECASTING AND THE FORECASTING OF TECHNOLOGY
Marvin Adelson 25 Apr. 1968 23 p refs Submitted for publication
(PB-184362; SP-3151) Avail: CFSTI

Forecasting -- technological and other -- is becoming more demanding as it is becoming more important. Present practices and needed developments in the state of the art are discussed.
Author (USGRDR)

N69-79221 RAND Corp., Santa Monica, Calif.
USE AND LIMITATIONS OF SYSTEMS ANALYSIS
Clay Thomas Whitehead Sep. 1967 182 p refs
(AD-689053; P-3683) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-78663 Defense Dept., Washington, D.C. Systems Analysis Div.
SYSTEMS ANALYSIS AND THE NAVY
Alain Enthoven *In* Northeastern Univ. Systems Analysis Mater. 23 Jun. 1969 14 p Repr. from Naval Rev., 1965 14 p
Avail: Issuing Activity

The systems analysis approach is defined as a systematic attempt to bring to bear on the problem of planning the defense program many relevant disciplines, and to do so in an integrated way. The list includes traditional military planning, economics, political science and other social sciences, applied mathematics, and the physical sciences. Emphasis is placed on systems analysis as applied economic analysis. The principles of economics are reviewed to indicate some of the fundamentals that are relevant to systems analysis. These include the comparison of alternatives, particularly the marginal comparisons; diminishing marginal returns; balanced forces, or an efficient mix of forces; allocation of resources; and construction of partial orderings. The art of weapon systems analysis is discussed, and the assumptions and uncertainties inherent in systems analysis are assessed. A contrast is drawn between systems analysis and operations research. Benefits resulting to the Navy from using the systems analysis approach are examined.
M.G.J.

N69-76451 Center for Naval Analyses, Wash., D.C.
WHERE IS SYSTEMS ANALYSIS ?
C. J. Di Bona Apr. 1968 15 p
(N00014-68-A-0091)
(AD-686702; CNA-134-69) Avail: CFSTI

For abstract see appropriate AD number (shown above), in corresponding category under DDC Entries.

N69-75889 Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN EMPIRICAL STUDY IN CHARTING THE INTERRELATIONSHIPS IN THE PROJECT MANAGEMENT ENVIRONMENT
Robert E. Bowen (M.S. Thesis) Sep. 1967 225 p refs
(AD-684538; GSM/SM-67-3) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-71302 Carnegie Mellon Univ. Management Sciences Research Group.
NEWS REPORT
Abraham Charnes, William W. Cooper, J. K. Devoe, David B. Learner, and Lawrence Light May 1968 26 p refs
(Nonr-760(24))
(AD-674408; RR-126) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-40498# RAND Corp., Santa Monica, Calif.
PROJECT MODELLING: A TECHNIQUE FOR ESTIMATING TIME COST PERFORMANCE TRADE OFFS IN SYSTEM DEVELOPMENT PROJECTS
E. V. W. Zschau Jul. 1969 105 p refs
(Contract F44620-67-C-0015)
(AD-691810; RM-5304-PR) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-39642# European Space Technology Center, Noordwijk (Netherlands).
ESRO 1 PROJECT MANAGEMENT AND ORGANISATION
M. G. Grensemann *In* ESRO ESRO/ELDO Bull., Suppl.: ESRO 1/AURORAE Apr. 1969 p 23–28
Avail; CFSTI

Cooperation between ESRO (ESTEC) and its contractors for the design of the ESRO 1 satellite is described. Several PERT networks were drawn to suit the needs of different users and the PERT/cost network was broken down into small work packages. Relations with the scientific groups involved and with NASA are also analyzed.
ESRO

N69-36356# Congress. House. Committee on Science and Astronautics.
ENGINEERING MANAGEMENT OF DESIGN AND CONSTRUCTION OF FACILITIES OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington GPO 1968 81 p Presented to Comm. on Sci. and Astronaut., 91st Congr., 1st Sess., Serial G, 11 Aug. 1969
Avail: Subcomm. on NASA Oversight

Congressional subcommittee report provides a cost accounting of the engineering management dealing with the design and construction of facilities at NASA field centers. The findings of a nationwide staff survey are reported for all of the principal space installations, including detailed tables of design, construction, and management costs for more than 200 projects. Various methods of engineering supervision are analyzed, and certain conclusions are advanced regarding management policies and procedures that may be pertinent to future facility development. Author

N69-35986*# Syracuse Univ., N.Y.
THE APOLLO PROJECT MANAGER, ANOMALIES AND AMBIGUITIES
David L. Wilemon and John P. Cicero Jun. 1969 20 p refs
(Grant NGL-33-022-090)
(NASA-CR-105282) Avail: CFSTI CSCL 05A

This article deals with some of the problems that Apollo project managers face in the everyday operation and implementation of the manned space effort. The emphasis is on the focal position of the project manager rather than on an overall systems concept of project management. Five areas of anomalies and ambiguities in terms of problem resolution and management strategies are discussed: (1) maintaining the balance between technical and managerial emphasis; (2) risk acceptance/rejection; (3) surviving environmental restraints; (4) the significance of project communication; and (5) penetrating organizational boundaries. Discussion of these areas gives some preliminary insights into the management styles of the effective project managers and opens significant areas for future research on the management of large-scale, complex undertakings such as Apollo. Author

N69-34657# Bosch (Robert) G.m.b.H., Stuttgart (West Germany). Entwicklung Fertigungstechnik.
VALUE ENGINEERING AS A BASIS OF METHODICAL PRODUCT DEVELOPMENT [WERTGESTALTUNG ALS GRUNDLAGE METHODISCHER ERZEUGNISENTWICKLUNG]
Paul Baier *In its* Tech. Rept., Vol. 2, No. 4 Jun. 1968 p 177–183 refs In GERMAN; ENGLISH summary
Avail: CFSTI

In developing a new product it is necessary to reconcile quality, profitability and modernity. This can be achieved by close co-operation between experts in all the areas involved. A plan exists, which is characterized by an outstanding combination of system and organization and which forms the foundation for realistic and successful team-work. The method, in the report, is known as 'value engineering'. ESRO

N69-31683# Congress. House. Committee on Science and Astronautics.
APOLLO PROGRAM MANAGEMENT
James E. Wilson and Peter A. Gerardi Washington GPO Jul. 1969 267 p refs Staff Study for the Comm. on Sci. and Astronaut., 91st Congr., 1st Sess. *Its* Serial C
Avail: Subcomm. on NASA Oversight

The Committee on Science and Astronautics staff reviewed with the NASA and key contractors in the Apollo program their views of the management contributions of the Apollo program. Each participated in a recorded conference and summaries of the main concepts are presented. These summaries represent a distillation of the accumulated management experience of each of the organizations and its application to the Apollo program. Since each industrial participant already had many years of corporate experience in major program management, both Federal and commercial, a major contribution from previous experience is a part of this record. Author

N69-21176# Bundesministerium fuer Wissenschaftliche Forschung, Bad Godesberg (West Germany).
SYMPOSIUM ON PROJECT MANAGEMENT [SYMPOSIUM UEBER PROJEKT MANAGEMENT]
Dec. 1968 209 p Partly in ENGLISH and GERMAN Symp. held at Bad Godesberg, 14–15 Sep. 1967; sponsored jointly by BMwF and WGLR
(BMwF-FB-W-68-78) Avail: CFSTI

Twelve papers are discussed on project and systems management problems seen from the angle of the contract-awarding agencies and of the contractors arising in national and international space programmes. The papers deal with the project manager's position within his organization, the flow of information at the management level and methods for project control and management. Author

N69-21067*# New York Univ., N. Y. Graduate School of Business Administration.
SCIENTISTS, ENGINEERS AND MANAGERS: PARTNERS IN SPACE
Alex W. Rathe and Dhun Irani Dec. 1968 214 p refs
(Grant NGR-33-016-067)
(NASA-CR-100414; C-69-1) Avail: CFSTI CSCL 05A

An attempt was made to identify the major factors in management practices and attitudes, as well as their effects, which would help to obtain a better understanding of the interdependence of engineering and management in the aerospace industry. The groundwork for the analyses was laid through an extensive search of the literature. For the discussions with managers and engineers, lengthy interview guides were drafted. All material was recorded and classified by subject matter. Each of these categories was tehn subjected to creative analysis in discussions among the authors; the observations were then fitted into a comprehensive framework that accommodated all major aspects of engineering management. The results presented discuss the engineer and his work; the impact of engineering management upon such work, after a recapitulation of motivational factors; and the systems approach to management. Planning, direction of operations, review and feedback, control, personnel administration, and managerial philosophy are discussed in relation to the management of engineers. B.P.

N69-11254# RAND Corp., Santa Monica, Calif.
NEW DIRECTIONS IN ORGANIZATION THEORY
Timothy Hallinan Sep. 1968 15 p refs
(AD-675167; P-3936) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

M2 CONTRACT MANAGEMENT

N69-77205 George Washington Univ., Washington, D.C.
THE EXPANDING ROLES OF NON-PROFIT ORGANIZATIONS AS CONTRACTORS WITH GOVERNMENT: SOME

RESEARCH NEEDS
Clarence H. Danhof Mar. 1968 20 p refs
(PB-182879; SDP-301) Avail: CFSTI

The analysis suggests that some of the problems of non-profit organizations are internal and can be met by better management. While others may require changes in the policies pursued by government agencies. Author (USGRDR)

N69-36917*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
A STUDY OF THE RELATIONSHIP OF CERTAIN PROJECT TEAM AND CONTRACT CHARACTERISTICS TO THE *PERFORMANCE OF R AND D CONTRACTS*
Raymond Lee Read (Ph.D. Thesis - Florida State Univ.) Jan. 1969 111 p refs Sponsored in part by Tex. Univ.
(NASA-TM-X-61809; MSC-BE-MR-69-3) Copyright. Avail: CFSTI CSCL 05A

Objective criteria based on contract and project team characteristics which bear a relationship to contract performance were investigated by studying contracts between $100,000 and one million dollars. Hypotheses were formulated which stated the relationship between contract and project criteria and performance. It is concluded: (1) There is a relationship between the average number of degrees per man and the contract performance. (2) There is no relationship between the experience per man on a project team and the performance. (3) There is no relationship between contract performance and the fact that a contract is compensated on either a cost-plus-a-fixed-fee, or fixed-price basis. F.O.S.

N69-35778# European Space Vehicle Launcher Development Organization, Paris (France).
THE ELDO CONTRACTING SYSTEM AND ITS SPECIAL JURIDICAL ASPECTS [LE REGIME DES CONTRATS DU CECLES/ELDO ET SES ASPECTS JURIDIQUES PARTICULIERS]
J. de Reuse *In its* ESRO/ELDO Bull. No. 5 May 1969 p 10–13 In French
Avail: CFSTI

This report describes the special ELDO contracting system which comprises either direct contracts with industry or indirect ones through ELDO Member States. The juridical problems arising from this twofold policy are also discussed. ESRO

M3 RESEARCH & DEVELOPMENT

N69-80513 Massachusetts Inst. of Tech., Cambridge.
SOME STUDIES OF LABORATORY MANAGEMENT
Herbert A. Shepard *In* AGARD Proc. of the 4th AGARD General Assembly May 1954 p 148-152 Avail: CFSTI

The complex problems involved in the personal relations among scientists collaborating in research are discussed from the viewpoint of how such relationships may affect the quality of their work as a group. Management attitudes and policies are surveyed to show the wide divergence of existing opinions. The dilemma of the laboratory director is characterized as one of conflict between two organizational principles: the colleague principle characteristic of professional associations, and the hierarchy principle characteristic of bureaucracies. The question is raised as to whether the team work concept has been emphasized too much in American laboratories, or whether too much stress has been placed on individual work in some European countries. It is concluded that studies of national differences and similarities in approach, and their relation to each nation's special areas of competence and brilliance, can be a useful undertaking. M.G.J.

N69-77686 General Dynamics/Astronautics, San Diego, Calif.
A STUDY OF MANAGEMENT CRITERIA NECESSARY FOR *EFFECTIVE DIRECTION OF RESEARCH ACTIVITIES*
C. E. Burgi 25 Apr. 1962 43 p refs
(AD-686427; GDA-AE62-0448) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-72548* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
AN OUTLINE FOR A GRADUATE LEVEL COURSE IN R AND D MANAGEMENT
20 Jan. 1969 81 p refs
(NASA-TM-X-61649) Avail: CFSTI

The detailed outline presented covers the following areas: (1) the R & G industry, (2) the organization of the principal R & D effort in the government, (3) the Federal Government decision-making process, (4) the roles of technical and nontechnical people in the formulation and execution of public policy, (5) government-industry relations, (6) government-university relations, (7) government relations with nonprofit institutions, (8) personnel management, (9) contracting for R & D effort, (10) program planning and budgeting, (11) the organization of R & D effort, and (12) the management and control of R & D effort. M.G.J.

N69-71220 Office of Aerospace Research, Washington.
TECHNOLOGICAL BARRIERS DOCUMENTATION PROJECT OF THE OFFICE OF AEROSPACE RESEARCH, UNITED STATES AIR FORCE
Currie S. Downie and Ernest P. Luke Jun. 1968 31 p refs
(AD-674050; OAR-68-0013) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-71134 MIT-Cambridge. Alfred P. Sloan School of Management.
STUDY OF INFORMATION REQUIREMENTS FOR RESEARCH AND DEVELOPMENT Annual Report
Aug. 1968 79 p refs
(Grant NSF-GN-597)
(PB-179538) Avail: CFSTI

Parallel projects; Laboratory communication networks; Characteristic costs of information channels; Inter-organizational transfer of information; Other approaches; Educational activities; Principal conclusions and implications; Theses produced as part of the research program; Papers and reports produced as part of the research program; The problem of internal consulting in R and D organizations; Information flow in R and D laboratories; A model *for the description and evaluation of technical problem solving.* Author

N69-70208 RAND Corp., Santa Monica, Calif.
STATE-OF-THE-ART PROJECTION AND LONG-RANGE PLANNING OF APPLIED RESEARCH
F. Pardee Jul. 1965 24 p refs Presented at the 2d ONR Conf. on Res. Program Effectiveness, Washington, D.C., 27-29 Jul. 1965 Submitted for publication
(P-3181) Avail: CFSTI

Several methods are proposed for improving the communications process between the applied research scientist and systems engineers or long-range planners. To attain a degree of uniformity in the manner in which estimates of probable technical performance are prepared and documented, it is suggested that particular consideration be given to (1) criteria for selection performance characteristics, (2) uniformity in time frames and research status points.

(3) explicit treatment of uncertainties, (4) the problem of interdependencies, (5) documentation of major underlying assumptions, and (6) coordination of the estimates of a group of experts. Guidelines for quantitative projection of advances in the state of the art are included. M.G.J.

N69-34289# Air Force Office of Scientific Research, Arlington, Va.
PLANNING PHENOMENA-ORIENTED RESEARCH IN A MISSION-ORIENTED ORGANIZATION
Howard M. Vollmer ed., John K. Galt, Guilford L. Hollingsworth, Donald C. Pelz, William J. Price et al Sep. 1968 59 p refs Presented at the 12th Inst. on Res. Admin., Washington, D.C., 24-27 Apr. 1967 Prepared in Cooperation with Am. Univ.
(AD-675991; AFOSR-68-1759) Avail: CFSTI CSCL 05/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-32966 National Lending Library for Science and Technology, Boston Spa (England).
NEW PLANNING METHOD FOR RESEARCH TECHNOLOGY
Emanuel Naumann [1969] 15 p refs Transl. into ENGLISH from ZIS Mitt. (Germany), v. 9, pt. 2, Feb. 1967 p 178–190
(NLL-M-7506-(5828.4F)) Avail: Nat. Lending Library, Boston Spa, Engl.

The advantages of network and block diagrams are combined in a spatial planning chart for simplicity in organizational planning and control of projects. The activity oriented networks are considered a useful measure for time schedules and for completion deadlines. The system is applied to construction of an electron beam welding plant. It is concluded that this method is capable of standardizing and improving research projects. F.O.S.

N69-31284# Office of Aerospace Research, Arlington, Va. Office of Scientific and Technical Information.
OVERCOMING BARRIERS IN R AND D COUPLING
Arthur A. Ezra (Denver Univ.) 14 Mar. 1969 15 p refs Presented at OAR Lectures on R and D Coupling and Information Transfer, 1969 Supported in part by ARPA and Army
(AD-686430; OAR-69-0005) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-25500*# California Univ., Los Angeles.
THE MANAGEMENT OF SCIENTISTS: A STUDY OF THE MANAGEMENT INFLUENCE ON THE PRODUCTIVITY OF SCIENTISTS
Cyril O'Donnell 9 Dec. 1968 265 p refs
(Grant NGR-05-007-090)
(NASA-CR-100904) Avail: CFSTI CSCL 05A

The results of a study analyzing the relationship between the scientist and his environment, in terms of its contribution to successful scientific research, are presented. A copy of the field questionnaire, which was partially used as the basis for the results, and some of the dialogue at a seminar composed of responding scientists and managers are included. Such topics are discussed as factors affecting the productivity of scientists, the managing process, planning within the laboratory, the control and organization of research, staffing the laboratory, and the direction and management of scientists. It is concluded that the management of scientists is in no way different from any other management; it is primarily a facilitative process, defining objectives and developing the plans essential for their achievement. P.A.B.

N69-25454# George Washington Univ., Washington, D.C.
INTERDEPENDENCIES BETWEEN PUBLIC AND PRIVATE INTERESTS IN THE ADVANCEMENT OF NEW TECHNOLOGIES Science and Technology Policy Study
Clarence H. Danhof Dec. 1968 69 p refs Prepared for the Comm. on Marine Sci., Eng. and Resources *Its* Internal Ref. Doc. 45
(PB-182600) Avail: CFSTI CSCL 05A

The federal government's activities over the past couple of decades in the promotion and application of new technology provide a body of experience upon which new programs can draw. This study seeks to make available in orderly fashion the aspects of that experience which seem relevant to the promotion of technological advance in oceanography. USGRDR

N69-17993# Office of Aerospace Research, Arlington, Va.
OAR PROGRESS, 1968
Joseph Seiden, ed. 1968 143 p refs
(AD-679700; OAR-68-0007) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-14324# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PLANNING RESEARCH AND DEVELOPMENT AND EXPERIMENTAL DESIGN WORK
M. L. Bashin 28 Dec. 1967 140 p refs Transl. into ENGLISH of the book "Planirovaniye Nauchno-Issledovatel'skikh i Opytno-konstruktorskikh Rabot" Moscow, Ekonomik, 1966 p 1–215
(AD-677022; FTD-HT-23-1247-67) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

M4 MANAGEMENT TOOLS & TECHNIQUES

N69-78999 Florida Univ., Gainesville. Dept. of Industrial and Systems Engineering.
PROJECT MANAGEMENT USING GPSS/360
Philip E. Hicks and Suresh K. Jain May 1969 25 p refs
(DAHC04-68-C-0002)
(AD-688954; THEMIS-UF-TR-19; AROD-T-1.32-RT) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-75954 Mitre Corp., Bailey's X-roads Va.
SURVEY OF MANAGEMENT INFORMATION SYSTEMS AND THEIR LANGUAGES
James P. Fry and John A. Gosden May 1968 32 p refs *Its* Data Management Series No. 1
(AF-19(268)-5165)
(AD-684706; MTP-313) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-72385 North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
A STANDARDIZED APPROACH TO COST EFFECTIVENESS EVALUATIONS

A. D. Kazanowski, A. N. Lillenas, and J. J. Stuart 20 Dec. 1966 85 p refs
(SID-66-1923) Avail: CFSTI

This report presents a standardized approach to the conduct of cost effectiveness evaluations. Ten basic steps constituting the standardized approach are presented in detail. Common pitfalls encountered in the conduct of cost effectiveness evaluations are discussed. Over 700 criteria for the evaluation of space systems are listed in the appendixes and categorized by space missions. Author

N69-71346 Army Edgewood Arsenal.
PERT AND ITS ASSOCIATED MANAGEMENT SCIENCES
M. M. Michie May 1968 105 p refs
(AD-677394; EASP-400-15) Avail: CFSTI

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-37681# RAND Corp., Santa Monica, Calif.
REDUCING LEAD-TIME THROUGH IMPROVED TECHNOLOGICAL FORECASTING: SOME SPECIFIC SUGGESTIONS FOR MORE USEFULLY FORMULATED PROJECTIONS OF TECHNOLOGICAL AVAILABILITY
David Novick and Frederick S. Pardee Jun. 1969 17 p Submitted for publication
(AD-689246; P-4122) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-36421# ARINC Research Corp., Annapolis, Md.
GUIDEBOOK FOR SYSTEMS ANALYSIS/COST-EFFECTIVENESS
Fort Monmouth, N.J. ECOM Mar. 1969 451 p refs
(Contract DAAB07-68-C-0056)
(AD-688154; Publ-800-01-01-957) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-34658# Bosch (Robert) G.m.b.H., Stuttgart (West Germany). Entwicklung Fertigungstechnik.
A SPECIAL CASE OF NETWORK PLANNING IN PRODUCTION PLANNING [EIN SONDERFALL DER NETZPLANTECHNIK IN DER FERTIGUNGSVORBEREITUNG]
Erich Knapp, Manfred Schauss, and Edgar Weckerle *In its* Tech. Rept., Vol. 2, No. 4 Jun. 1968 p 184–192 refs In GERMAN; ENGLISH summary Prepared jointly with R. Bosch Electron. und Photokino
Avail: CFSTI

The application of critical path methods to a special case of production planning is described; General PERT methods have been adapted to design a planning network from three components: standard network plans, components lists and time estimates for activities. The program was written in Fortran and no manual drafting of network plans was required. ESRO

N69-31231# RAND Corp., Santa Monica, Calif.
EVALUATION AS FEEDBACK IN THE PROGRAM DEVELOPMENT CYCLE
Majorie L. Rapp Apr. 1969 8 p
(AD-686412; P-4066) Avail: CFSTI CSCL 5/11

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-28820# Mitre Corp., Baileys Crossroads, Va.
DATA MANAGEMENT SYSTEMS SURVEY
James P. Fry, Samuel Branson, David C. Fried, Walter P. Grabowsky, John Jeffries, Jr. et al Jan. 1969 182 p refs
(Contract F19628-68-C-0365)
(AD-684707; MTP-329) Avail: CFSTI CSCL 9/2

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-24425# RAND Corp., Santa Monica, Calif.
SOME CURVE-FITTING FUNDAMENTALS
R. L. Petruschell Dec. 1968 138 p refs
(Contract DAHC15-67-C-0150)
(AD-680613; RM-5766-SA) Avail: CFSTI CSCL 14/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-20406# RAND Corp., Santa Monica, Calif.
SOME THOUGHTS ON THE USE AND MISUSE OF STATISTICAL INFERENCE
Ralph E. Strauch Jan. 1969 19 p refs
(AD-681109; P-3992) Avail: Issuing Activity CSCL 12/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-19408*# Washington Univ., St. Louis, Mo. Dept. of Economics.
PLANNING PROGRAMMING BUDGETING SYSTEMS, SELECTED CASE MATERIALS
Murray L. Weidenbaum Feb. 1969 44 p refs *Its* Working Paper No. 6900
(Grant NGR-26-008-003)
(NASA-CR-100030) Avail: CFSTI CSCL 05C

Planning, programming, and budgeting profiles for an organization are developed by: (1) identification of the overriding objectives; (2) development of an array of feasible alternatives for achieving these objectives; (3) systematic choice between the alternatives; and (4) conversion of results into operational decisions. G.G.

N69-18057*# University of Southern Calif., Los Angeles.
EVALUATION OF THE GODDARD RESEARCH AND ENGINEERING MANAGEMENT EXERCISE SIMULATION
A. J. Rowe, P. Gruendeman, and D. McConaughy Washington NASA Feb. 1968 97 p refs
(Grant NSR-05-018-089)
(NASA-CR-1275) Avail: CFSTI CSCL 05A

Evaluated is a computer program designed to simulate the environment of a project manager involved in research and development activities of spacecraft management. The program uses a hypothetical spacecraft project—an orbiting optical observatory—which is described in a series of technical and administrative documents. The player-participant assumes the role of a project manager and is allowed to make decisions on schedules, costs, and hardware G.G.

N69-17743# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
PROJECT SCHEDULING WITH RESOURCE CONSTRAINTS
Egon Balas Jun. 1968 28 p refs
(Contract Nonr-760(24))
(AD-679621; RR-147) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-17086# Electronic Systems Div., Bedford, Mass. Cost Analysis Div.
AN INDEX FOR USE IN THE SELECTION OF COST EFFECTIVE SYSTEMS
Walter G. Hartung Oct. 1968 36 p refs
(AD-678514; ESD-TR-68-426) Avail: CFSTI CSCL 14/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-16934# Air Force Office of Scientific Research Washington, D. C.
LONG RANGE FORECASTING METHODOLOGY
Joseph P. Martino and Thomas E. Oberbeck [1968] 197 p
(AD-679176; AFOSR-68-0049) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-16331# McDonnell-Douglas Co., Santa Monica, Calif. Western Div.
COMPLETE SYSTEM ANALYSIS: QUANTITATIVE SYSTEM ANALYSIS, COMPUTER SIMULATION, AND SYSTEM OPTIMIZATION
A. F. Goodman, L. Gainen, and C. O. Beum, Jr. (N. Am. Rockwell Corp.) Sep. 1968 63 p refs Presented to Am. Inst. of Aeron. and Astronautics 1967 Lecture Ser., Los Angeles, 7 Mar. 1967
(Douglas-Paper-4431) Avail: Issuing Activity

Many systems and processes in use today are quite complex, and experimentation regarding them is both difficult and expensive. For such systems or processes, mathematical solution for outputs in terms of inputs is usually not feasible, and computer simulation is often an effective and efficient complement to experimentation. Complete system analysis is a general approach to the coordination of experimentation and computer simulation in the analysis and optimization of a system or process. In addition, it is somewhat novel in its approach. Three basic stages of complete system analysis are quantitative system analysis, computer simulation, and system optimization. Author

N69-14939# European Space Vehicle Launcher Development Organization, Paris (France).
NETWORK ANALYSIS—CONTRIBUTION TO THE ELDO MANAGEMENT [L'ANALYSE DE RESEAU—CONTRIBUTION A LA GESTION DU CECLES]
I. Stevenson *In* ESRO ESRO/ELDO Bull. No. 2 Aug. 1968 p 11-17 In FRENCH
Avail: CFSTI

The network for the ELDO management planning and program control was divided into three levels of detail: network level 1 comprises a general summary of the ELDO programs as a whole; network level 2 is established by the governmental organization and allows for planning and control from one week to the next; network level 3 is established by the contractors and is used for day-to-day project management. Some examples of the computer analysis of the ELDO PERT network are given and the problems of communication between Member States and Secretariat, necessary for the updating and the analysis of the central network, are outlined. ESRO

N69-13820# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
SIMPLE STOCHASTIC NETWORKS: SOME PROBLEMS AND PROCEDURES
D. P. Gaver, Jr. and John M. Burt, Jr. Jul. 1968 42 p refs
(Contracts Nonr-760(24); Nonr-1228(10))
(AD-676891; RR-142) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-13790# RAND Corp., Santa Monica, Calif.
A REAL TIME METRIC FOR THE DISTRIBUTION OF SERVICEABLE ASSETS
Bruce L. Miller Oct. 1968 41 p refs
(Contract F44620-67-C-0045)
(AD-676641; RM-5687-PR) Avail: CFSTI CSCL 15/5

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-13674# Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Deputy for Engineering.
RESEARCH AND DEVELOPMENT EFFECTIVENESS PROGRAM 1969 (RDE 69) A MANAGEMENT TOOL TO ALLOCATE THE BUDGET OF A RESEARCH ORGANIZATION
Robert R. Jurick and James F. Bittle, II Jul. 1968 138 p
(AD-676269; ASD-TR-68-23) Avail: CFSTI CSCL 9/2

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-12474# Royal Coll. of Art, London (England). Research Unit.
THE STRUCTURE OF DESIGN PROCESSES
Bruce Archer 1968 211 p refs Reprinted
(PB-179321) Avail: CFSTI CSCL 12B

A framework is set up within which the set of skills, sensibilities, and intellectual disciplines that, taken together, constitute the art of designing might be logically related so as to form the basis of a science of design. No attempt is made to distinguish between architectural, engineering, and industrial design. Indeed, it is an essential element in the underlying philosophy that the logical nature of the act of designing is largely independent of the character of the thing designed. By the same token, no attempt is made to define good design. The argument presented is concerned with the theory of navigating towards a chosen destination rather than with the identity or merit of the destination itself. A logical model of the design process is developed, and a terminology and notation is adopted, which is intended to be compatible with neighbouring disciplines of management science and operational research. Author (USGRDR)

N69-10662*# National Aeronautics and Space Administration, Washington, D. C.
APPLICATIONS OF SYSTEMS ANALYSIS MODELS: A SURVEY
1968 73 p Prepared for NASA by ABT Assoc. Inc.
(NASA-SP-5048) Avail: SOD $0.50 CFSTI CSCL 05A

This publication discusses the adaptation and application of know-how and methods that NASA has used to problems that continually confront management, for example, long-range planning, cost effectiveness and control, and market development. It also deals with the use of these modern techniques in urban and regional planning, and points out their potential helpfulness to city officials and the administrators of public health, educational, and other programs. It emphasizes NASA-funded work that may be as meaningful outside the aerospace field as it has been within it. Author

M5 PERSONNEL MANAGEMENT

N69-36442*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
A COMPARATIVE ANALYSIS OF THE PROFESSIONAL'S

OCCUPATIONAL ENVIRONMENT AT THE MANNED SPACECRAFT CENTER
Richard A. Hamilton (San Diego State Coll.) Jan. 1969 59 p refs
(NASA-TM-X-61808; MSC-BM-MR-69-2) Avail: CFSTI CSCL 05A

This study was a comparative analysis of the work environments of nonsupervisory Aerospace Technologists at the Manned Spacecraft Center in Houston, Texas. Specifically, it focused on the attitudes or perceptions that nonsupervisory AST's have toward their organization and position in the following Directorates: Engineering and Development; Flight Operations; Science and Applications; and Flight Crew Operations. The report considers the limitations of cause-effect relationships between two variables and cautions against "organizational scientism." Building upon the results from computer analysis, the study's second stage explored the possibility of organizational payoffs associated with job ambiguity. The results indicated that a certain degree of job ambiguity was functional and interrelated with the nature of the ASTs' work group environment. However, the interviewees with high ambiguity scores generally reported detrimental effects associated with a high degree of uncertainty concerning their organizational position.
Author

N69-36274*# California Univ., Berkeley. Space Sciences Lab.
ENABLING ACTIVITIES, PROFESSIONALS' EXPERIENCE AND RESOURCE RELATIONSHIPS: THE EFFICACY OF ENTREPRENEURIAL AND BOOTLEGGING ACTIVITIES
Todd R. La Porte Aug. 1969 30 p refs *Its* Internal Working Paper-105
(Grant NGL-05-003-012)
(NASA-CR-105645) Avail: CFSTI CSCL 05A

The role of the contemporary professional in organizational systems is considered from the aspect of the professional's decrease of influence in determining the manner in which his work is to be directed in the accomplishment of organizational demands for coordination, and control for achieving goals. The response of the management to the individual, influenced by funding and objectives, and the entreperneurial activities of scientists to enable them to pursue the type of work they regard as rewarding are discussed. It is concluded that a decline in managerial control is occurring.
F.O.S.

N69-22196*# State Univ. of New York at Buffalo.
INDIVIDUAL AND CORPORATE SOURCES OF MOTIVATION: A PRELIMINARY INVESTIGATION
Raymond G. Hunt and Ira S. Rubin Mar. 1969 30 p refs
(Grant NGR-33-015-061)
(NASA-CR-100556; TR-3) Avail: CFSTI CSCL 05J

Two separate sets of rating scales were administered to a sample of expert judges. The rating scales paired nine individual component motivations and nine corporate motivations with statements reflecting possible conditions for the fulfillment of the tendencies. Responses were factor analyzed to determine underlying motivational dimensions. The results indicated that the dominant sources of motivation for both individuals and industrial organizations were located along four dimensions: external and internal, control, interpersonal concern, security and self-actualization.
Author

N69-17088# Bunker-Ramo Corp., Canoga Park, Calif. Systems Effectiveness Dept.
THE IMPACT OF MANPOWER REQUIREMENTS AND PERSONNEL RESOURCES DATA ON SYSTEM DESIGN Final Report, 1 Jun. 1967–31 May 1968
David Meister, Dennis J. Sullivan, and William B. Askren (AMRL) Wright-Patterson AFB, Ohio AMRL Sep. 1968 224 p refs
(Contract F33615-67-C-1650)
(AD-678864; AMRL-TR-68-44) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-15778# Naval Personnel Research Activity, San Diego, Calif.
CATALOG OF PERSONNEL COST DEFINITIONS AND CONCEPTS FOR THE DERIVATION OF MAN/MACHINE FUNCTION ALLOCATION FORMULAE Final Report
Marilee N. Connelly Oct. 1968 50 p refs
(AD-678347; SRM-69-8) Avail: CFSTI CSCL 14/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-13788# Applied Psychological Services, Wayne, Pa. Science Center.
DEVELOPMENT OF PERFORMANCE EVALUATIVE MEASURES. PERSONNEL PSYCHOPHYSICS: TERMINAL THRESHOLD AND SIGNAL DETECTION THEORETIC APPLICATIONS TO PERFORMANCE ASSESSMENTS
Arthur I. Siegel, M. A. Fischl, and Mark G. Pfeiffer Sep. 1968 62 p refs
(Contract N00014-67-C-0107)
(AD-676326) Avail: CFSTI CSCL 5/10

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

M6 TECHNOLOGICAL RESOURCES

N69-77930 Rice Univ., Houston, Tex. Dept. of Space Science.
THE ROLE OF BASIC RESEARCH IN UNIVERSITIES
A. J. Dessler Feb. 1969 13 p refs Avail: CFSTI

The difficulties of providing reasonable assurance of visible benefits to society from basic research projects conducted by universities are discussed. Among the views presented are the following: (1) The universities should maintain, in a narrow sense, the concept that their only proper business is education. Community service and acquisition of knowledge are valued by-products of this primary mission. (2) Graduate education can be used to provide society with a large number of people who are trained to think creatively, and who can solve problems whose solutions cannot be found in a book. Universities are the only institution that can provide this national resource on the scale required. (3) The level of Federal funding required to establish and maintain research programs to be used for graduate education should be tied closely to the number of able students wishing to obtain advanced degrees.
Author

N69-77130 George Washington Univ., Washington, D.C.
SOME RESEARCH APPROACHES TO STUDYING THE DEVELOPMENT AND FUNCTIONING OF TECHNOLOGY ASSESSMENT-CONTROL PROCESSES
Richard Myrick and Barbara S. Marx 1969 32 p refs
(PB-182872; SDP-200) Avail: CFSTI

The paper presents outlines of seven possible research studies that might be conducted in pilot form to learn more about the emergence, growth, and functioning of assessment-control processes

in American society which come into being to prevent undesirable effects of new or developing technologies. The goal of the suggested research is to assemble necessary data and raw materials and to explore what are appropriate key research questions for lengthier studies, in the event it is decided by the Program of Policy Studies that such studies would be valuable. Author (USGRDR)

N69-77128 George Washington Univ., Washington, D.C.
PROMISING APPROACHES TOWARD UNDERSTANDING TECHNOLOGY TRANSFER
James E. Mahoney Dec. 1967 11 p refs
(PB-182873; SDP-201) Avail: CFSTI

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

N69-41278# Congress. House. Committee on Science and Astronautics.
A STUDY OF TECHNOLOGY ASSESSMENT
Chauncey Starr (Natl. Acad. of Eng.) et al Washington GPO Jul. 1969 217 p refs Prepared by the Natl. Acad. of Eng., Comm. on Public Eng. Policy for the House Comm. on Sci. and Astronaut.
Avail: SOD: $1.25

Studies were undertaken to characterize the sociotechnical research that discloses the benefits and risks to society emanating from alternative courses in the development of scientific and technological opportunities. The methodology used is described, the experience gained in using task forces to conduct such studies is analyzed, and the interaction of the methodology with the organizational mode used is examined. The following are among the principal findings: (1) Technology assessments on a broad range of subjects are feasible and can be expected to be useful to the decision-making processes of the Congress when prepared by properly constituted, independent, ad hoc task forces with adequate staff support and time. (2) Technology assessments should be produced in an environment free from political influence or predetermined bias. (3) Members of the task force should be chosen for their expertise but not as representatives of affected parties or special interests. (4) Task force members will necessarily come from public and private organizations that have knowledge about the subject. M.G.J.

N69-40305*# George Washington Univ., Washington, D.C.
THE MANAGEMENT OF TECHNOLOGY ASSESSMENT
Louis H. Mayo *In its* Technol. Assessment Jul. 1969 p 89-150 refs Sponsored by NASA
Avail: CFSTI CSCL 05B

The frequently advanced notion of a Total Problem Approach to technology assessment is discussed, and a tentative suggestion is offered for one type of institutional arrangement which might produce a close approximation to this goal. It is stressed that such an arrangement would supplement and coordinate the existing technology assessment function and would not supplant it. A brief overview is presented of past and current trends in the area of technology assessment and several major deficiencies are suggested The establishment of a neutral group of assessment centers is proposed as a first step for providing timely and reliable input into the final Congressional evaluations. The Total Problem approach would be used to monitor the performance of technology assessment systems relevant to each of the major techno-social problem areas, to recommend optimum social subsystems for interim assessments, to identify opportunities for applying technology to social problems, and to seek out and publicize existing or prospective detrimental impacts. A.C.R.

N69-40302*# George Washington Univ., Washington, D.C.
ASSESSMENT INFORMATION SYSTEMS
Clarence H. Danhof *In its* Technol. Assessment Jul. 1967 p 1-20 refs Sponsored by NASA
Avail: CFSTI CSCL 05B

The assessment of new technology is stressed as an integral part of the process of accomplishing technological change. The central concern of the assessment process in contemporary society is with the adverse effects of new technology and the relationships that follow between users and originators. These effects include human death, personal injury, and collective injury. The great need for a formal information or communication structure, particularly in areas viewed over a long period of time, is emphasized; major difficulties lie in the basence of a platform and an audience before whom the assessments of experts can be given adequate and authoritative consideration in light of long-range public policy. This is particularly true in situations where no immediate threat to life is involved, but public action must be secured in order to implement the recommendations of expert evaluators. It is suggested that a possible solution may lie in a periodic, authoritative, public review of the nation's progress toward achieving scientific and technical goals. A.C.R.

N69-39957*# National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
FUTURE FIELDS OF CONTROL APPLICATION
Washington 1969 144 p refs Proc. of Conf. Held in Cambridge, Mass. 10-11 Feb. 1969
(NASA-SP-211) Avail: CFSTI CSCL 05A

The control concepts and technology developed to improve the nation's control abilities in the aeronautical and space areas are examined in the context of recognizing the value of applications in other areas of the public and private sectors. The nature of the problems existing and anticipated in the transportation, biomedical, economic, social, production, and communication areas are discussed. Particular consideration is given to applications in print communication, biological cybernetics, air transportation, urban studies, World Bank operations in the less developed countries, production problems in the oil and chemical industries, and biological oceanography in relation to sea productivity. M.G.J.

N69-36934# Congress. House. Committee on Science and Astronautics.
SCIENCE, TECHNOLOGY, AND PUBLIC POLICY DURING THE NINETIETH CONGRESS, FIRST AND SECOND SESSIONS, 1967-1968
Washington GPO 1969 352 p refs Presented to the Comm. on Sci. and Astronaut, 91st Congr., 1st Sess., Serial D, Jul. 1969
Avail: Subcomm. on Sci., Res., and Develop.

This report covers public policy for science and technology during the 90th Congress. Emphasis is placed on the governing applications of science and technology. Included are chapters on research, development, and national goals; fostering applications of

science and technology; national resources, organization and administration, and federal funds for science and technology; and science and technology in foreicn affairs. Attention also is given to advice, decisions, and legislation which change present policies. Author

N69-36273*# California Univ., Berkeley. Space Sciences Lab.
TECHNOLOGIES TRANSFER: A CONTEXT FOR POLICY CONSIDERATION
Todd R. La Porte Jun. 1969 27 p refs *Its* Internal Working Paper-104
(Grant NGL-05-003-012)
(NASA-CR-105646) Avail: CFSTI CSCL 05A

The application of technologies to urban development is studied, based on the assumption that scientific and technological progress are the primary determinants of change in cultures. Technology is defined as the application of scientific knowledge to the solution of social or economic problems. The relationship of science to political systems with the implementing technologies is summarized by use of a chart. These following problems are discussed: effects of using technology for social purposes, technology and the organization of public affairs, and technological transfer and the city. A set of general criteria for assessing technology as applied to urban and national problems are listed. F.O.S.

N69-36014# Congress. House. Committee on Science and Astronautics.
PANEL ON SCIENCE AND TECHNOLOGY. TENTH METTING: SCIENCE AND TECHNOLOGY AND THE CITIES
Washington GPO 1969 308 p Proc. Before Comm. on Sci. and Astronaut., 91st Congr., 1st Sess., No. 1, 4-6 Feb. 1969
Avail: Comm. on Sci. and Astronaut.

A transcript is provided for the proceedings of a Congressional panel considering the relationship of science and technology to the problems of the cities. Emphasis is placed on the urban crisis itself, city planning, urban and interurban transportation, the socio-economic syndrome, and the application of science and technology to urban problems. Testimony and papers presented by witnesses and panelists are included. Appendices provide biographies of witnesses and a copy of the Urban Detroit Area Report. L.B.H.

N69-34012# George Washington Univ., Washington, D.C.
THE SYSTEMS APPROACH AND THE URBAN DILEMMA
Robert G. Smith Jul. 1968 50 p refs
(PB-182869; SDP-101) Avail: CFSTI CSCL 13B

The report is concerned with the application of advanced R and D systems concepts and skills to the analysis and management of critical domestic problems such as urban renewal, air pollution, traffic congestion, and inadequate housing. It is based on a study of selected books, documents and articles, and on discussions with responsible and knowledgeable individuals in the Federal Government, research institutes and private industry. Author (USGRDR)

N69-31946*# National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE RELATED TECHNOLOGY FOR INDUSTRY
1969 177 p refs Presented at the Technol. Util. Conf., Langley Res. Center, Hampton, Va. 22 May 1969
(NASA-SP-5075) Avail: CFSTI CSCL 05B

The purpose of the Technology Utilization Program is to speed up the transfer of technology across regions, across disciplines, across industries, across medicine, and across education. As generators of new technology, NASA began in 1964 to sponsor regional conferences for the purpose of acquainting commerce and industry with the results of aerospace related research and development that could have practical application in the marketplace. Author

N69-31026*# Southeastern State Coll., Durant, Okla. Technology Use Studies Center.
TECHNOLOGY UTILIZATION IN A NON-URBAN REGION: A MEASUREMENT OF THE IMPACT OF THE TECHNOLOGY USE STUDIES CENTER Final Report
C. Henry Gold, Harold Warren, A. M. Moore, Don H. Carpenter, and Doyle L. Caton May 1969 152 p refs
(Grant NGR-37-004-008)
(NASA-CR-103218) Avail: CFSTI CSCL 05B

The role of technology in the economic development process is examined, and the objectives of the Technology Use Studies Center (TUSC) program of technology transfer are defined. An equation relating aggregate output to inputs is given, and graphs showing input factor (including technology) effect on the output growth are given. Tabulated data from the TUSC region include: manufacturing establishments by employment size, median family income by county, rank of TUSC counties by median family income, percent change in employment by county, components of employment change by industry, population by county, total employment, percent change in employment, new jobs and investment in new manufacturing establishments, and population trends. The data are analyzed and compared to the national averages as a standard. Selected case studies indicative of impact are presented. F.O.S.

N69-28915# Congress. House. Committee on Science and Astronautics.
SCIENCE AND TECHNOLOGY AND THE CITIES
Feb. 1969 Feb. 1969 133 p refs Presented at the 10th meeting of the Panel on Sci. and Technol., Washington, D.C. 1969
Avail: SOD $0.70

Eleven separate papers on various aspects of urban developments and problems, presented by scientists, educators, engineers, and sociologists from the United States and five other countries, are contained in this publication. In addition to a keynote address by the chairman of the Urban Coalition and two summary views, the papers cover the following: (1) a scientific approach to human settlement; (2) practical technological ideas for improving the urban environment; (3) the city of Milton Keynes as an example of the New Town program in Britain; (4) urban transportation planning in general and in the United States; (5) economic aspects of urban blight areas; (6) urban problems of Japan; and (7) planning in the port city of Rotterdam, Netherlands. K.W.

N69-26357*# Washington Univ., St. Louis, Mo. Dept. of Economics.
DIVERSIFICATION INTO CIVILIAN PUBLIC SECTOR MARKETS: A METHOD OF TRANSFERRING AEROSPACE TECHNOLOGY
Murray L. Weidenbaum Apr. 1969 30 p *Its* Working Paper No. 6902
(Contract NGR-26-008-003)
(NASA-CR-101123) Avail: CFSTI CSCL 05C

The newest and perhaps the fastest growing aspect of contracting out the performance of government activities to the private sector involves the use of the major defense and space contractors, that is, the government-oriented corporations, in the programs of domestic, welfare agencies. From the viewpoint of these companies, the civilian agencies, provide market diversification. For the agencies, these technology private companies provide capabilities not present in the government's own work force. From the viewpoint of society, the results and implications are far more subtle

and mixed; the growing involvement of industry in the government's business brings complication and concern as well as new resources. An examination in some detail should be of some value and is attempted here. Author

N69-23748# RAND Corp., Santa Monica, Calif.
BIG TECHNOLOGY, THE TECHNOLOGY GAP, AND A DANGEROUS POLICY PITFALL
Richard R. Nelson Mar. 1968 19 p refs Presented at the 6th Goddard Mem. Symp., Washington, D. C., 4–5 Mar. 1968
(P-3795) Avail: Issuing Activity

The alleged technology gap between Europe and the United States is discussed in terms of its meaning and existence, its evidence as a long standing phenomenon, and its connection with big science. It is argued that, while the technology gap does exist in a wide variety of fields, aside from defense and space it probably has much less to do with U. S. big science than is commonly throught. Association of U.S. economic progressivity with large government financed research and development programs may, in addition, to being mistaken, lead Europeans to unwise use of considerable resources. The potential dangers to Americans of a technology race for its own sake are discussed. It is stated that such a race is not only meaningless but extremely expensive, leaving little to allocate to more tangible interests. P.A.B.

N69-22392*# Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
THE WORLD WIDE SPREAD OF SPACE TECHNOLOGY
E. B. Skolnikoff and J. H. Hoagland (Brown and Shaw Res. Corp.) Oct. 1968 32 p refs Submitted for publication
(Grant NGL-22-009-019)
(NASA-CR-100565; CSR-TR-69-5) Avail: CFSTI CSCL 22A

The development of space-technological capabilities in the U.S., the U.S.S.R., Western Europe, Japan, China, and the developing nations of the world is reviewed. The current stand of space technology and projected developments in France, Great Britain, Germany, Japan, and in such international efforts as ELDO and ESRO are measured against those of the U.S. and the U.S.S.R. The capabilities to produce and launch sounding rockets, satellites, and manned spacecraft are considered. Special attention is paid to the monopoly problem in connection with communication satellites. Military uses, budgetary policies, and national sentiments are discussed as well as such economic implications as spin-off effects, government subsidies to the aerospace industry, the "brain-drain", and the technology gap between nations. K.W.

N69-21254# Southern Interstate Nuclear Board, Atlanta, Ga.
CONFERENCE ON SCIENCE, TECHNOLOGY AND STATE GOVERNMENT Background Study Report
Wyatt M. Rogers [1968] 57 p refs Meeting held at Louisville, Ky., 19–20 Sep. 1968 Sponsored in part by NSF
(PB-180923) Avail: CFSTI CSCL 05A

A number of states have recently established science and technology agencies within state government to deal with the problems and opportunities associated with scientific advances. Several such programs are described in some detail in this report. Author (USGRDR)

N69-20374# RAND Corp., Santa Monica, Calif.
PROJECTION OF SCIENTIFIC EVOLUTION AND TECHNICAL PROGRESS—ITS ROLE IN SOCIETY
Roger E. Levien Nov. 1968 27 p Presented at the 6th Congr. of the European Comm. of the Intern. Council for Sci. Management on Projection of Sci. Evolution and Tech. Progr., Cannes, France, 25 Nov. 1968
(AD-680749; P-3995) Avail: CFSTI CSCL 5/2

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-19411*# Oklahoma State Univ., Stillwater. College of Engineering.
A PILOT PROGRAM FOR SELECTING, EDITING AND DISSEMINATING ENGINEERING AND SCIENTIFIC EDUCATIONAL SUBJECT MATTER FROM NASA TECHNICAL REPORTS, APPENDIX 12 Annual Report, Sep. 1, 1967–Nov. 30, 1968
30 Nov. 1968 140 p
(Contract NSR-37-002-045)
(NASA-CR-100145; ER-69-I-2) Avail: CFSTI

Dissemination and evaluation statistics and analyses for various educational monographs on engineering and scientific technology systems are presented in subsections. Topics range from theoretical and computer calculations on thermodynamics to mathematical models for generating automatic control systems. A brief abstract is given for each monograph together with pertinent evaluation ratings and educator comments. G.G.

N69-19251*# California Univ., Berkeley. Space Sciences Lab.
A CRITICAL REVIEW OF SYSTEMS ANALYSIS: THE CALIFORNIA EXPERIENCE
Ida R. Hoos Dec. 1968 51 p refs *Its* Internal Working Paper No. 89
(Grant NGL-05-003-012)
(NASA-CR-100029) CSCL 05K

The socio-economic aspects of utilizing the technologies developed for and in the aerospace industry are recounted. The feasibility of using space engineering to solve difficult social problems was studied by four California based aerospace industries. Their findings are reported on the analyses of waste management, criminal justice, information, transportation, and public welfare. A critique of their conclusions is presented. It was stated that systems analysis as a tool in social planning cannot be assessed in isolation from (1) the particular technicians using it, (2) the salesmanship permeating it, and (3) the political environment surrounding it. Foremost among the contribution of the California experience was the rediscovery of the basically multifaceted nature of every major problem facing the government planner. This indicated a clearcut need for knowledge on many fronts and involving many kinds of capabilities; economic, political, and social rationality all must contribute to developing viable models for understanding the complex problems of society. B.P.

N69-19197*# Southwest Research Inst., San Antonio, Tex.
SOUTHWEST RESEARCH INSTITUTE ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Final Report, 1 Nov. 1967–30 Nov. 1968
Ray W. Ware, Felix L. St. Clair, III, Brian Caruth, Charles J. Laenger, Sr., Robert J. Crosby et al 31 Dec. 1968 130 p refs
(Contract NASw-1714; SwRI Proj. 14-2329)
(NASA-CR-100018) Avail. CFSTI CSCL 05B

The general program is described, and activities for this reporting period are listed. An operations research analysis and evaluation of the technology transfer process is briefly discussed. The actual transfers for the period are analyzed in detail, including a potential transfer. The processing status of all biomedical problems at the time of the report and new problems are identified. Separate case histories for each problem are given. The documents furnished to the participants of the program are also listed. K.W.

N69-19001*# Oklahoma State Univ., Stillwater. College of Engineering.
A PILOT PROGRAM FOR SELECTING, EDITING AND DISSEMINATION ENGINEERING AND SCIENTIFIC EDUCATIONAL SUBJECT MATTER FROM NASA TECHNICAL REPORTS Annual Report, 1 Sep. 1967–30 Nov. 1968
30 Sep. 1968 96 p refs
(Contract NSR-37-002-045)
(NASA-CR-100187; ER-69-I-2) Avail: CFSTI CSCL 05I

Educational monographs were distributed to 255 professors in 108 universities and received 11 favorable responses for each unfavorable response. Visual briefs were distributed to 73 professors in 46 universities and were received with similar success. Although this is an annual report, progress of the entire program is presented in many places to illustrate total achievement. The nature of the program requires this type of presentation. Details of quarterly or yearly progress are shown when it enhances the presentation. In the statement of work for the second contract period a number of objectives particularly significant to the program have been listed. Author

N69-18285*# California Univ., Berkeley. Space Science Lab.
SYSTEMS ANALYSIS AS A TECHNIQUE FOR SOLVING SOCIAL PROBLEMS: A REALISTIC OVERVIEW
Ida R. Hoos Oct. 1968 13 p refs Presented at the Application of Computers to the Probl. of Urban Soc., N. Y., 18 Oct. 1968 *Its* Internal Working Paper No. 88
(Grant NGL-05-003-012)
(NASA-CR-99344) Avail: CFSTI CSCL 05

A critical evaluation in the form of an essay is presented of present applications, weaknesses, and potential applications of systems analysis in solving socio-economic problems. K.W.

N69-16644*# Denver Research Inst., Colo. Industrial Economics Div.
PROJECT FOR THE ANALYSIS OF TECHNOLOGY TRANSFER: THE INITIAL YEAR Annual Report, 13 Nov. 1967–12 Nov. 1968
Theodore D. Browne, Richards O. Morgan, Dean R. Lessley, William M. Hildred, and Dean C. Coddington 13 Nov. 1968 64 p refs
(Contract NSR-06-004-063)
(NASA-CR-99235) Avail: CFSTI CSCL 05B

The purpose of the project is to provide data on the secondary uses made of technology developed by NASA and AEC, and to provide for a better understanding of the technology transfer process. Toward this end, efforts were made to identify cases of space technology transfer, to document the circumstances surrounding the use of such aerospace information, to design and implement a Transfer Data Bank, and to analyze the resulting data to assist NASA with technology transfer activities. The information in this report is presented in the following form: (1) a background discussion of technology transfer; (2) a description of research activities, contents of earlier reports, and resulting publications; and (3) analyses and recommendations regarding data collected during the first year of the program. K.W.

N69-15413*# George Washington Univ., Washington, D. C.
THE NEW TECHNOLOGICAL ERA: A VIEW FROM THE LAW
Harold P. Green Jan. 1968 12 p *Its* Monograph No. 1
(Grant NGL-09-010-030)
(NASA-CR-99039) Avail: CFSTI CSCL 05D

The problem of protecting society from the hazards of technology, e.g., unemployment, excessive leisure, changes in moral or social standards, etc. is considered. The law's involvement in imposing constraints on technological progress has been mainly a trial and error process. The legal system traditionally has dealt with these problems only after they are shown to exist. Consideration is given to the capabilities and implications of determining whether the legal system is capable of imposing effective social control over new technologies before they inflict very substantial, or even irreparable injury, upon society. The challenge to protect people against technology requires that protective measures be built into the development and practice of technology. B.P.

N69-14955*# National Aeronautics and Space Administration, Washington, D. C.
TECHNOLOGY UTILIZATION. USA—TRIP REPORT [NUTZBARMACHUNG NEUER TECHNOLOGIEN USA—REISEBERICHT]
H. Kolodziej Nov. 1968 25 p Transl. into ENGLISH of the German Rept. GfW-AB-68/1, Jun. 1968 26 p
(NASA-TT-F-11882; GfW-AB-68/1) Avail: CFSTI CSCL 05A

Information on NASA's Technology Utilization Program is summarized with the object of applying the experience gained from visiting various U.S. installations to developing a similar program in Germany. Specific suggestions on organization, operation, methods, services, and problems of the program for Germany are made. B.P.

N69-12564*# Stanford Research Inst., Menlo Park, Calif.
SOME MAJOR IMPACTS OF THE NATIONAL SPACE PROGRAM, VOLUME 7 Final Pilot Study Report
I. M. Levitt, John Baird, A. E. Bayce, V. F. Holley, R. W. Hough et al Sep. 1968 54 p refs
(Contract NASw-1722; SRI Proj. MU-7227)
(NASA-CR-97751) Avail: CFSTI CSCL 22

Spin-off benefits of the space program were defined and measured for their impact upon aviation, science, materials technology, economy, public health, medicine, biology, and newly derived occupations. It was found that the very successful technological advances were not positively presented to the American public for full appreciation. Especially such divergent areas as electroforming and unconventional electrical power sources, as well as new refractory alloys and titanium alloys, are now in commercial development and as such have a marked economic impact in major areas of the US South. G.G.

N69-12186# System Development Corp., Santa Monica, Calif.
KNOWLEDGE PRODUCTION AND UTILIZATION IN CONTEMPORARY ORGANIZATIONS
Launor F. Carter Oct. 1967 30 p refs
(AD-661738; SP-2976) Avail: CFSTI CSCL 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-10831# Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
MODELS AND TECHNIQUES FOR URBAN PLANNING Final Report
Douglass B. Lee, Jr. Sep. 1968 290 p refs
(CAL-VY-2474-G-1) Avail: Issuing Activity

Presented are urban planning models to provide information for technically skilled persons in applying quantitative methodology to the modeling of urban phenomena. Described are a number of abstract attributes, a variety of concepts and techniques, and an overview of the modelling process. Models are classified according to projected purpose. G.G.

N69-10486*# Midwest Research Inst., Kansas City, Mo.
STUDY OF A CONTRACTORS CAPABILITIES CENTER AND THE TECHNOLOGY TRANSFER PROCESS Final Report, 15 Mar. 1966–30 Jun. 1968
Robert E. Roberts and Howard Gadberry [1968] 56 p ref
(Contract NASr-63(09))
(NASA-CR-97583) Avail: CFSTI CSCL 05A

Surveys were conducted to examine the feasibility of a comprehensive, multi-user, NASA Contractors Capabilities Center which would augment the existing, informal system of capability identification, expression, communication, and application. Selected NASA contractors were interviewed to define broadly the types of capabilities they had developed, descriptive information required, and major constraints to be recognized in the design of the Center, and to express their opinions as potential suppliers of information and as potential users of the output. The interview findings disclosed that capability identification and expression was an extremely complex process which presented both conceptual and information processing problems. The implications of these views are assessed, and the design of approaches to speed technology transfers is considered. It was concluded: (1) Broad purpose multi-client capabilities files present difficulties and costs which outweigh the present need for such centralized systems. (2) Any NASA contractor capability file created to serve Technology Utilization should be designed for that audience alone, and should be kept small and highly specialized. M.G.J.

M7 MANAGEMENT POLICY & PHILOSOPHY

N69-41136*# National Aeronautics and Space Administration, Washington, D.C.
AN APPRAISAL OF THE HARBRIDGE HOUSE STUDY FROM THE RESEARCH AND DEVELOPMENT AGENCY VIEWPOINT
Leonard Rawicz 1969 21 p Presented at Briefing Conf. on Pat. Law, 26 Sep. 1969
(NASA-TM-X-61908) Avail: CFSTI CSCL 05A

Favorable and unfavorable reactions to a study on the effects of government patent policies are discussed. Effects on achieving the utilization of government financed inventions; obtaining the fullest participation of industry in government R&D programs; and competition in commercial markets were emphasized. The negative view questions the validity of the data base and the type of data collected; specific criticisms are listed. Although new concepts were not established, the study indicates the basic soundness of certain policies: (1) A single presumption of ownership to the inventions flowing from government R&D does not provide a satisfactory basis for either a government-wide patent policy or for the patent policy of a single agency or government program. (2) Operational flexibility in the allocation of rights to inventions resulting from government research and R&D is needed for the government agencies to accomplish their missions under different contracting situations. NASA patent policy is reviewed, and arguments in favor of specific patent legislation and administrative handling of these cases are offered. M.H.E.

N69-39048# . RAND Corp., Santa Monica, Calif.
POLICY ANALYSIS IN THE NATIONAL SPACE PROGRAM
B. W. Augenstein Jul. 1969 103 p
(AD-690187; P-4137) Avail: CFSTI CSCL 22/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-36295# Congress. House. Committee on Science and Astronautics.
TECHNOLOGY: PROCESSES OF ASSESSMENT AND CHOICE
Jul. 1969 175 p refs NAS Report to the Comm. on Sci. and Astronaut., Jul. 1969
Avail: SOD: $0.75

The channelization of technological developments in directions that serve human needs is considered. Some grave and most urgent dangers posed by the applications of technology are listed as the specter of thermonuclear destruction; tensions of congested cities; pollution; the expanding arsenal of techniques for surveillance and manipulation of private thought and behavior; and the alienation of those who feel excluded from power. Existing processes of assessment and decision, the formulation of objectives, problems and pitfalls, and recommendations are discussed. It is concluded that mechanisms for technology assessment beyond those currently operating are clearly needed, and that the present organization of private and public assessment systems is too fragmented, uncoordinated, lacking in professionalism, and continuity to provide the required guidance. F.O.S.

N69-35834*# Battelle Memorial Inst., Columbus, Ohio.
SELECTED SPACE GOALS AND OBJECTIVES AND THEIR RELATION TO NATIONAL GOALS
G. E. Wukelic and N. A. Frazier 15 Jul. 1969 117 p refs
(Contract NASw-1146)
(NASA-CR-105304; BMI-NLVP-TR-69-2) Avail: CFSTI CSCL 22A

This study is designed to improve the rationale used in long-range planning of space transportation systems. The overall effort is based on the premise that meaningful relationships exist between national goals and priorities, and space goals and objectives. In turn, these relations can provide the basis for formulating a methodology for defining and analyzing rational future mission models required for national space transportation systems planning. Funding allocations to the national goals provide a yardstick for measuring priorities among the goals. These quantified relationships are indicators of the nation's willingness to commit funds for translating broad philosophical statements of national purpose into accomplishments. As such, these relationships may then be condidered into accomplishments. As such, these relationships may then be considered to be meaningful measure of response to desires and purposes of the nation. A working set of space goals and objectives were identified and between them and the set of 13 national goals were determined. Author

N69-27133# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LET US HAVE SCIENTIFIC BASES FOR PLANNING
V. Arefev et al 28 Aug. 1968 6 p Transl. into ENGLISH from Izv. (Moscow), 5 Apr. 1968 p 3
(AD-683142; FTD-HT-23-600-68) Avail: CFSTI 5/1

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-26114# George Washington Univ., Washington, D.C.
HIGHLIGHTS FROM THE LITERATURE ON ORGANIZATION AND FEDERAL PROGRAMS IN SCIENCE AND TECHNOLOGY
Fred R. Brown (Industrial College of the Armed Forces) and Stephen R. Chitwood Jul. 1968 152 p refs Prepared in cooperation with Comm. on Marine Sci. Its Monograph No. 2
(PB-182603) Avail: CFSTI CSCL 05A

The document reviews and analytically summarizes selected literature pertinent to planning organizational arrangements for Federal Government programs in science and technology. The

objective has been to provide an orderly and concise synopsis of recent thought concerning the most significant and unique factors requiring consideration when organizing and structuring Federal programs of this nature. The criteria used for choosing these factors included the repetitiveness with which different scholars, researchers, and practitioners identify an element as an important factor and the authoritativeness of the individual identifying and discussing the factor. With a few exceptions, the literature reviewed has been published since 1955. Author (USGRDR)

M8 ECONOMICS

N69-77731 George Washington Univ., Washington, D.C.
SOME EFFECTS OF FEDERAL PROCUREMENT OF RESEARCH AND DEVELOPMENT ON INDUSTRY
Guy Black Jul. 1968 76 p refs
(PB-182880) Avail: CFSTI

From data supplied by 67 firms, there is evidence of a casual relationship between federal and private R and D funding in which federal funding is the operative factor, with a two-year time lag. Size of the effect seems to depend on the industry and type of R and D organization. The evidence from company data is strong that, on the whole, federal funding of R and D in industry has stimulated rather than substituted for R and D funding by industry, and that a lag of several years is involved. Author (USGRDR)

N69-74541* Vermont Univ., Burlington.
REGIONAL ECONOMIC FORECASTING: A SURVEY OF AVAILABLE TECHNIQUES
James W. Peterson Sep. 1964 59 p refs
(Contract NASw-1086)
(NASA-CR-101522) Avail: CFSTI

The general state of the art of regional economic analysis is reviewed, and alternative approaches are evaluated in terms of the regional economic implications of the NASA expenditure programs. The economic interactions that ideally should be covered if NASA's interests are to be satisfied are discussed. Specific operational techniques used by regional economists are examined, with emphasis placed on the economic base analysis, the regional input-output analysis, the regional output analysis, and the interregional models. Further development of the Leontief interregional model is viewed as an attractive approach to NASA's problem, as the technique evades the data deficiency by a systematic inference of cross regional flows based on location of demand and available sources of supply. M.G.J.

N69-72073* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE IMPACT OF COLLECTIVE BARGAINING ON MASSACHUSETTS MUNCIPAL ADMINISTRATION
Robert H. Kirby (M.S. Thesis MIT, Cambridge) Jun. 1968 161 p refs
(NASA-TM-X-61555) Avail: CFSTI

The administrators of 20 municipalities, labor leaders, and persons with related experience were interviewed to determine the impact of collective bargaining on the form, structure, and personnel qualifications of municipal administration. The study indicates that the administrative and legislative policies of personnel relations have changed very little since the collective bargaining law was enacted in late 1965. With only a few exceptions, municipal management has been reluctant to negotiate on anything except wages and a few fringe benefits. This reluctance seems to stem from four factors: (1) management's inexperience in the bargaining process, (2) the fact that, through the years, personnel functions have been largely separated from the chief executive by civil service, (3) management's desire for one personnel policy for all employees, and (4) the hesitancy of strong elected officials to relinquish any control. There is unanimous agreement among elected officials in both cities and towns that collective bargaining has to be removed from politics if it is to become a viable labor relations system. Author

N69-70733* Washington Univ., St. Louis, Mo. Dept. of Economics.
THE GOVERNMENT-ORIENTED CORPORATION
Murray L. Weidenbaum Dec. 1968 20 p *Its* Working Paper No. 6820
(Grant NGR-26-008-003)
(NASA-CR-98629) Avail: CFSTI

The long-term impacts of space and related government programs are discussed in the context of the rise of the corporation oriented primarily to government rather than commercial markets. This has resulted in companies becoming less effective in competing for private business and becoming heavily dependent on the government customer. Efforts being made to extend the use of the government-oriented corporation are discussed. Four civilian public sector activities are identified as areas where the type of systems analysis and advanced technology developed by the leading military-space contractors can be utilized. These are improvements in transportation, development of water systems, communications systems, and applying the systems approach to area development. The nature of the government-oriented corporation is described, and some of the adverse side effects resulting from this government-industry relationship are examined. Policy changes are suggested for making private business firms more effective instruments of public policy, and helping them maintain their essentially private characteristics. M.G.J.

N69-40410# RAND Corp., Santa Monica, Calif.
ON DIFFERENT METHODS FOR ALLOCATING RESOURCES
Martin Shubik Jul. 1969 12 p refs
(AD-691864; P-4161) Avail: CFSTI CSCL 5/3

For abstract see appropriate AD number (shown above) in corresponding category under DDC Entries.

N69-20989*# *Battelle Memorial Inst., Columbus, Ohio.*
AN ANALYSIS OF THE ALLOCATION OF FEDERAL BUDGET RESOURCES AS AN INDICATOR OF NATIONAL GOALS, AND PRIORITIES, PART 1
Leonard L. Lederman and Margaret L. Windus 10 Feb. 1969 76 p refs
(Contract NASw-1146)
(NASA-CR-100435; BMI-NLVP-TR-69-1-Pt-1) Avail: CFSTI CSCL 05A

National goals and objectives are analyzed and defined in order to plan space program budgets with emphasis on allocation of Federal research and development resources. This will permit the later consideration space goals in relationship to broader national goals and objectives and more specified Federal scientific and technological activities. Concepts are based on: (1) goal oriented activities; (2) priorities among goals; and (3) analyses of past and present activities and goals that contribute to an understanding of the future. G.G.

N69-20988*# *Battelle Memorial Inst., Columbus, Ohio.*
AN ANALYSIS OF THE ALLOCATION OF FEDERAL BUDGET RESOURCES AS AN INDICATOR OF NATIONAL GOALS AND PRIORITIES, PART 2
Leonard L. Lederman and Margaret L. Windus 10 Feb. 1969 297 p refs
(Contract NASw-1146)

(NASA-CR-100436; BMI-NLVP-TR-69-1-Pt-2) Avail: CFSTI CSCL 05A

Discussed are national program areas in connection with government outlays and research and development activities. Overall goals and resources allocated are summarized and translated in a proposed Federal budget that is designed to support a total active force strength of approximately 3.5 million men and women. Considered are functional field budgets for: (1) national security; (2) welfare; (3) health; (4) commerce, transportation, and communications; (5) education and knowledge; (6) agriculture; (7) international relations; (8) labor and manpower; (9) veterans; (10) space; (11) housing and community development; (12) natural resources and environment; and (13) general government. G.G.

N69-14618# National Science Foundation, Washington, D. C.
FEDERAL FUNDS FOR RESEARCH, DEVELOPMENT, AND OTHER SCIENTIFIC, FISCAL YEARS 1967, 1968, AND 1968, VOLUME 17
[1969] 268 p refs
(NSF-68-27-VOL-17) Avail: Issuing Activity

The report covers federal research and development support to every kind of performer, by character of work, by field of science, and by agency. Federal funding is also reported for scientific and technical information activities and for the collection of general-purpose scientific data. Characteristics, levels, and trends of federal funding are indicated. Data are presented in tables and graphs. K.W.

N69-10717# Select Committee on Small Business (U. S. House).
THE POSITION OF SMALL BUSINESS IN GOVERNMENT PROCUREMENT
Washington GPO 1968 1334 p Hearings before Subcomm. No. 2 on Govt. Procurement and Econ. Concentration of the Select Comm. on Small Business, 90th Congr., 17, 18 and 25 Oct., 1 Nov., 4–5 Dec. 1967, 23 Jan., 13–14 Mar., and 11 Jun. 1968
Avail: SOD

The hearings of the Subcommittee on Government Procurement and Economic Concentration of the Select Committee on Small Business are reported. Included are: (1) government agencies testifying, (2) government agencies reporting, (3) private industry testimony, (3) comments by government agencies in response to industry views and complaints, and (4) Small Business Administration testimony. Additional information concerning actions of government agencies is included in the appendexes. F.D.S.

M9 GENERAL

N69-41006*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PROGRAM AND PROJECT MANAGEMENT: A DEMAND BIBLIOGRAPHY
9 May 1969 57 p refs
(NASA-TM-X-61920; GP-698) Avail: CFSTI CSCL 05B

This bibliography lists references published chiefly during the 1960s. Most of the works relate to activities in aerospace technology. The references are arranged according to the following subject headings: (1) budgeting and cost analysis; (2) critical path method; (3) general management and organization; (4) PERT and combination of PERT/critical path method; (5) reliability and quality assurance; (6) research and development; (7) scheduling; (8) selection; and (9) unique programs and projects. K.W.

N69-34917*# National Aeronautics and Space Administration, Washington, D.C.
THE SYSTEMS APPROACH TO MANAGEMENT. AN ANNOTATED BIBLIOGRAPHY. WITH INDEXES
Jul. 1969 69 p refs
(NASA-SP-7501) Avail: CFSTI CSCL 05B

The announcements of the systems approach to management appear by accession number and are grouped under the following categories: the systems concept, recent developments, specific functions, multi-national organization, manpower management, public administration, impact on management, and practical applications. F.O.S.

N69-32430*# National Aeronautics and Space Administration, Washington, D.C.
MANAGEMENT: A CONTINUING LITERATURE SURVEY WITH INDEXES
Jun. 1969 58 p refs
(NASA-SP-7500(03)) Avail: CFSTI CSCL 05B

This is a compilation of references to unclassified reports and periodical articles on the subject of management that may be found in the NASA scientific and technical information system. The publication assembles groups of citations formerly announced in separate journals, *Scientific and Technical Aerospace Reports (STAR)* and *International Aerospace Abstracts (IAA)*, together with other reports included in the system but not previously announced. This issue covers references to material from both NASA and non-NASA sources that entered the system in 1968. The items are grouped in nine categories. Subject, personal author, and corporate source indexes are provided. Author

N69-29492*# National Aeronautics and Space Administration, Washington, D.C.
NASA SCIENTIFIC AND TECHNICAL REPORTS FOR 1968. A SELECTED LISTING
May 1969 453 p refs
(NASA-SP-7033) Avail: CFSTI CSCL 05B

This publication contains a combined selective listing of NASA reports that were announced during 1968 in *Scientific and Technical Aerospace Reports (STAR)*, NASA's semimonthly announcement journal for the aerospace sciences. The documents listed were issued as part of the following NASA report series: *Special Publications* (NASA SP). *Technical Reports* (NASA TR-), *Technical Notes* (NASA TN D-), *Technical Memorandums* (NASA TM X-), *Technical Translations* (NASA TT F-), and *Contractor Reports* (NASA CR-). The listing does not include references to journal articles that were published as a result of NASA-sponsored activities. The volume has been limited to reports which were printed and widely distributed. Access to material thus omitted from this listing continues to be available through STAR and its indexes. The arrangement of this publication is the same as that of STAR. The first section contains the bibliographic citations and abstracts arranged by STAR subject categories. The second section contains five indexes (subject, personal author, corporate source, report/accession number, and accession/report number.) Author

N69-28868*# Denver Univ., Colo.
TECHNOLOGY TRANSFER: A SELECTED BIBLIOGRAPHY
M. Terry Sovel Washington NASA Jun. 1969 103 p refs
(Contract NSR-06-004-063)
(NASA-CR-1355) Avail: CFSTI CSCL 05B

This is a comprehensive compilation of 428 works on the subject of technology transfer. Technology is considered here to be technical information, including scientific knowledge, making possible the conception, development, design, production, and distribution of goods and services. Transfer here means the effective

communication of such information from one person or source to a recipient who accepts it for consideration and possible application. The bibliography contains chiefly primary sources, and outdated information has been eliminated. K.W.

N69-22213*# State Univ. of New York at Buffalo.
INCENTIVE CONTRACTING: AN ANNOTATED AND CLASSIFIED MODERN BIBLIOGRAPHY
Stanley Fong and Raymond G. Hunt Feb. 1969 38 p refs
(Grant NGR-33-015-061)
(NASA-CR-100555; TR-2) Avail: CFSTI CSCL 05A

A bibliography is given of incentive contracts and contracting phenomena ranging from the normative to the empirical. Emphasis is on work that has appeared since 1961, but some references of earlier work are included. B.G.D.

IAA ENTRIES

M1 PROGRAM & PROJECT MANAGEMENT

A69-43043 #
ACTION AND REACTION. II.
Robert C. Seamans, Jr.
Astronautics and Aeronautics, vol. 7, Sept. 1969, p. 44-52.

Discussion of the effectiveness of cooperation in complex space-flight programs. It is noted that when actions in this field are motivated by competition between adversaries of equal ability, each with the sole purpose of preeminence in a single limited field, neither can achieve a permanent advantage, and costs increase without limits. However, competition can be beneficial when it is viewed as an incentive to improve the effectiveness of the decision-making and implementation processes. It is concluded that when action is cooperative, each participant can obtain returns equal in value to those from unilateral action, but at substantially less cost. The effectiveness of multilateral activities is shown to be greatly enhanced by the assignment of program responsibility to a single management team. P.G.

A69-42812 * #
NEW APPROACH TO LOGISTICS MANAGEMENT.
Clifford J. Hall and Hiland Gardner (NASA, Manned Spacecraft Center, Apollo Applications Program Office, Houston, Tex.).
American Astronautical Society and Operations Research Society of America, Joint National Meeting, Denver, Colo., June 17-20, 1969, AAS Paper 69-204. 17 p.

Description of a revised logistics management system developed for the Apollo Applications Program of the NASA Manned Spacecraft Center. The management problems and constraints resulting from the interprogram activities and from common or concurrent use of equipment are discussed. Also presented are the logistics techniques evolving from system analyses, the methods derived for the application of requirements, and techniques for controlling the logistics management process. V.Z.

A69-38116 #
THE 1968-1969 MINTA MARTIN LECTURE/ACTION AND REACTION—THE NATIONAL COMMITMENT TO APOLLO. I.
Robert C. Seamans, Jr. (USAF, Washington, D.C.).
Astronautics and Aeronautics, vol. 7, Aug. 1969, p. 32-48.

Review of the development and progress of the U.S. space program since the establishment of the National Aeronautics and Space Act of 1958, culminating in the Apollo program for a manned lunar landing and return. NASA's record of mission successes is charted, and a historical description of manpower, budgetary, technological, and political developments from NASA's inception to the completion of the Apollo program is presented. It is shown that critical policy decisions made in 1958 led ultimately and directly to the success of the Apollo mission. Large development programs for the future are discussed, and it is noted that they will require appropriate management systems capable of rapidly assembling and ultimately disbanding teams of qualified scientific, technical, and administrative personnel. B.H.

A69-38021
CONFIGURATION MANAGEMENT.
Melvin Feller (Loral Electronics Corp., Loral Electronic Systems Div., Bronx, N.Y.).
IEEE Transactions on Engineering Management, vol. EM-16, May 1969, p. 64-66.

Configuration management is the management of technical requirements which define systems, system equipment, or individual equipment and changes thereto. It is implemented through procedures by which uniform and mutually supporting methods for configuration identification, control, and accounting are established and maintained for systems and equipment and for components of systems and equipment. (Author)

A69-37709
A DISCUSSION ON SYSTEM EFFECTIVENESS ASSURANCE ELEMENTS.
Orest A. Meykar (U.S. Navy, Ship Systems Command, Washington, D.C.).
(Institute of Electrical and Electronics Engineers, Seminar on Telecommunications and Telecontrol, Mexico City, Mexico, Nov. 27-30, 1968.)
IEEE Transactions on Aerospace and Electronic Systems, vol. AES-5, July 1969, p. 620-626. 5 refs.

Growing complexity of some technological systems requires engineering assurance that the systems will perform effectively at some distant point in time, when all contractual requirements shall have been met and the first assembled system faces the performance test program. The many and related assurance disciplines are outlined briefly, as being indispensable to effective engineering acquisition of present day systems of large magnitude for civilian or defense purposes. (Author)

A69-36006
THE SYSTEMS EFFECTIVENESS FUNCTION--FROM A MANAGERIAL POINT OF VIEW.
D. E. Hibsman and J. Meltzer (Aerospace Corp., El Segundo, Calif.).
IN: ANNALS OF ASSURANCE SCIENCES; PROCEEDINGS OF THE EIGHTH RELIABILITY AND MAINTAINABILITY CONFERENCE, DENVER, COLO., JULY 7-9, 1969.
Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.
New York, Gordon and Breach, Science Publishers, Inc., 1969, p. 77-84.

The image of the systems effectiveness function as seen by project and organization management is analytically examined. Commonly, this image is projected as a task which polishes, improves, and perfects an assigned product capability. Systems effectiveness is not an independent scientific approach to systems development, but performs within a blend of managerial considerations and tradeoffs, such as cost effectiveness, organizational structure, manpower, company image, experience, funding, and capability. The individual systems effectiveness elements are also sensitive to the optimization techniques utilizing cost effectiveness as a parameter. While systems effectiveness functions are emphasized, tradeoff considerations highlighting problems faced by systems effectiveness personnel and their management are presented. The recently generated draft of MIL-STD-XXX, Systems Engineering Management, is discussed as a promising tool for managing program-optimized system engineering tasks. The timing and cost-effectiveness aspects in systems effectiveness efforts are singled out for special emphasis. (Author)

A69-34649
THE UNEXPECTED PAYOFF OF PROJECT APOLLO.
Tom Alexander.
Fortune, vol. 80, July 1969, p. 114-117, 150, 153, 154, 156.

Discussion of the by-products of the lunar-landing program. It is noted that instead of the technological harvest, the lunar-landing program has provided lessons in how to manage great undertakings - a need greatly felt after projects like the F-111, the C-5A, the Supersonic Transport, and the Cheyenne helicopter overran

their initially stated cost estimates. The coordination of the multifarious aspects of a large enterprise can be based upon the methods of the Apollo Project. As for the technological contributions of NASA's moon venture, mention is made of improved techniques of metal forming and of obtaining a new order of reliability in complex equipment. V. P. M.

A69-34616
PROJECT MANAGEMENT ACCOMPLISHES "IMPOSSIBLE" MISSION.
Joan Segal.
Electronic Engineer, vol. 28, June 1969, p. 33-35, 38-40.

Discussion of the solution of the Apollo short stack testing project. The project consisted in confirming that the short stack, as an assembly, was capable of withstanding the rigors of flight. An approach used by project management is discussed which made it possible to finish a program initially estimated to take from 10 to 14 months to complete in only 16 weeks. Organization, planning and operating procedures, and procurement problems are considered. Aside from the technology involved, perhaps the most unique feature of the program was the smoothness with which the program manager was able to get all the people from the various stage manufacturers and NASA to work together. G.R.

A69-30427
DEFENSE INTEGRATED MANAGEMENT ENGINEERING SYSTEMS.
C. E. Hunter (U.S. Naval Air Rework Facility, Methods and Standards Div., Production Engineering Dept., Naval Air Station, North Island, San Diego, Calif.).
Defense Management Journal, vol. 5, Winter 1968-1969, p. 35-40.

Discussion of a defense integrated management engineering system (DIMES) employed at the Naval Air Rework Facility at North Island, San Diego, Calif. Effective production labor costs control requires the double-barrel approach of improved work methods and engineered performance standards (EPS). The prototype DIMES program required (1) the maximum economic utilization of EPS in performance evaluation, (2) the development of improved methods, (3) the utilization of labor-saving equipment, (4) the application of EPS to production and manpower planning and to standard cost accounting, and (5) the reporting of resultant cost reductions. G.R.

A69-28850 #
MANAGEMENT AND CONTROL OF PRODUCT ENGINEERING CHANGES FOR AIRCRAFT.
R. G. Haddenhorst (McDonnell Douglas Corp., McDonnell Aircraft Co., St. Louis, Mo.).
American Society of Mechanical Engineers, Design Engineering Conference and Show, New York, N.Y., May 5-8, 1969, Paper 69-DE-54. 6 p.
Members, $0.75; nonmembers, $1.50.

Techniques for the management and control of product engineering changes for aircraft. The McDonnell approach, utilizing the elements of identification, verification, change control, and status accounting, is described. Use of automated record-keeping techniques to keep track of change control is discussed. B.H.

A69-28101
MISSION - POSSIBLE.
Q. Rand Creasy (General Dynamics Corp., Fort Worth Div., Fort Worth, Tex.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 205-208.

Discussion of the ultimate objectives of value engineering (VE), as it has proved itself in hundreds of companies. The VE goal is prorated to each of the applicable departments with Engineering and Procurement being charged with the largest percentage of the responsibility. The VE personnel within these departments further prorate their goal as they deem advisable. The accomplishment of these goals results in the implementation of changes with their resulting cost savings and other value benefits. A key problem is to transform detail plans into clearly stated objectives which will be in consonance with the overall plans of the corporation. P.v.T.

A69-28099
GOVERNMENT VERSUS M & O INDUSTRY IN THE VALUE ENGINEERING ENDEAVOR.
Maks A. Stajich (Fairchild Hiller Corp., St. Petersburg, Fla.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 183-188.

Summary of the conditions prevalent in the maintenance and overhaul industry in pursuit of the value engineering endeavor. The expenditures considered pertain to the investment for preparation and/or all costs necessary to develop a proposal ready for submittal. The preparation of value engineering contracting proposals is discussed, and the advisability of forming a central agency for value engineering is considered. P.v.T.

A69-28096
IMPROVED VALUE THROUGH WEIGHT AND COST CONTROL OF THE BOEING 747 AIRPLANE.
Charles E. Brewster and Seymour M. Rosenthal (Boeing Co., Everett Branch, Everett, Wash.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 125-137.

Discussion of the application of value engineering in conjunction with accepted weight engineering practice to assist in the design and manufacture of the Boeing 747 commercial jet transport. The implementation, operation, examples, and results of a weight and cost control program are described. This program has permitted to remove weight and cost at a satisfactory rate, and has been twice as effective with less cost than previous programs. It was found that employing value engineering methods, with proper regard for the human elements, contributed largely to the successful weight and cost control program. P.v.T.

A69-28095
VALUE CONTROL-COST CONTROL PROGRAM FOR C-5.
Ira B. Funderburke and Guy E. Knowles, Jr. (Lockheed Aircraft Corp., Lockheed-Georgia Co., Marietta, Ga.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 119-123.

Discussion of a new concept of value engineering for the C-5A Galaxy aircraft that became known as the Value Control Program. It resulted in an expanded value engineering effort which formalizes a plan for scientific attack upon those features which do not contribute to function. Significant cost savings during the last quarter of 1967 and the year of 1968 were achieved by applying this program. Some of the major factors contributing to the success of the program are: (1) total involvement of the systems design engineering organization; (2) recognition and active support of upper management; (3) effective program control systems; (4) program management with direct lines of authority and decision making ability; and (5) budgetary adjustments as an incentive provision. Of singular importance to this program is the charge and commission given to the design organization. Initiation of the cost change proposal occurs where the cost is located, namely, with the design engineer. P.v.T.

A69-28094
ENGINEERING-DESIGN INFLUENCED COST CONTROL PROGRAM.
Doyle T. Brooks (LTV Aerospace Corp., Vought Aeronautics Div., Dallas, Tex.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 111-117.

Discussion of the development of a realistic program for design cost control, which evolved from initial experiences on a subcontract program. The intent of the program is to measure engineering performance in regard to cost, not so much to provide actual accounting type cost data. The cost figures used represent only the major elements of program cost most directly affected by design decisions: engineering design, major tests, production tooling, production materials, product manufacturing, and significant user costs. The objectives of this program are: (1) to track and control design influenced costs similar to weight control programs; and (2) to maintain a cost data bank, geared to engineering requirements.
P.v.T.

A69-28041 #
LET'S STOP USING LABOR AS A FREE GOOD.
Herman L. Gilster (U.S. Air Force Academy, Colorado Springs, Colo.).
Air University Review, vol. 20, Mar.-Apr. 1969, p. 21-32.

Discussion of the concept that extensive use of labor as a free economic good does not conform with good business practice. It is shown that, as the number of skilled personnel available decreases, the failure rate increases. Based on airline pay rates, it was found that the mean man-hour cost to the USAF per B-52 stateside sortie was $498. Proposals are made for a more equitable allocation of maintenance resources. It is suggested that the substitution of capital for labor might well result in considerable savings for the Air Force.
F.R.L.

A69-25849 #
WHAT IS CONFIGURATION MANAGEMENT?
Stanley A. Stevens (Bell Aerospace Corp., Bell Aerosystems Co., Buffalo, N.Y.).
IN: AMERICAN SOCIETY FOR QUALITY CONTROL AND SOCIETY OF RELIABILITY ENGINEERS, RELIABILITY-QUALITY CONTROL SEMINAR, ERIE COUNTY TECHNICAL INSTITUTE, BUFFALO, N.Y., MAY 4, 1968, PROCEEDINGS.
Buffalo, N.Y., American Society for Quality Control and Society of Reliability Engineers, 1968. 16 p.

Discussion of configuration management - i.e., the management of technical requirements which define systems, system equipment, or individual equipment and changes thereto. It is implemented through procedures by which uniform and mutually supporting methods of configuration identification, control, and accounting are established and maintained for systems and equipment. Its purpose is to enable the customer and the contractor to be sure that the final hardware has the configuration agreed on.
F.R.L.

A69-25304 #
INTEGRATED MANAGEMENT INFORMATION SYSTEM (IMIS).
G. H. Boos (General Electric Co., League City, Tex.).
IN: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, ANNUAL REGION III CONVENTION, 7TH, COCOA BEACH, FLA., NOVEMBER 18-20, 1968, RECORD.
New York, Institute of Electrical and Electronics Engineers, Inc., 1968, p. S7-3p1 to S7-3p10.

Discussion of an integrated management information system (IMIS) obtained as the result of a study performed by General Electric's Apollo Systems Department for the Kennedy Space Center. IMIS operates with the three disciplines of configuration management, logistics, and reliability and quality assurance. Each discipline is treated as a separate and distinct entity and is then integrated with the other two so a change or modification in any one discipline is impacted on the other two disciplines and the effect of the impact is known.
G.R.

A69-24371
MANAGEMENT OF DESIGN.
J. T. Stamper (Hawker Siddeley Aviation, Ltd., Kingston-on-Thames, Surrey, England).
Aeronautical Journal, vol. 73, Mar. 1969, p. 173-185.

Discussion of the development of design management over the next century. The subjects discussed include design methodology, the market need, the design process, communication with computers, industrial environment, and management. Various aspects of management are considered, such as motivation, organization, the development of design organization, the matrix organization, organization as a multidimensional problem, and control.
G.R.

A69-20629
PROCEDURES FOR PROJECT MANAGEMENT BASED ON DETAILED PROGRAMMING.
A. G. Williamson (Ministry of Technology, Training and Education Branch, London, England).
(Royal Aeronautical Society, All-Day Symposium on Project-Management and Incentive Contracting Procedures, London, England, Oct. 7, 1968.)
Aeronautical Journal, vol. 73, Jan. 1969, p. 37-41.

Discussion of project management procedures in which cost control is accorded equal importance with technical noncontrol. It is considered vital that procedures for controlling cost progress be adequately integrated with those for monitoring and control of technical achievement. The work should be broken down into a series of small tasks which are assembled into a program and also costed individually. The subjects discussed include work breakdown, task duration estimating, programming, cost estimating, and the generation of the development and cost plan.
G.R.

A69-20628
THE PROCEDURES FOR PROJECT MANAGEMENT - THE DOWNEY STEERING GROUP.
F. E. Tyndall (Ministry of Technology, Training and Education Group, London, England).
(Royal Aeronautical Society, All-Day Symposium on Project-Management and Incentive Contracting Procedures, London, England, Oct. 7, 1968.)
Aeronautical Journal, vol. 73, Jan. 1969, p. 35-37.

Discussion of an approach to perfect planning and to match more accurately achievement to plan. In connection with major defense development projects it was found that final costs were often substantially higher than the estimates. Therefore a group was set up to study this problem. The report, with the recommendations made by this group, are discussed.
G.R.

A69-20626
MANAGING UNSERVICEABILITY.
K. G. Wilkinson (British European Airways Corp., Ruislip, Middx., England).
Aeronautical Journal, vol. 73, Jan. 1969, p. 20-24.

Discussion of the problem of operating a large fleet of transport aircraft and of dealing with the mechanical and avionic defects in the machines. Operations research was of great value in overcoming initial difficulties. Effective handling of the problems depends very much on the outlook and the intellectual discipline of the people involved. Where the system involves sophisticated equipment there

has to be a good understanding of the performance of the equipment in its operating role and environment and an ability to fit this to the system. G.R.

A69-19842
THE APPLICATION OF SYSTEMS ANALYSIS TO GOVERNMENT OPERATIONS.
Guy Black (George Washington University, Washington, D.C.).
New York, Frederick A. Praeger, Inc., 1968. 200 p. 119 refs.
$15.

The purpose of this book is to show the relationship between the tools of systems analysis and the structure of systems concepts as related to government operations. It is intended for the large group of persons, not themselves systems practitioners, who may have developed a curiosity about the systems approach, or have been put in position of needing to exercise personal judgment as to its applicability to particular operations of government. The concept of a system and the methods of system analysis are discussed. The use of benefit functions is described in connection with the benefit question. The fundamentals of systems cost analysis and optimization are explained. The data needs in systems analysis are examined and the need for more systems analysis in government is considered. G.R.

A69-14807
RESEARCH PLANNING AS AN AID TO DEVELOPMENT DECISIONS [DIE PLANUNGSFORSCHUNG ALS HILFSMITTEL FÜR ENTWICKLUNGSENTSCHEIDUNGEN].
Hans M. Dathe (Industrieanlagen-Betriebsgesellschaft mbH, Operations Research Gruppe, Ottobrunn, West Germany).
(Wissenschaftliche Gesellschaft für Luft- und Raumfahrt and Deutsche Gesellschaft für Raketentechnik und Raumfahrt, Gemeinsame Jahrestagung, Technische Universität Karlsruhe, Karlsruhe, West Germany, Oct. 3-6, 1967.)
IN: WISSENSCHAFTLICHE GESELLSCHAFT FÜR LUFT- UND RAUMFAHRT, YEARBOOK 1967 [WISSENSCHAFTLICHE GESELLSCHAFT FÜR LUFT- UND RAUMFAHRT, JAHRBUCH 1967].
Edited by Hermann Blenk and Werner Schulz.
Cologne, Wissenschaftliche Gesellschaft für Luft- und Raumfahrt, 1968, p. 105-112. 11 refs. In German.

Consideration of the cost-dependent utility characteristics for several alternatives as a useful model for the planning of the optimum allocation of limited resources to research and development projects. The typical shape of these utility functions is validated by examples, and the determination of their parameters is facilitated by certain criteria. From the most promising candidates, those project combinations are selected from which a maximum return may be expected. The optimum distribution of funds among these alternatives is computed using Lagrange multipliers. Following a discussion of the results obtained from a sample calculation, some indications for time-dependent program planning are given. G.V.

A69-13451
ENGINEERING/MANUFACTURING INTERFACES.
Wilbur F. Snelling, Lawrence E. Stewart (North American Rockwell Corp., Aerospace and Systems Group, El Segundo, Calif.), and William S. Cherin (North American Rockwell Corp., Rocketdyne Div., Canoga Park, Calif.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680668. 15 p.
Members, $0.75; nonmembers, $1.00.

Discussion of the manner in which manufacturing can help engineering turn out more producible designs. Manufacturing contributions are discussed in terms of keeping aware of all on-going activities by means of tours, reports, reprints of articles, tradeoff studies, and engineering-manufacturing human relationships; and in terms of those activities related to the capture, design, and production of a hardware program. These latter include selecting the proper program manager; the participation of manufacturing departments during the proposal phase (planning activities, pilot runs, and so forth); the use of engineered standards; the monitoring of designs on the drawing boards; and involvement in the area of planned costs. M.M.

A69-13447
WHAT SHOULD ENGINEERING ADMINISTRATION DO FOR THE CHIEF PROJECT ENGINEER?
J. H. Richards (McDonnell Douglas Corp., McDonnell Douglas Astronautics Co., Huntington Beach, Calif.) and J. R. Blackwell (Marquardt Corp., Van Nuys, Calif.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680682. 23 p. 6 refs.
Members, $0.75; nonmembers, $1.00.

Discussion of criteria and functions of engineering administration which are of importance to the chief project engineer in an aerospace company. Some methods of accomplishing the administrative functions so as to provide better service to the chief project engineer are described, and reasons why the administration should be responsive to the project engineer are explained. It is pointed out that these administrative functions must be performed accurately, efficiently, economically, and in a timely and uniform manner. They are not simply routine steps that can be taken for granted. They must be managed by expert professionals and need to be kept under a spotlight in view of the project engineers, chief engineers, and directors of engineering to ensure that high standards are maintained. M.M

A69-10147
FORECASTING MILITARY AIRCRAFT.
Noland D. Harris (DMS, Inc., Greenwich, Conn.).
Space/Aeronautics, vol. 50, Oct. 1968, p. 54-63.

Examination of the military services' technological forecasts, on which they base their development and procurement decisions, as a means of forecasting the military aircraft market. It is considered that any aircraft company can work up a sufficiently accurate picture of the military procurement trends on which its future depends. Favorable results can be obtained by monitoring what the services do and logically relating these findings to future requirements and technological capabilities. F.R.L.

M2 CONTRACT MANAGEMENT

A69-38023
A STRUCTURE AND SCORING METHOD FOR JUDGING ALTERNATIVES.
Alfred Skolnick (U.S. Navy, Joint Surface Effect Ships Program Office, Washington, D.C.).
IEEE Transactions on Engineering Management, vol. EM-16, May 1969, p. 72-83. 15 refs.

Description of a method for organizing, evaluating, and classifying contestants in a competition. The technique facilitates the task of decision making by introducing orderliness of approach, quantification technique, and mathematical processing to the subjective problem of judging alternatives. The system is essentially two-phased: (1) an organizational structure that is simply adjusted to encompass the particular subject under consideration; and (2) a rank ordering evaluation and accumulation scheme leading to a numerical assessment for each competitor, which is insensitive to overriding superiority in specific capabilities and demands balanced excellence. The usual vagaries of assigning weights to particular categories are avoided, and the lack of defined specifications normally arising in cost-reimbursable competition is handled efficiently. M.M.

A69-36005
INDUSTRY VIEWS ON OPTIMIZED CONTRACTING FOR SYSTEMS ENGINEERING MANAGEMENT, MIL-STD-XXX.
O. A. Bernhoff (McDonnell Douglas Corp., McDonnell Douglas Astronautics Co., Huntington Beach, Calif.).
IN: ANNALS OF ASSURANCE SCIENCES; PROCEEDINGS OF THE EIGHTH RELIABILITY AND MAINTAINABILITY CONFERENCE, DENVER, COLO., JULY 7-9, 1969.
Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.
New York, Gordon and Breach, Science Publishers, Inc., 1969, p. 70-76.

A detailed industry review of the proposed MIL-STD-XXX identified several concerns which significantly influence attainment of an optimized system engineering function. The key areas of scope, application, depth, procurement process, and technical performance measurement are discussed. While industry generally agreed with the intent, it was felt that the standard should more clearly provide criteria and guidelines. These criteria and guidelines should do two things: (1) permit contractual requirements to be expressed in the proper scope at a meaningful but not excessive depth and (2) require only that verification and data which will provide visibility without restricting program flexibility. Customer responsibilities attain a new importance in the program formulation stage if the objectives of the standard are to be met. A list of points which the contractor must consider in order to facilitate program optimization is provided. *(Author)*

A69-34655
HANDLING RISK IN DEFENSE CONTRACTING.
Richard M. Anderson (H. R. Land and Co., Los Angeles, Calif.).
Harvard Business Review, vol. 47, July-Aug. 1969, p. 90-98.

Evaluation of the probability of budget overrun in risk areas of defence contracting. The complexity of present-day military preparedness requires the evolution of a risk management procedure for expressing risk judgment explicitly and quantitatively. One such procedure, which makes it possible to scrutinize hazards and adjust for risk, is outlined. Several applications of the procedure in the context of contingency planning are given. V.P.M.

A69-31071
METHODS OF ANALYZING THE IMPACT OF PROGRAM STRETCHOUTS.
William Rudelius (Minnesota, University, School of Business Administration, Minneapolis, Minn.).
IEEE Transactions on Engineering Management, vol. EM-16, Feb. 1969, p. 23-35. 16 refs.

Investigation of the main causes of program stretchout in aerospace procurement. The effect on costs in relation to incentive contracts is discussed, and methods are explored for the equitable determination of responsibility and cost-sharing between the government and the contractor for stretchouts due to changing requirements or necessary delays of deliveries in aerospace systems. B.H.

A69-30426 *
COST PLUS AWARD FEE CONTRACTING.
Gordon W. Rule (U.S. Naval Material Command, Procurement Control and Clearance Div.) and James E. Cravens (NASA, Washington, D.C.).
Defense Management Journal, vol. 5, Winter 1968-1969, p. 27-29.

Discussion of cost plus award fee (CPAF) contracting, a subjective incentive system based upon after-the-fact evaluation of overall performance effectiveness. The system was first explored in the early sixties. Various aspects of the system are discussed including the concept of the CPAF contract, practices of the defense department and NASA, efficiencies, and some isolated deficiencies found in procurement and in contract administration. G.R.

A69-30314
PROCUREMENT DOCUMENT REVIEWS MOVE UPSTREAM.
W. H. Behrens (General Dynamics Corp., Convair Div., San Diego, Calif.).
Quality Progress, vol. 2, May 1969, p. 22-24.

Discussion of difficulties inherent in procurement procedures and of ways to overcome them. Improvements in procurement procedure are discussed, and flow charts are presented which show previous procurement document flow at the Convair Division of General Dynamics and the present procurement document flow. G.R.

A69-28100
VALUE ENGINEERING INCENTIVE VS. PRODUCT IMPROVEMENT.
Rudy H. Kempter (U.S. Department of Defense, Defense Value Engineering Directorate, Washington, D.C.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 199-203.

Investigation of the relation between Value Engineering (VE) and Component/Products Improvement (C/PI) services, stressing its importance to the manager. Effective ways are proposed for using both the C/PI and the VE incentive and program requirement clauses to the mutual benefit of defense contractors and the government. It is suggested that managers consider the potential gains to be realized by the use of the not so well-known engineering contract incentive clauses. They may be used most effectively as a companion to VE program requirement clauses, and under some conditions as a replacement of the conventional C/PI clause approved for procuring quality efforts to improve defense products. P.v.T.

A69-22777
THE INFLUENCE OF INCENTIVE PROVISIONS ON PROJECT MANAGEMENT.
D. Walker (Honeywell Controls, Ltd., Greenford, Middx., England).
(Royal Aeronautical Society, All-Day Symposium on Project Management and Incentive Contracting Procedures, London, England, Oct. 7, 1968.)
Aeronautical Journal, vol. 73, Feb. 1969, p. 125-128; Discussion, B. D. Blackwell, p. 128.

Discussion of the effects of incentive provisions, used by mutual agreement between the purchaser and the contractor, on the management of projects. The topics chosen for consideration are planning, control, financial, technical, and personnel functions. For cost incentives to succeed in their purpose of improving the contractor's efficiency with rewards for improvement, a cooperative approach to the target cost should be used with accurate and approved cost data applied to set up a realistic target cost. G.R.

A69-22776
DESIGN OF INCENTIVE CONTRACTS - BASIC PRINCIPLES.
A. H. Blyth (Ministry of Technology, Contracts Div., London, England).
(Royal Aeronautical Society, All-Day Symposium on Project Management and Incentive Contracting Procedures, London, England, Oct. 7, 1968.)
Aeronautical Journal, vol. 73, Feb. 1969, p. 119-124.

Discussion of six points which are important in incentive contracting. These points include the degree of confidence in the cost estimates, target cost incentives, incentives to improve on technical performance, avoidance of performance incentives in the absence of cost incentives, a realistic program, and care in the formulation of multiple incentive arrangements. G.R.

A69-15987 *
FEDERAL GOVERNMENT CONTRACTING - THE LEGAL DEBATE REGARDING NASA SERVICE CONTRACTS.
James M. Hollis (NASA, Manned Spacecraft Center, Houston, Tex.).
National Contract Management Journal, vol. 2, Fall 1968, p. 91-115.

Detailed exploratory analysis of complex problems engendered by the rulings of the U.S. Civil Service Commission's General Counsel and the Comptroller General in 1965 and 1968, in which they questioned the legality of certain federal support service contracts, and explanation of the government's position, insofar as the situation permits, regarding contracting out for services. In part, because the studying, bargaining, compromising, and decision making are still in process, the methodology used in the presentation is mixed - i.e., the analysis is based on research of written data, observations from participating directly in government procurement

and contracting, and interviews with several individuals who are currently involved in, and concerned with the legal debate. It is considered that the general trend is toward a degree of curtailment in the federal practice of contracting out for some services, but that the situation, which is still fluid, could change drastically as a result of action by the courts, the Congress, and/or the Chief Executive. G. V.

M3 RESEARCH & DEVELOPMENT

A69-38022 *
IN-HOUSE RESEARCH ON THE MANAGEMENT OF R&D IN GOVERNMENT AGENCIES.
William L. Williams (NASA, Langley Research Center, Hampton, Va.; George Washington University, Washington, D.C.) and Michael Radnor (Northwestern University, Evanston, Ill.).
(Institute of Management Sciences, International Meeting, 17th, Mexico City, Mexico, Aug. 22-25, 1967.)
IEEE Transactions on Engineering Management, vol. EM-16, May 1969, p. 67-71. 5 refs.
Grant No. NsG-495.

Discussion of the need for in-house R&D management research activities in government agencies. Problems of manning and training of personnel to conduct such research programs are described. Case studies of new and on-going activities are presented. The work summarizes a workshop, devoted to the subject of in-house management research activities, that was held at Northwestern University, Dec. 12, 13, 1966. Participating were representatives from a dozen governmental organizations and Northwestern. The first day explored the methods of organizing and conducting in-house studies within the various governmental organizations represented. The second day was devoted to a meeting on in-house research programs within NASA. (Author)

A69-38020 *
A MODEL FOR THE DESCRIPTION AND EVALUATION OF TECHNICAL PROBLEM SOLVING.
Daniel S. Frischmuth (General Dynamics Corp., Fort Worth Div., Fort Worth, Tex.) and Thomas J. Allen (Massachusetts Institute of Technology, Sloan School of Management, Cambridge, Mass.).
IEEE Transactions on Engineering Management, vol. EM-16, May 1969, p. 58-64. 13 refs.
NSF Grants No. GN-233; No. GN-353; No. GN-594; Grant No. NsG-235-62.

Description of an investigation in which tape-recorded weekly protocols were gathered from three different engineers engaged on the same problem in a three-way parallel R&D project. Based on these protocols and a postproject interview with each engineer, a model of the individual technical problem-solving process is developed. The model is in the form of a process flow chart and details the engineer's interaction with sources of technical information. The results of the study indicate that the problem solver need not view the process as one in which the best solution is to be found for a fixed problem. Often the best approach lies in the direction of adapting to existing solutions the criteria which must be met. M.M.

A69-34129
PLANNING AN INDEPENDENT RESEARCH AND DEVELOPMENT PROGRAM.
Lewin T. Baker (General Electric Co., Apollo Systems Dept., Daytona Beach, Fla.).
IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, PROCEEDINGS. New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 507-512. 14 refs.

Description of an independent R&D (IR&D) program based upon the determination of a quantitative measure for the value of the results of the proposed projects to the firm's future business. Although an analytical expression for the value of a proposed project's results based on measurable parameters does not appear feasible, an IR&D program is as optimal as the Chief Executive judges it to be. While classical decision theory suggests that the decisions of the decision maker can be anticipated through a series of questions, this approach is not applicable to IR&D management where the decisions are more complex. V.P.M.

A69-34127
TECHNICALLY BASED MARKETING DECISIONS IN AEROSPACE R & D.
Dan R. McConnell (Raytheon Co., Microwave and Power Tube Div., Lexington, Mass.).
IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, PROCEEDINGS. New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 495-499. 10 refs.

Survey of marketing decisions required in aerospace research and development when technical considerations are the deciding factor. The four basic marketing decisions examined are: (1) the identification of the R&D capability possessed by a firm, (2) the identification of business opportunities in the form of potential systems contracts, (3) the development of strategies for the capture of the eventual R&D award, and (4) the selection and funding of independent R&D program to be financed by the company to support marketing strategy and build capability. V.P.M.

A69-34126
RESEARCH AND DEVELOPMENT FOR ECONOMIC GROWTH.
J. S. Newton (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).
IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, PROCEEDINGS.
New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 486-494. 19 refs.

General description of the strategy and planning required when research and development is undertaken only with the aim of economic growth in view. The process of converting R&D into cash demands an improved understanding of the essential interaction of talents and resources in all areas of the enterprises involved, and particularly between top management, planning, engineering, marketing, production, and, last but not least, the customers and the competitors. The various stages of the operation are separately discussed. V.P.M.

A69-32965
NATIONAL DIFFERENCES IN STYLES OF RESEARCH MANAGEMENT.
Harold Gershinowitz.
(Tripartite Chemical Engineering Conference, Symposium on the Management of Research and Development for Commercial Results, Montreal, Canada, Sept. 1968.)
Research Management, vol. 12, May 1969, p. 205-218. 7 refs.

Comparison of European and American corporate structure and delegation of authority and responsibility as they affect R&D performance. Also discussed are the cultural differences and their interaction on the national scene, prevalent in the universities, the industrial research laboratories, and business enterprises. Cost comparisons show that the U.S. sales/employee ratio is double the European ratio, and that the limited social mobility of the European employee increases European production costs. Innovation is found to receive more encouragement in the U.S. because of its less hierarchical social structure. Research costs are found to be about equal. B.H.

A69-31072
THE VALIDITY OF SUBJECTIVE PROBABILITY OF SUCCESS FORECASTS BY R & D PROJECT MANAGERS.

William E. Souder (Monsanto Co., Organic Chemicals Div., St. Louis, Mo.).
IEEE Transactions on Engineering Management, vol. EM-16, Feb. 1969, p. 35-49. 18 refs.

Results of an experiment to measure the predictive validity and consistency of probability-of-success forecasts by R&D personnel. Results show that success or failure of certain types of R&D projects can be predicted by measuring the time shape of polled probability of success forecasts. It is shown that R&D planning and control models based on subjective probability estimates are reliable for the early identification of eventually failing projects, and are useful aids in project selection and funding. B.H.

A69-31068
A MATHEMATICAL BASIS FOR THE SELECTION OF RESEARCH PROJECTS.
Anthony C. Atkinson (London, University, Imperial College of Science and Technology, London, England) and Arthur H. Bobis (American Cyanamid Co., Bound Brook, N.J.).
IEEE Transactions on Engineering Management, vol. EM-16, Feb. 1969, p. 2-8.

Mathematical model for determining the amount of money to be spent on product-oriented research programs. The algebraic formulations deal with five categories: (1) the probability model, (2) commercial information, (3) the rate of expenditure, (4) optimization, and (5) simulation. The analysis is based on accumulated net profits over an 11-year period. This figure was chosen because returns beyond the 11th year are subject to increasing variation, and a shorter basis could unduly penalize a long-range project. B.H.

A69-30958
MACRO R&D.
Marvin J. Cetron (U.S. Naval Material Command, Exploratory Development Div., Washington, D.C.) and Harold F. Davidson.
Industrial Management Review, vol. 10, Winter 1969, p. 87-100.

Description of MACRO, a methodology for allocating corporate resources to objectives for R&D. MACRO is an analytical technique for dealing with problems of R&D management. MACRO uses collective judgments and policy decisions from three levels within the organization: corporate planning and policy staffs, interdisciplinary teams of marketing and engineering personnel, and teams of specialists within given technologies. The input data emanating from these sources are processed in accordance with certain assumptions to derive utility measures. A MACRO program then determines the optimal allocation of an aggregate development budget to specific technologies based on this utility measure. M.M.

A69-30596 *
UNUTILIZED IDEAS IN UNIVERSITY LABORATORIES.
Donald H. Peters (EG & G, Inc., Bedford, Mass.) and Edward B. Roberts (Massachusetts Institute of Technology, Cambridge, Mass.).
Academy of Management Journal, vol. 12, June 1969, p. 179-191. 7 refs.
Research supported by the Gillette Safety Razor Co.; Grant No. NsG-496.

Study of the relationship between idea generation and implementation based on a survey of 299 university scientists and engineers. Of two groups who reported having initiated ideas in the laboratory, only 32% in one group and 35% in the other reported taking any steps to develop their ideas. The experience and background of those who do and those who do not implement their ideas are analyzed, and it is concluded that marketing experience and background in product development (as distinct from research) enhance the generation as well as the implementation of ideas. B.H.

A69-30402
MANAGEMENT OF THE INDEPENDENT TESTING LABORATORY.
Blayne M. Bleak (Wyle Laboratories, Systems Group).
IN: MAN IN HIS ENVIRONMENT; INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING AND EQUIPMENT EXPOSITION, 15TH, ANAHEIM, CALIF., APRIL 20-24, 1969, PROCEEDINGS. Mt. Prospect, Ill., Institute of Environmental Sciences, 1969, p. 589-592.

Discussion of the problems of independent testing laboratory management outlining the basic management requirements specialized to fit the unique conditions of the testing laboratory. The following steps toward continued growth are suggested: (1) evaluation of the market and search for ways to diversify and capture nonaerospace portions of the testing market; (2) careful analysis of all expenditures; (3) continued development of management and cost control tools aimed at more efficient and responsive operation; (4) aggressive approach to the growing complexity of the market; and (5) management flexibility to respond rapidly and effectively to the ever changing requirements. P.v.T.

A69-29281
CAPITAL BUDGETING FOR RESEARCH AND DEVELOPMENT.
Peter L. Mullins (Ohio State University, Columbus, Ohio).
Management Services, vol. 6, May-June 1969, p. 45-50. 9 refs.

Meeting of the rising costs for R&D by careful capital budgeting. Five basic categories of R&D activity are suggested: (1) basic research consisting of investigations attempting to advance fundamental scientific knowledge but (in contrast to "pure" research) with an ultimate commercial objective; (2) applied research which differs from basic research in that the specific goals of an applied research project are normally defined before work is initiated; (3) advanced development activities that focus on the exploration of engineering-oriented areas of technical uncertainty; (4) new-product development, which is the conventional, coordinated engineering effort necessary to complete development of the new product so that it can be released to the production and marketing activities; and (5) product improvement, which category includes redesign and similar engineering activities directed toward improvement of products already on the market. P.v.T.

A69-29280
PUTTING R&D ON A PROFIT-MAKING BASIS.
Robert B. Nienow (Arthur Young and Co., Milwaukee, Wis.) and Robert A. Coltman (Jacobsen Manufacturing Co., Racine, Wis.).
Management Services, vol. 6, May-June 1969, p. 21-27.

Rational approach to R&D in order to establish a profit-making basis. Management should separate the functions of its R&D department into those activities that lend themselves to measurement and those others, such as pure research, that do not. To evaluate the cash flow expected after the introduction of a new product, the division manager should see that a planned profit and loss statement is prepared for each of the three years following the products introduction to the market. Three forms are suggested for this purpose: (1) a computation of estimated cash flow on new-product expenditures, with "Estimate" and "Actual" columns for three years; (2) a computation of estimated return on new-product development expenditures; and (3) a R&D project progress report, to be filled in and filed every month. P.v.T.

A69-26733
ONE KEY TO R&D SUCCESS - THE RIGHT KIND OF PROPOSAL.
E. C. Hughes (Standard Oil Co., Cleveland, Ohio).
Research Management, vol. 12, Jan. 1969, p. 43-55.

Development of some philosophies of intracompany proposals, which usually differ considerably from similar proposals made to sponsoring agencies. Part of the proposals of an R&D department will be aimed toward innovation, creation, invention, and fortuitous discoveries. Another part will be concerned with the advancement and development of the results of such creativity. A research proposal is described which tries to emphasize the business and marketing orientation needed for launching research in a particular subject, as well as the state of the science and art. Some additional features involving development proposals are outlined. Such proposals are much more "selling" documents than is a research proposal. F.R.L.

A69-26732
WAYS TO MEET THE INCREASING PRESSURE ON R&D ORGANIZATIONS.

Richard F. Moore (National Cash Register Co., Dayton, Ohio).
Research Management, vol. 12, Jan. 1969, p. 25-36.

Attempt to isolate several major environmental factors which have significant impact upon current and future R&D operations. It is suggested that, although recognition of these factors is important, recognition must be supplemented with active, aggressive pursuit of techniques to exist in a new set of environmental circumstances. Further extension of the cost-center philosophy and aggressive internal investigation of R&D measurement techniques are felt to be key elements in responding to the corporate need for assessing the effectiveness of the R&D dollar. A formalized core-technology program structure is offered as a potential tool in reacting to the growing acceptance of systems management structures. The development of a short-course, specially tailored curriculum external to the traditional scope of academic institutions is suggested as a partial answer to the rapid obsolescence of technical skills and knowledge. F.R.L.

A69-21155 *

ORGANIZATION AND MANPOWER UTILIZATION IN RESEARCH AND DEVELOPMENT.
Richard Alan Goodman (California, University, Graduate School of Business Administration, Los Angeles, Calif.).
IEEE Transactions on Engineering Management, vol. EM-15, Dec. 1968, p. 198-204. 8 refs.
Grant No. NsG-342.

The effect of two basic types of organizational form on the stability and flexibility of manpower in companies engaged in research and development for the U.S. government was investigated. Important criteria for selecting one organizational form rather than another were investigated in order to ascertain which criteria provide the rationale for choosing specific organizational forms. (Author)

A69-21153

ARMY MATERIEL COMMAND PLANNING PRINCIPLES AND PHILOSOPHY.
Lewis A. Roepcke (U.S. Army, Materiel Command, Washington, D.C.), Walter E. Rafert (U.S. Army, Office of Research and Development, Washington, D.C.), and R. Palmer Benedict (U.S. Army, Natick Laboratories, Natick, Mass.).
IEEE Transactions on Engineering Management, vol. EM-15, Dec. 1968, p. 150-178. 109 refs.

Discussion of the fundamental concepts of the U.S. Army Material Command R&D planning structure and technical planning processes. The outline should be helpful in understanding the rationale of R&D technical planning as a means toward improving the quality of decisions in the face of the difficult constraints and uncertainties inherent in the R&D field. This discussion of the Army's planning environment gives a general rationale for planning as a necessary R&D management function, and establishes the time frame settings used for short- and long-range planning. P.v.T.

A69-21124

THE RESEARCHER AND HIS WORKING ENVIRONMENT - RESEARCH FINDINGS AND THEIR APPLICATION.
Floyd C. Mann (Michigan, University, Ann Arbor, Mich.).
IN: VISTAS IN SCIENCE; U.S. AIR FORCE OFFICE OF SCIENTIFIC RESEARCH, SCIENCE SEMININAR, 13TH, ALBUQUERQUE, N. MEX., JUNE 12-19, 1968, PROCEEDINGS.
Seminar co-sponsored by the University of New Mexico.
Edited by D. L. Arm.
Albuquerque, University of New Mexico Press, 1968, p. 25-47. 11 refs
USAF-supported research.

Study of the organizational behavior of scientists and the utilization of this knowledge for organizational development. The life history of a sequence of studies on research management is described in some detail. An overview of the approach, models, and conceptualizations being used in this field is provided, and the methodologies of measurement and change now in use are examined. Attention is given to the difficulties encountered in doing research that contributes to understanding and is helpful to the laboratory manager and his associates. F.R.L.

A69-18963 #

DEFICIENCIES IN SELECTED CONTROL SYSTEMS WITH SPECIAL REFERENCE TO RESEARCH AND DEVELOPMENT.
Arthur W. Gutenberg (Southern California, University, Los Angeles, Calif.).
Operations Research Society of America, National Meeting, 34th, Philadelphia, Pa., Nov. 6-9, 1968, Paper. 10 p. 9 refs.

Analysis of the requirements of management control processes with an attempt to identify causes of malfunction and inefficiency. Criteria for deficiencies are established and underlying assumptions for adequate control systems are laid down. It is noted that available mechanical techniques at present outstrip the ability of most control systems to cope with the human inputs. It is concluded that control systems, once they are established, must reflect the needs of the human elements and provide them with communications which can be identified as relating to individual and organizational goals. B.H.

A69-17871

TECHNOLOGICAL FORECASTING IN PLANNING FOR COMPANY GROWTH.
Harper Q. North and Donald L. Pyke (TRW, Inc., Cleveland, Ohio). (ELECTRONIC MANAGEMENT, PUBLIC PROGRAMS AND EDUCATION; WESTERN ELECTRONIC SHOW AND CONVENTION, LOS ANGELES, CALIF., AUGUST 20-23, 1968, TECHNICAL PAPERS, p. B/1-1 to B/1-10.)
IEEE Spectrum, vol. 6, Jan. 1969, p. 30-36. 8 refs.

Description of TRW's experience with technological forecasting, one of several techniques which a company may use in improving its selectivity in the allocation of those resources committed toward insuring its future. A modification of the Delphi technique was used, which seeks to take full advantage of the committee approach, while at the same time eliminating some of the disadvantages. The Delphi technique deals individually with each member of the committee and protects his anonymity. The TRW experimental study, described, resulted in the publication of a document containing a forecast of 401 technical events which a panel of experts felt would occur during the next twenty years and which would have a significant impact on the products, services, or processes of the company. F.R.L.

A69-16145 #

IMPACT OF EFFECTIVENESS CONCEPTS ON THE PROJECT MANAGER.
A. J. Rothstein (General Electric Co., Missile and Space Div., Valley Forge, Pa.).
American Society of Mechanical Engineers, Winter Annual Meeting and Energy Systems Exposition, New York, N.Y., Dec. 1-5, 1968, Paper 68-WA/MGT-2. 6 p.
Members, $0.75; nonmembers, $1.50.

Discussion of day-to-day project-management decisions in the light of today's requirements from the standpoint of the nature of the decisions, the effectiveness measures, and the incentives. An attempt is made to detail the kinds of change that become the chief job of the program manager to resolve in his quest for effectiveness. The project manager's measures of effectiveness, which are operative on his job are highlighted, together with the manner in which they differ from those usually held as paramount. It is pointed out that the attempt to resolve change in the light of these effectiveness measures should lead to an initial concentration of attention on the technical changes which will, inevitably, cause schedule and cost changes. One means of assisting in this resolution - contract incentives - with particular attention to certain of their limitations, is discussed. M.M.

A69-14530

THE ECONOMIC MANAGEMENT OF RESEARCH AND ENGINEERING.
P. C. Sandretto (International Telephone and Telegraph Corp., New York, N.Y.).
New York, John Wiley and Sons, Inc., 1968. 210 p. 85 refs.
$9.50.

A text covering the economic management of all technical efforts from the most esoteric research to basic engineering is

offered to nontechnical managers of enterprises that manufacture technical products, and to senior technical managers. The book attempts to obtain answers to the questions of where the technical dollars go, how much should be spent, how spending should be directed for best results, how technical operations may be judged, and what actions can be taken to improve technical operations. As a first step in improving the efficiency of the research and engineering effort, an analysis of the current expenditures should be made. An attempt is made to establish some guidelines that a manager or other member of his staff may use in establishing the annual research and engineering budget. The question of whether research can be afforded is examined, and the selection of profitable projects is discussed. The genesis and impact of the project plan, the control of engineering projects, and evaluation of the research and

A69-13552 #
SELECTION AND PLANNING OF RESEARCH AND DEVELOPMENT PROJECTS.
John F. McCarthy, Jr. (North American Rockwell Corp., North American Aviation Divisions Office, El Segundo, Calif.) and Russell L. Strom (North American Rockwell Corp., Space Div., Downey, Calif.).
Operations Research Society of America, National Meeting, 34th, Philadelphia, Pa., Nov. 6-9, 1968, Paper. 15 p.

Outline of a system to identify R&D projects which can develop the capabilities that will contribute to increasing the probability of success in the areas in which the sponsoring company wishes to compete. The following information is required as a part of each such project proposal: (1) relationship to company objectives; (2) estimated sales and profit; (3) probability of success; (4) capabilities, required and existing; (5) deficiencies which must be remedied; (6) an itemized statement of work; (7) milestone events and dates; (8) estimate of incremental and total work; (9) break-even point; (10) risk; and (11) required standards of performance, so that deviations from performance tolerances may be measured using a control-by-variance system. G.V.

A69-12476
PROJECT MANAGEMENT - AN INCENTIVE CONTRACTING DECISION MODEL.
W. A. Meinhart and Leon M. Delionback (Oklahoma State University, Stillwater, Okla.).
Academy of Management Journal, vol. 11, Dec. 1968, p. 427-434. 6 refs.

Development of a model for the analysis and solution of project-management problems in complex research and development programs. Particular focus is the incentive contract situation. The allocation of resources by the project manager under conditions of slack resources, cost reduction, schedule improvement, and technical performance parameters is given special attention. B.H.

A69-10991
TRADE SECRETS - WHAT PRICE LOYALTY?
Michael S. Baram (Massachusetts Institute of Technology, Cambridg Mass.).
Harvard Business Review, vol. 46, Nov.-Dec. 1968, p. 66-74.

Examination of the basic question of industrial loyalty regarding trade secrets. The Goodrich-Wohlgemuth case is used as the focal point of challenge to the preservation of certain forms of intellectual property posed by the mobile employee. Some suggestions for the development of sound management policies are offered. M.M.

M4 MANAGEMENT TOOLS & TECHNIQUES

A69-43018
AIDING THE DECISION MAKER—A DECISION PROCESS MODEL.
L. P. Schrenk (Honeywell, Inc., Systems and Research Center, Minneapolis, Minn.).
(Institute of Electrical and Electronics Engineers and Ergonomics Research Society, International Symposium on Man-Machine Systems, St. John's College, Cambridge, England, Sept. 8-12, 1969.) *Ergonomics,* vol. 12, July 1969, p. 543-557. 67 refs.

Description of a tentative, conceptual model of an idealized process of decision making. The model is based on both empirical and theoretical research and contains phases of problem recognition, problem diagnosis, and action selection. The model is intended primarily to provide (1) a guide to system designers in structuring decision tasks and (2) a framework for organizing knowledge about decision-making behavior. This model may also provide a basis for task allocation, for specifying requirements for aids to operator decision making, and for guiding further research by highlighting gaps in knowledge. The design of the decision tasks can be determined when the nature of the expected decisions is defined and the information needed to make the decisions is specified. P.G.

A69-42819 #
TECHNOLOGICAL FORECASTING—HOW CAN IT AFFECT AEROSPACE PLANNING?
Peter H. Neukirch (Martin Marietta Corp., Denver Div., Denver, Colo.).
American Astronautical Society and Operations Research Society of America, Joint National Meeting, Denver, Colo., June 17-20, 1969, AAS Paper 69-105. 21 p. 7 refs.

Evaluation of technological forecasting as an aid to the aerospace planner in optimizing the allocation of R&D resources, particularly in the light of divergent interests of the forecasters and planners themselves. Some conclusions are drawn on the values and the limitations of technological forecasting in determining the pace of the nation's space program. (Author)

A69-42818 #
MINIMIZATION OF TRAINING COST AND QUANTITY OF MULTI-SKILLED PERSONNEL WHEN REQUIREMENTS ARE UNCERTAIN.
Kenneth W. Haynam (U.S. Army, Behavioral Science Research Laboratory).
American Astronautical Society and Operations Research Society of America, Joint National Meeting, Denver, Colo., June 17-20, 1969, AAS Paper 69-116. 22 p.

Description of an algorithm which minimizes both the quantity of personnel and the training costs necessary to meet skill requirements which are uncertain. The algorithm is applicable when personnel may be given training in one or more skills and the requirements are for single skills. Given n contingencies in terms of the required number of men in each of m skills, the algorithm calculates the optimum mix of personnel with multiple and single skills to satisfy skill requirements completely no matter which contingency is realized. The solution algorithm was developed to calculate the optimum training composition of a contingency force of Army aviators. (Author)

A69-42710 #
THE CHANGING FACE OF PRODUCTION—THE USE OF NUMERICAL CONTROL IN MANUFACTURING.
L. Brown (United Aircraft of Canada, Ltd., Montreal, Canada).
(Canadian Aeronautics and Space Institute, International Aerospace Exposition, Montreal, Canada, Nov. 26, 27, 1968.)
Canadian Aeronautics and Space Journal, vol. 15, Sept. 1969, p. 247-253.

Description of a large Canadian company's experience in the development and use of numerical control as a manufacturing tool, stressing the importance of preplanning the manufacturing environment to ensure successful application of this new technology. Emphasis is on the application of numerical control to the manufacture of aircraft engine precision components. Its flexibility to meet product change and prototype as well as batch manufacture

is considered. The cost gain and loss ratios illustrate the advantages and pitfalls. The important indirect costs, inventory, durable tooling, and materials handling are described. (Author)

A69-40489 #
MANAGEMENT TECHNIQUES FOR COMPLEX SYSTEMS.
F. A. Cleveland and G. F. Viehmeyer, Jr. (Lockheed Aircraft Corp., Lockheed-Georgia Co., Marietta, Ga.).
Royal Aeronautical Society, Canadian Aeronautics and Space Institute, and American Institute of Aeronautics and Astronautics, Anglo-American Aeronautical Conference, 11th, London, England, Sept. 8-12, 1969, RAeS Paper 9. 19 p. 7 refs.
$0.50.

Outline of a concept for the management of a complex program, with primary emphasis on system engineering management. Management is considered as a process which has means for instrumentation and control of program resources. The management system guides the engineering of a best end-product to fill the need and suggests the organizational and procedural means to develop, test, acquire, deploy, and operate the end-product. It also identifies control media for parameters significant to ultimate success in meeting goals of the customer and of the contractor. The proposed concept of management is explained with aeronautical system examples and is illustrated with the C-5 program experience. Forecasts of future trends are offered as a challenge for the possible application of engineering technology to management systems. P.G.

A69-37533
INTRODUCTION TO SYSTEMS COST-EFFECTIVENESS.
Karl Seiler, III (Computer Command and Control Co., Education Institute, Philadelphia, Pa.).
New York, Wiley-Interscience (ORSA, Publications in Operations Research, No. 17), 1969. 118 p. 61 refs.
$9.95.

A comprehensive introduction to cost-effectiveness methodology is presented, based on an analysis of cost factors, system cost, system effectiveness, and system cost-effectiveness. System-cost models are developed and are combined with effectiveness models based on system performance, availability, reliability, and survivability, to construct overall cost-effectiveness models ranging from simple ratio models to models with complex probabilistic indifference curves. A basic understanding of calculus and probability theory is assumed, but it is pointed out that systems cost-effectiveness is essentially an extension of classic economic theory, which is concerned with the allocation of scarce resources among competing ends to maximize satisfaction. B.H.

A69-37353
TECHNOLOGICAL FORECASTING TO AID R&D PLANNING.
Harper Q. North and Donald L. Pyke (TRW, Inc., Redondo Beach, Calif.).
Research Management, vol. 12, July 1969, p. 289-296. 5 refs.

Description of the Delphy technique of technological forecasting, based on the committee approach, with methods for eliminating subjectivity resulting from the vested interests of individual committee members. An experimental study containing a forecast of over 400 technical events over the next 20 years, compiled by a panel of 27 experts, is analyzed as an example. The study, designated as Probe I, was developed to aid corporate executives in their perception of the need and feasibility of new product and service development, and to enable them to make appropriate modifications of long-range corporate plans. Probe is also designed to aid R&D managers in the executive evaluation of modified plans as compared to corporate plans and objectives for reaching decisions leading to the execution of specific programs. B.H.

A69-36924
STOCHASTIC MODEL FOR MANUFACTURING COST ESTIMATING.
C. T. Abraham and R. D. Prasad (International Business Machines Corp., Armonk, N.Y.).
IBM Journal of Research and Development, vol. 13, July 1969, p. 343-350. 9 refs.

Analysis of a stochastic model for estimating manufacturing costs in a process involving a series of operations. The Mellin and Laplace transforms, and the Gram-Charlier series approximations are discussed as techniques for deriving the probability distribution of rational algebraic functions of random variables. The present model is developed to show that both program and unit cost are specific functions of demand quantities, yield of operation, and the various cost components. Thus both program cost and unit cost, regarded as functions of random variables, have probability distributions that permit estimation at any desired confidence level. It is shown that it is possible, in the planning stage, to evaluate the effect of alternative methods of production with different costs of operation and different yield distributions on both the expected values and the confidence limits associated with the program. B.H.

A69-36008
THE DEVELOPMENT AND APPLICATION OF A METHODOLOGY OF PROGRAM RISK EVALUATION.
E. L. Welker, G. E. Ingram, and C. R. Herrmann (General Electric Co., Santa Barbara, Calif.).
IN: ANNALS OF ASSURANCE SCIENCES; PROCEEDINGS OF THE EIGHTH RELIABILITY AND MAINTAINABILITY CONFERENCE, DENVER, COLO., JULY 7-9, 1969.
Conference sponsored by the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, and the American Society of Mechanical Engineers.
New York, Gordon and Breach, Science Publishers, Inc., 1969, p. 90-98.

Discussion of research in the development and application of techniques for estimating program risks probabilistically based on the synthesis of a probabilistic description of the impact of program activities on the accomplishment of program goals. The analysis of the system to identify the significant program parameters, the development of a system model to relate activities to achieved parameter levels, the collection of data which reflect appropriate probabilistically described inputs, and the associated computerized numerical processing are described. The program risks are evaluated in the form of density functions which reflect the probabilities of attaining program goals, the random variables being the significant program parameters mentioned. The relationship of this approach to some current military requirements on this subject is briefly discussed. M.M.

A69-35236
HYPERCORRELATION - A CONCEPT FOR SYSTEM CHARACTERIZATION.
K. K. Krishnan Kutty, P. Sadanandan, and N. Seshagiri (Tata Institute of Fundamental Research, Computer Section, Bombay, India).
IEEE Transactions on Systems Science and Cybernetics, vol. SSC-5, Apr. 1969, p. 161-166.

Introduction of the concept of "hypercorrelation," a method for the statistical characterization of systems. It is shown that there exists a minimal set of hypercorrelation coefficients which uniquely characterizes a system for a given transfer function. The method of hypercorrelation is applied to management models, and it is shown that certain useful economic conclusions can be drawn from the analysis. Application of the concept to the characterization of simple multiport systems is discussed. (Author)

A69-34505
OPERATIONAL SYSTEM EFFECTIVENESS STUDY - A LAYMAN'S APPROACH.
Hans Reiche (Department of National Defence, Canadian Forces Headquarters, Ottawa, Canada).
IN: ANNUAL SYMPOSIUM ON RELIABILITY, CHICAGO, ILL., JANUARY 21-23, 1969, PROCEEDINGS.
Symposium sponsored by the Institute of Electrical and Electronics

Engineers, the Institute of Environmental Sciences, the American Society for Nondestructive Testing, and the American Society for Quality Control.
New York, Institute of Electrical and Electronics Engineers, Inc. (Annals of Assurance Sciences. Volume 2, No. 1), 1969, p. 263-269.

Description of a development program to design methods of providing operational system-effectiveness information for a reconnaissance drone system. A simple model was developed and special recording forms were prepared for gathering information

A69-34504
COST EFFECTIVENESS VIA WEIGHTED FACTOR ANALYSIS.
Nicholas Salatino and Myron Feistman (Radio Corporation of America, Defense Communications Systems Div., Camden, N.J.).
IN: ANNUAL SYMPOSIUM ON RELIABILITY, CHICAGO, ILL., JANUARY 21-23, 1969, *PROCEEDINGS.*
Symposium sponsored by the Institute of Electrical and Electronics Engineers, the Institute of Environmental Sciences, the American Society for Nondestructive Testing, and the American Society for Quality Control.
New York, Institute of Electrical and Electronics Engineers, Inc. (Annals of Assurance Sciences. Volume 2, No. 1), 1969, p. 256-262.

Recommendation of a *management criterion* for selecting work tasks with fixed funds based on a mathematical acceptability index model. It is noted that, in order to minimize expenditures and maximize the contributions of various work tasks relative to program objectives, profit, or military requirements where funding and time are both limited, it is advantageous to use mathematical models. Considering the advantages and disadvantages of various mathematical techniques, a *statistical approach* based predominantly on the data available and expert technical judgment appears to be one of the better alternatives. M.M.

A69-34503
AN OPERATIONS RESEARCH APPROACH TO SYSTEM EFFECTIVENESS.
A. Constantinides (Communications and Systems, Inc., Falls Church, Va.).
IN: ANNUAL SYMPOSIUM ON RELIABILITY, CHICAGO, ILL., JANUARY 21-23, 1969, PROCEEDINGS.
Symposium sponsored by the Institute of Electrical and Electronics Engineers, the Institute of Environmental Sciences, the American Society for Nondestructive Testing, and the American Society for Quality Control.
New York, Institute of Electrical and Electronics Engineers, Inc. (Annals of Assurance Sciences. Volume 2, No. 1), 1969, p. 250-255. 15 refs.

Discussion of the desirability of utilizing operations research techniques in performing system effectiveness studies. Several examples illustrate the application of existing methods and tools successfully employed in the operations research and system engineering disciplines. Based on this approach, the decision-maker can be presented with key decision models, wherein the most likely alternatives are optimized and compared on a consistent basis, thus enabling more meaningful decisions to be made.
(Author)

A69-34130
TESTING TORQUE - A QUANTITATIVE R&D RESOURCES ALLOCATION SYSTEM.
A. B. Nutt (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio).
IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, *PROCEEDINGS.*
New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 513-518.

Description of a rational method of allocating and justifying the allocation of resources in an organization. The genesis and operation of the system are reviewed, together with the results and some of its implications, insofar as they affect R&D. V.P.M.

A69-31126
SUPPORT SYSTEM COST EFFECTIVENESS.
Wendell A. Triplett (Radio Corporation of America, Moorestown, N.J.).
IN: AMERICAN SOCIETY FOR QUALITY CONTROL, ANNUAL TECHNICAL CONFERENCE, 23RD, LOS ANGELES, CALIF., MAY 5-7, 1969, TRANSACTIONS.
Milwaukee, American Society for Quality Control, Inc., 1969, p. 239-250.

Description of Integrated Logistics Support (ILS), a systems management discipline relating to the analysis and implementation of the many systems elements, which have come to include such items as computer programs, training, maintenance, facilities, procedures, instrumentation, data reduction, and transportation, in addition to prime mission equipment factors. ILS tradeoffs can significantly influence support equipment design, including the effects of operational constraints and considerations of commonality, and integration of test functions which avoid duplication of equipment and the other factors involving development, mobility, availability, and test system support. F.R.L.

A69-31125
COST EFFECTIVENESS ANALYSIS - A CASE STUDY APPROACH.
Ben S. Blanchard (General Dynamics Corp., General Dynamics/Electronics, Rochester, N.Y.).
IN: AMERICAN SOCIETY FOR QUALITY CONTROL, ANNUAL TECHNICAL CONFERENCE, 23RD, LOS ANGELES, CALIF., MAY 5-7, 1969, TRANSACTIONS.
Milwaukee, American Society for Quality Control, Inc., 1969, p. 229-238.

Study of the selection and acquisition of DOD/military systems where a consistent cost-effectiveness approach is needed. The concept of cost effectiveness, the application of basic cost-effectiveness principles, and an analytical model with a case study illustrating the multitude and variety of elements which must be considered in a cost-effectiveness evaluation are discussed. The approach conveyed is applicable to the selection and acquisition of any DOD/military system. F.R.L.

A69-28098
NUMERICAL VALUE RATING SYSTEM.
L. Sztan (U.S. Naval Air Systems Command, Washington, D.C.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 161-165.

Description of the U.S. Navy Numerical Value Rating System (NVRS) by outlining the concepts on which it is formulated and discussing the technique of computing the numerical value ratings. NVRS is a scientific value engineering (VE) technique of selecting the lowest cost design approach for accomplishing a specific primary function. The major problem during the design development stage is how to identify the best design approach, when detail costs are not available. NVRS was developed to solve this problem by providing rapid means of comparison during the design development stage of alternate designs. Nine areas of cost are selected for analysis and consideration: (1) number of parts, units, assembly procedures, and distinguishing properties; (2) quantity of operation; (3) function; (4) complexity; (5) material; (6) weight; (7) resources; (8) reliability; and (9) maintenance. Each of these cost parameters is converted into an NVR component by the use of equations.
P.v.T.

A69-28097
VALUE ANALYSES DURING THE DESIGN PHASE.
James B. Allis (Sylvania Electric Products, Inc., Sylvania Electronic Systems Div., Waltham, Mass.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.

Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 157-160.

Discussion of a design-phase value analysis process which includes an evaluation of alternative solutions directed at (1) identifying the cost of each alternative, and (2) providing data that will serve as a basis for making a logical selection of the best, most economical solution. The role of value engineering and its relationship to system cost-effectiveness during the design-development and production phases are described. Value engineering is a vital source providing: (1) information, particularly cost indices; (2) creative ideas or alternatives; (3) cost/value improvement recommendations; and (4) implemented improvements. P.v.T.

A69-28093
THE USE OF VALUE ENGINEERING TECHNIQUES IN DETERMINING THE WORTH OF PROBABILISTIC EVENTS.
Robert W. Holmes (Bausch and Lomb, Inc., Scientific Instrument Div., Rochester, N.Y.).
IN: SOCIETY OF AMERICAN VALUE ENGINEERS, NATIONAL CONFERENCE, SAN DIEGO, CALIF., APRIL 21-23, 1969, PROCEEDINGS.
Edited by Ann Fountain.
Smyrna, Ga., Society of American Value Engineers (SAVE Proceedings. Volume 4), 1969, p. 87-89.

Description of a method which was used to evaluate the worth of various stages in an industrial relations function - engineering recruiting. It is shown, by means of a specific example, how value engineering techniques can be used in areas normally considered outside the application of value engineering. P.v.T.

A69-22377 #
A DETERMINISTIC MODEL FOR COST-EFFECTIVENESS ANALYSIS OF AVIONICS SUPPORT PROGRAMS.
Richard A. Navarro and James W. Smith (McDonnell Douglas Corp., McDonnell Aircraft Co., St. Louis, Mo.).
American Institute of Aeronautics and Astronautics, Flight Test, Simulation, and Support Conference, 3rd, Houston, Tex., Mar. 10-12, 1969, Paper 69-305. 7 p. 13 refs.
Members, $1.00; nonmembers, $1.50.

Description of a mathematical model which calculates cost-effectiveness indices for avionics support programs. Analyses are based on factors which include (1) the avionic subsystem's supportability, (2) the test philosophy, and (3) the test equipment design and manufacture. A rating factor is derived which represents the quantified interrelationships among these factors and the associated requirements and logistics influences. Direct calculation of costs, maintenance times, equipment capability and performance, and spares factors is provided. An effectiveness factor, based on a statistical analysis of the performance characteristics of the support equipment, is generated. This factor is used to modify the rating and cost values; long- and short-term cost effectiveness indices are calculated. (Author)

A69-21162 #
AN INTRODUCTION TO THE STATISTICAL APPROACH.
R. A. Harvey (British Aircraft Corp., Ltd., London, England).
(Production Engineering Research Association, Symposium on Statistics for Management, Melton Mowbray, Leics., England, Mar. 13, 14, 1968.)
Aircraft Engineering, vol. 41, Feb. 1969, p. 12-19, 24. 5 refs.

Discussion of the principles of statistics and their application to design and management. The current meaning of statistics is discussed. General aspects of the statistical approach and the scope of statistics in industry are considered. Other subjects discussed include multiple regression analysis, statistics of attributes, intuition, probability, and simulation. Several examples of statistical applications are given covering flight testing, project evaluation, and economic analysis. G.R.

A69-20733
DESIGNING OF DECISION-ORIENTED AUTOMATIC DATA PROCESSING SYSTEMS [ZUR FRAGE DER GESTALTUNG EINES ENTSCHEIDUNGSORIENTIERTEN ADV-SYSTEMS].
W. Poths (Köln, Universität, Institut für Organisation und Automation, Cologne, West Germany).
Elektronische Datenverarbeitung, vol. 11, no. 1, 1969, p. 9-16. 14 refs. In German.

Discussion emphasizing the need to develop "application systems", in view of the advanced state of development of modern data processing systems. In a fully integrated data processing system, management must be provided with all required decision-relevant information in the case of nonprogrammable decisions. This requires an appropriate "compression" of the stream of "upward" directed information in the sense of reducing the quantity of information while enhancing its quality. P.v.T.

A69-20630
PROJECT CONTROL IN PRACTICE.
D. A. Walker-Arnott (Hunting Engineering, Ltd., Ampthill, Beds., England).
(Royal Aeronautical Society, All-Day Symposium on Project Management and Incentive Contracting Procedures, London, England, Oct. 7, 1968.)
Aeronautical Journal, vol. 73, Jan 1969, p. 41-43; Discussion, B. D. Blackwell (Ministry of Technology, Management Studies Group, London, England), p. 43.

Discussion of three aspects of project management. The control cycle used in a British engineering firm is described. It was found that projects lasting two years or more need to be reviewed and recast, if necessary, at least every month. The other subjects discussed are cost monitoring and the need for a simplified presentation of relevant information on time- and cost-monitoring reports to senior management. G.R.

A69-16300
CSPC - REPORTING PROJECT PROGRESS TO THE TOP.
Arnold R. Saitow (Westinghouse Electric Corp., Pittsburgh, Pa.).
Harvard Business Review, vol. 47, Jan.-Feb. 1969, p. 88-97. 10 refs.

Discussion of a recently tested new approach to cost and schedule planning and control (CSPC), which shows promise as an effective technique for relating cost and schedule performance in a meaningful way. The primary difference between CSPC and other reporting techniques is that CSPC is designed to enhance executives' visibility of the projects in progress rather than to serve as a control mechanism for project managers. The basis for this approach used in CSPC is "earned value," which focuses on the value of the work performed over time as opposed to the costs incurred, commitments, or the time elapsed. The practical application of CSPC is illustrated on a number of diagrams. CSPC has proved its worth by providing top management with a tool which integrates the cost and schedule performance of a project-type endeavor. In addition, it provides a mechanism by which executives can maintain visibility over a number of projects in progress simultaneously. P.v.T.

A69-16299
BAD DECISIONS ON COMPUTER USE.
John Diebold (Diebold Group, Inc.; Diebold, Inc., New York, N.Y.).
Harvard Business Review, vol. 47, Jan.-Feb. 1969, p. 14-16, 27, 28, 176.

Analysis of the benefit of automatic data processing (ADP) to a business, with emphasis on increased management capacity to control and plan. In view of the fact that computers are becoming useful at a higher level of management and for more sophisticated tasks, top executives should use different yardsticks in evaluating and planning for them. Some major questions are posed which policy makers should ask themselves and their organizations. The changing role of the computer is illustrated in a number of charts. In the present stage of transition, the use of ADP in business is moving toward greater involvement in corporate operations and decision making of a nonroutine, high-level character. With the new form of machines coming into use, this transition requires the adoption of new standards for evaluating ADP investment and operations. P.v.T.

A69-16239 #
AN APPLICATION OF STATISTICAL TECHNIQUES TO ESTIMATE ENGINEERING MAN-HOURS ON MAJOR AIRCRAFT PROGRAMS.
D. B. Owen (Southern Methodist University, Dallas, Tex.) and D. F. Reynolds (Texas Christian University, Fort Worth, Tex.).
Naval Research Logistics Quarterly, vol. 15, Dec. 1968, p. 579-593. 13 refs.
Research sponsored by the LTV Aerospace Corp.

Data on 23 lots of various aircraft programs were gathered. Total engineering man-hours, and information on performance, weight, area, avionics systems, data, and schedule were subjected to least squares analysis. An equation is presented which indicates a relationship between total engineering man-hours and a set of seven predictor variables. While the equation derived could only be used with confidence by the manufacturer whose data was analyzed, this article should be looked upon as demonstrating a method of data analysis which others may also find useful, not only for predicting engineering man-hours in major aircraft programs, but also in other situations where there is an abundance of possible predictor variables, and the problem is to sort out a meaningful subset of these variables. In order to demonstrate the viability of the formula obtained, comparisons were made with various bid programs. (Author)

A69-15981 *
ESTIMATE ACCURACY AND PROJECT SELECTION MODELS IN INDUSTRIAL RESEARCH.
Dennis L. Meadows (Massachusetts Institute of Technology, Cambridge, Mass.).
Industrial Management Review, vol. 9, Spring 1968, p. 105-119. 12 refs.
NASA-supported research.

Analysis of the relation between estimated and actual outcomes in commercial development projects. Data from five firms are utilized, and results are discussed under the categories of miscellaneous, technical, and commercial failure. Cost relationships are examined between technically and commercially unsuccessful projects and commercially successful ones and it is noted that generally there is a low correlation between the actual and estimated values of cost, and the probability of technical and commercial success. More empirical research is urged to gather data on which to base formal models with greater utility in the complex process of project selection. B.H.

A69-15803
THE SYSTEMS APPROACH TO TEST EVALUATION.
David M. Bradley (Grumman Aircraft Engineering Corp., Bethpage, N.Y.).
IN: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, SYSTEMS SCIENCE AND CYBERNETICS CONFERENCE, SAN FRANCISCO, CALIF., OCTOBER 14-16, 1968, RECORD.
New York, Institute of Electrical and Electronics Engineers, Inc., 1968, p. 153-162.

Discussion of the necessity of setting up a central test evaluation group as an integral part of systems engineering of large and sophisticated systems. Test evaluation by systems engineering has three fundamental objectives: establishing a feedback of intelligence from the test program to the designers and managers, maintaining the systems approach in solving the problems evidenced in the tests, and obtaining the greatest utilization of test data. In meeting its objectives, the test evaluation group contributes directly to the test operation. The improvement in communications speeds up the organizational response to test problems. Design changes are issued more promptly. The test evaluation group makes an indirect contribution to the program by increasing management and customer confidence in the validity of the tests. A system approach to test evaluation has proved effective as both an engineering and a management tool. P.v.T.

A69-15100 *#
FOUR GERT VIEWS OF PLANNING R & D PROJECTS.
A. Alan B. Pritsker and Ronald A. Enlow (Arizona State University, Industrial Engineering Faculty, Tempe, Ariz.).
Operations Research Society of America, National Meeting, 34th, Philadelphia, Pa., Nov. 6-9, 1968, Paper. 28 p. 40 refs.
Contract No. NAS 12-2035.

General procedure for the formulation and evaluation of systems using the graphical evaluation and review technique (GERT). Uses of GERT in studying the R&D planning processes are illustrated; the R&D process is examined from four viewpoints: (1) the scientific or philosophical; (2) the idea generating or psychological; (3) the administrative control or business orientation; and (4) the engineering or technical. Charts illustrate the GERT approach to converting a project into network form, and present the node characteristics and symbols for the networks used within the GERT procedure. B.H.

A69-14980 #
A MODEL FOR PREDICTING RISK IN PROPOSED RESEARCH AND DEVELOPMENT TASKS.
Robert D. Doering (Hughes Aircraft Co., Ground Systems Group, Fullerton, Calif.).
Operations Research Society of America, National Meeting, 34th, Philadelphia, Pa., Nov. 6-9, 1968, Paper. 20 p.

Discussion of the role of R&D in the generation of technological advance, and in the prediction of variance from planned achievements. Techniques for formulating a predictive model are discussed, and an example of model validation, comparing scheduled times with actual performance in a given project, is tabulated. The increasing dominance of R&D in business success is noted, and the recommendation is made that management develop and use more objective criteria and methodologies to plan and control this activity. B.H.

A69-13440
SYSTEMS ANALYSIS APPLICATIONS TO THE C-5.
D. L. Bouquet and P. C. Greenlee (Lockheed Aircraft Corp., Lockheed-Georgia Co., Marietta, Ga.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 7-11, 1968, Paper 680729. 16 p.
Members, $0.75; nonmembers, $1.00.

Applying systems analysis to the C-5 the basic analytical tools used were computer programs which evaluated C-5 characteristics and determined cost effectiveness. Three programs used to evaluate characteristic effectiveness were the loading program, productivity program, and effectiveness analysis program. The fourth program, a life cost model presentation, determined airplane cost effectiveness, and is presented in two levels, the conceptual and contract definition phase and the acquisition phase. A description of PERT-TECH techniques is also presented outlining how managers on the C-5 program were able to assess the technical health of the program and to pinpoint problem areas where action had to be taken during developmental work. Systems analysis applications presented illustrate one of the first cases where detailed alternatives on a major transportation system were measured against total system effectiveness to attain maximum product performance. (Author)

A69-11251
IS PERT/COST DEAD?
Peter P. Schoderbek (Iowa, University, Iowa City, Iowa).
Management Services, vol. 5, Nov.-Dec. 1968, p. 43-50. 6 refs.

Discussion of the chances of survival of PERT/Cost, a technique for planning, monitoring and controlling the cost of and progress in attaining technical performance objectives. An attempt is made to throw some light on this question by means of an analysis of the system's pros and cons, with emphasis on some aspects of its implementation. It is concluded that the PERT/Cost technique is hardly dead and that, even without the impetus supplied by the government, it has sufficient momentum to go it alone. M.M.

A69-11250
THE DELPHI TECHNIQUE - IMPLEMENTATION IN THE CORPORATE ENVIRONMENT.
Robert M. Campbell (Lear Siegler, Inc., Santa Monica, Calif.) and David Hitchin (Southern California, University, Los Angeles,

Calif.).
Management Services, vol. 5, Nov.-Dec. 1968, p. 37-42.

Description of the Delphi technique, a new but proven approach to long-range forecasting. The technique requires the selection of a panel of experts on the subject under study. These individuals are then asked to independently develop their best answers to the questions being asked. In addition, they are required to make their underlying assumptions explicit and to identify any source material that they would find helpful in refining and improving their answers. After their first answers are completed, each expert is given the composite replies of the group, together with the other experts' assumptions and their own requested additional information, if it is available. The names of the individual panel members are not associated with the opinions provided. Successive revisions of the original forecasts are undertaken following this procedure. Finally, a composite forecast is compiled. M. M.

A69-11096 #
COST-EFFECTIVE SELECTION FOR A NATIONAL SPACE LAUNCH VEHICLE STABLE.
Robert E. Drowns (General Dynamics Corp., Convair Div., San Diego, Calif.).
Operations Research Society of America, National Meeting, 34th, Philadelphia, Pa., Nov. 6-9, 1968, Paper. 12 p.
Research supported by the General Dynamics Corp.

Description of a systematic approach to the development of standard launch vehicles, based on the minimization of the federal government's expenditures while concurrently attaining the established mission goals. This methodology will provide a management tool to: (1) evaluate the effect of the launch-vehicle mix; (2) evaluate the use of launch vehicles and stages; (3) determine the effect of increasing or decreasing the available launch-vehicle inventory; and (4) evaluate the degree to which proposed launch-vehicle performance improvements are economically efficient. It is pointed out that industrial management can also benefit from this operational-analysis approach. A computer simulation, MAP, has been programed for evaluation of the aerospace launch-vehicle market, and examples are given of the utility of this versatile management tool. M. M.

A69-10652 #
DERIVATION AND APPLICATION OF UNIT COST EXPRESSIONS PERTURBED BY DESIGN CHANGES.
Paul Meyer James (U.S. Naval Air Systems Command, Washington, D.C.).
Naval Research Logistics Quarterly, vol. 15, Sept. 1968, p. 459-468.

Learning curves have been used extensively to predict future costs in the airframe and other industries. The paper deals with the effect of perturbations induced by design changes on the learning curves. Equations that are developed and applied make it possible to predict future costs accurately in a perturbed environment. The formulations can be used effectively in electronic data processing programs. (Author)

M5 PERSONNEL MANAGEMENT

A69-43020
DEVELOPMENTS IN SELECTION AND TRAINING.
K. W. Tilley (Royal Air Force, Training Command, Brampton, Hunts., England).
(Institute of Electrical and Electronics Engineers and Ergonomics Research Society, International Symposium on Man-Machine Systems, St. John's College, Cambridge, England, Sept. 8-12, 1969.) *Ergonomics*, vol. 12, July 1969, p. 583-597. 15 refs.

Following a brief outline of the characteristic features of the systems approach to training, the information-processing model is identified as a particularly illuminating approach to job classification. It is argued that the model highlights the multidimensional nature of task difficulty, indicates appropriate training methods, and provides a language for describing any human skill. The problem of deriving a meaningful classification of cognitive skills is discussed, and it is suggested that higher-order mental processes can be broken down into four distinguishable stages, each with its own potential sources of difficulty. The implications of the systems approach for selection are then considered, and it is argued that there is a need for increased flexibility and sophistication in diagnostic testing. Finally, examples drawn from recent studies conducted within the Royal Air Force are adduced to illustrate the kinds of improvement in performance which can be achieved through the application of a systems approach to training. (Author)

A69-42930 *
ORGANIZATIONAL COMMUNICATION.
Walter Wiesman (NASA, Marshall Space Flight Center, Huntsville, Ala.).
Defense Management Journal, vol. 5, Summer 1969, p. 33-37.

Discussion of communication in governmental, industrial, and business organizations, with emphasis on the development of an internal communication program. Internal (organizational) communication is defined as the total influence of any number of diverse factors on any or all members of a workforce. Conclusions drawn from previous experience with internal communication programs are summarized. The key factors which are essential to effective communication are presented and explained. Methods of improving the internal communication system ("special interest" approaches) are discussed in detail. O.H.

A69-42015 *
LEADERSHIP ATTEMPTING--WHY AND WHEN?
Cabot L. Jaffee (Tennessee, University, Knoxville, Tenn.).
Psychological Reports, vol. 23, 1968, p. 939-946. 25 refs.
Grant No. NGL-43-001-021.

Study of leadership-attempting behavior in an effort to define the parameters involved and to describe the conditions under which it can be manipulated. Research shows that the likelihood of a given individual speaking in a group is quite complex and depends on a number of situational and perceptual variables. Moreover, leadership attempting may be modified by changing the situation or the perceptions of the individual to the point where reinforcement from within the group becomes necessary to maintain the leadership-attempting behavior. T.M.

A69-38765
ORGANIZATIONAL IDENTIFICATION OF SCIENTISTS.
Sang M. Lee (Virginia Polytechnic Institute, Blacksburg, Va.).
Academy of Management Journal; vol. 12, Sept. 1969, p. 327-337. 21 refs.

Analysis of the variables associated with organizational identification on the part of scientists. The relationship between the scientist's degree of identification with the organization and his perceived self-prestige in the organization and in his profession is explored. The scientist is defined as a professional employee engaged in pure or applied research in a natural science, and holding at least a bachelor's degree. The study reveals that scientists with higher organizational esteem have higher organization loyalty, while scientists with low organizational prestige but high perceived professional prestige showed the lowest organizational identification. B.H.

A69-32964
MORE EFFECTIVE RESEARCH FOR LARGE CORPORATIONS.
Donald W. Collier (Borg-Warner Corp., Chicago, Ill.).
(National Conference on the Administration of Research, 22nd, St. Charles, Ill., Sept. 1968.)
Research Management, vol. 12, May 1969, p. 181-192. 8 refs.

Analysis of the basic elements of research productivity in large organizations. The importance of minimizing interface problems is stressed, while pointing out that project selection and evaluation

depends on effective communication across these interfaces, which consist of a plan of action based on corporate objectives, the creation of a technology for the execution of the plan, and an effective company policy for applying the technology to its operations. It is suggested that closer relationships be fostered in large companies among personnel involved in research, that the research department be kept in close touch with the market place, and that the deferred bonus system be applied to encourage innovation. It is finally suggested that the research department become involved in economic and market research as well as technical research. B.H.

A69-32963
MOTIVATION, INCENTIVES, AND REWARDS FOR R&D PERSONNEL.
Research Management, vol. 12, May 1969, p. 169, 170.

Evaluation of incentive plans to increase motivation and performance among R&D personnel. External factors affecting individual motivation were agreed to be prestige, power, responsibility, recognition, and the work itself. Salary, comfort, and other amenities were also considered important. Tangible rewards, such as one-shot bonuses for particular accomplishments, paid sabbaticals, leave programs for doctorates and tuition reimbursements, savings programs, and stock purchase plans, are evaluated. It was generally conceded that cost-of-living bonuses should be incorporated within the salary, which should be based on merit. B.H.

A69-31242
THE CHARACTERISTICS AND WORK ADJUSTMENT OF ENGINEERING TECHNICIANS.
Archie Kleingartner.
California Management Review, vol. 11, Spring 1969, p. 89-96.

Study of the characteristics, incentive and promotional patterns, and work adjustment of engineering technicians. The study included draftsmen, engineering and physical science technicians, life science technicians, and a residual category including such occupations as programmers and surveyors. Technicians are found to occupy a marginal position between professional engineers and manual workers; they exhibit a need for more individualized treatment from management in order to achieve greater job satisfaction and improved performance. B.H.

A69-31073 *
DIFFERENCE BETWEEN ENGINEERS AND SCIENTISTS.
Harold J. Peake (NASA, Goddard Space Flight Center, Greenbelt, Md.).
IEEE Transactions on Engineering Management, vol. EM-16, Feb. 1969, p. 50-53. 15 refs.

Delineation of behavioral differences between engineers and scientists with specific reference to the work environment. Results show that engineers are employer-oriented and recognize managerial authority, while scientists are career-oriented and recognize colleague-authority. The implications for management in terms of psychological climate, salary schedules, incremental policies, and other on-the-job factors are explored. B.H.

A69-31070
AN EVALUATION OF MEASURABLE CHARACTERISTICS WITHIN ARMY LABORATORIES.
Raymond W. Harrold (Avon Products, Inc., New York, N.Y.).
IEEE Transactions on Engineering Management, vol. EM-16, Feb. 1969, p. 16-23. 13 refs.

Results of a study conducted to identify characteristics that are measurable and strategic to the management of Army laboratories. Two standards were used, (1) the number of papers published and invention disclosures, and (2) laboratory performance. It is concluded that an increase in R&D experience on the part of military personnel would significantly increase laboratory performance and output. B.H.

A69-31069 *
SOME ANTECEDENTS AND CONSEQUENCES OF SCIENTIFIC PERFORMANCE.
George F. Farris (Massachusetts Institute of Technology, Alfred P. Sloan School of Management, Cambridge, Mass.).
IEEE Transactions on Engineering Management, vol. EM-16, Feb. 1969, p. 9-16. 19 refs.
Grant No. NsG-28-014.

Relationships between organizational factors and the performance of 151 engineers are studied to determine the extent to which the factors preceded performance, and performance preceded the factors. Four factors are related significantly to subsequent performance - namely, involvement in work, colleague contact, diversity of work activities, and number of subordinates. Every factor studied (these four, plus salary and influence on work goals) was related to previous performance. The performance-factor sequence was much more predominant than the factor-performance sequence. An engineer's performance apparently has pervasive consequences for his social-psychological working environment. (Author)

A69-25305 #
MANAGEMENT TRAINING FOR EXECUTIVE DEVELOPMENT.
J. H. Hinton (Bendix Corp., Kennedy Space Center, Cape Kennedy, Fla.).
IN: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, ANNUAL REGION III CONVENTION, 7TH, COCOA BEACH, FLA., NOVEMBER 18-20, 1968, RECORD.
New York, Institute of Electrical and Electronics Engineers, Inc., 1968, p. S7-4p1 to S7-4p7. 8 refs.

Discussion of various goals and methods of management training. It is pointed out that management training attempts to modify or develop managerial behavior by emphasizing techniques rather than the fundamental knowledge from which the techniques are derived. Ineffective and effective management training programs are compared. G.R.

A69-25303 #
ISOLATION - THE MAJOR BARRIER TO THE INTELLECTUAL CROSS-FERTILIZATION OF SCIENTIFIC PERSONNEL IN AN AIR FORCE-INDUSTRY RESEARCH AND DEVELOPMENT PROGRAM.
Joseph A. Angelo, Jr. (USAF, Systems Command, Space and Missile Systems Organization, Los Angeles, Calif.).
IN: INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, ANNUAL REGION III CONVENTION, 7TH, COCOA BEACH, FLA., NOVEMBER 18-20, 1968, RECORD.
New York, Institute of Electrical and Electronics Engineers, Inc., 1968, p. S7-1p1 to S7-1p8. 5 refs.

Intellectual cross-fertilization is defined as the mutual technical enrichment that occurs as a result of lateral communication among scientists and engineers. In an Air Force sponsored industry-conducted research and development program, intellectual cross-fertilization promotes the cost effective utilization of scientific and engineering talent. The isolation of technical personnel, since it prevents lateral communication, is identified as the principal barrier to intellectual cross-fertilization. Potential solutions for removing various segments of this barrier are examined. (Author)

A69-20196 #
THEORY OF MANAGING SCIENTIFIC AND PROFESSIONAL PERSONNEL.
J. C. Sawatsky (International Behavioral Consultants /North America/, Ltd., Toronto, Canada).
(Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Management in the Fields of Aerospace Meeting, Montreal, Canada, July 8, 9, 1968, AIAA Paper 68-805.)
Canadian Aeronautics and Space Journal, vol. 15, Feb. 1969, p. 37-39.

Consideration of a disk in its fundamental radial mode with constant stresses. The resulting contour is of Gaussian type, well known to the designers of centrifuge rotors. The second radial case is a resonant, uniformly-stressed ring with one nodal cylinder. Its contour depends on the radius of the nodal cylinder, and on the

Poisson ratio. The contours are determined for torsion disks and torsion rings having constant shear stress throughout their volume. The elastic waves are cylindrical shear waves. The contours of these resonators depend on the radius of the one nodal cylinder that is allowed for them. For these resonators, formulas are given that indicate the vibration amplitude as a function of stress. The uniform-stress resonators are compared both with plane disk resonators and with the known uniform-stress horns, Gaussian for longitudinal waves, catenoidal for torsional waves. It is shown how the disks and rings can be terminated without disturbing the uniform stress condition. Numerical examples are given. M.M.

A69-19728 *

METHODS OF ESTIMATING OCCUPATIONAL ATTRITION.

Hugh Folk (Illinois, University, Urbana, Ill.) and Donald E. Yett (Southern California, University, Los Angeles, Calif.).

Western Economic Journal, vol. 6, Sept. 1968, p. 297-302. 10 refs.

Research supported by the Ford Foundation; NSF Grant No. G-22296; PHS Grants No. NU 0054; No. CH 00024; Grants No. NsG-342; No. NGR-26-008-003.

Discussion of methods of determining the rate at which qualified persons leave an occupation through marriage, death, retirement, or transfer to other occupations. An exact method is presented for calculating an overall attrition rate, along with methods involving several simpler approximations. The bias resulting from the use of these approximate methods is discussed. The importance of age-specific occupational employment rates is pointed out. The results of an application of the proposed methods to the fields of engineering and nursing are cited. G.R.

A69-10450

HUMAN FACTORS AND AIRLINE TRAINING.

Robert C. Houston (American Airlines, Inc., Fort Worth, Tex.).

IN: HUMAN FACTORS IN AVIATION: 1968; HUMAN FACTORS SOCIETY, ANNUAL SYMPOSIUM, 5TH, LOS ANGELES, CALIF., JUNE 1968, PROCEEDINGS.

North Hollywood, Calif., Western Periodicals Co., 1968, p. 15-21; Discussion, p. 21, 22.

Discussion of recent progress made in airline crew training. Aircraft training times have been markedly reduced but with a resultant improved product. The airlines are primarily concerned with training personnel who are already competent airline crew members. The heaviest training workload is the transition of present crew members and pilots from one type aircraft to another. Recent airline training experience is reviewed, training trends are discussed, and the current key areas for research are outlined. P.v.T.

A69-10449

HUMAN FACTORS IN AIRCRAFT DEVELOPMENT.

Edward R. Jones (McDonnell Douglas Corp., McDonnell Co., Engineering Physiology Dept., St. Louis, Mo.).

IN: HUMAN FACTORS IN AVIATION: 1968; HUMAN FACTORS SOCIETY, ANNUAL SYMPOSIUM, 5TH, LOS ANGELES, CALIF., JUNE 1968, PROCEEDINGS.

North Hollywood, Calif., Western Periodicals Co., 1968, p. 1-6; Discussion, p. 6, 7.

Description of the characteristics of a continuing human-factors effort for an aircraft system that has been in operation for a decade. Some of the management characteristics are the use of a few highly skilled human factors personnel with a relatively constant manpower level throughout the design and manufacturing phases. The activities are selective rather than extensive with the individual having broad, continuous responsibilities for a system element. Formal documentation is severely limited. Field surveys and quick-reaction laboratory studies are used extensively to obtain objective data for design. An anthropologist has been used full time to support productively many facets of the system. P.v.T.

M6 TECHNOLOGICAL RESOURCES

A69-36258 *

INDUSTRIAL, SCIENTIFIC AND COMMERCIAL APPLICATIONS OF NASA DEVELOPED TELEMETRY TECHNOLOGY.

Erwin S. Teltscher (Digicom, Inc., Roslyn, N.Y.).

IN: NTC 69; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., APRIL 22-24, 1969, RECORD.

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 124-131. 69 refs.

NASA-supported research.

The work presented is a survey dealing with commercial, industrial, and scientific applications of NASA developed telemetry technology, and is a condensed version of a report prepared for NASA under contract. While it is hard to say which particular telemetry application is an actual outgrowth of NASA developed telemetry technology, it is undoubtedly true that NASA telemetry technology spurred either directly, or indirectly a host of industrial, commercial, and scientific applications of telemetry. Liberal use of published references is made, and where such references have been quoted or abstracted, appropriate copyright permission has been obtained. (Author)

A69-35105 *#

NASA TECHNOLOGY UTILIZATION PROGRAM.

Lee DuGoff (NASA, Kennedy Space Center, Cocoa Beach, Fla.).

IN: SPACE, TECHNOLOGY, AND SOCIETY; CANAVERAL COUNCIL OF TECHNICAL SOCIETIES, SPACE CONGRESS, 6TH, COCOA BEACH, FLA., MARCH 17-19, 1969, PROCEEDINGS. VOLUME 1. Edited by L. E. Jones, III.

Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1969, p. 18-5 to 18-30.

Survey of the program and purposes of the NASA Technology Utilization Program. It is noted that NASA has been conducting a vigorous experimental program to bring about the multiple use of the new knowledge gained as a result of activities under NASA contracts. By encouraging additional uses of this new knowledge, an additional return on the national investment is derived for the civilian economy. It is concluded that the NASA Technology Utilization Program provides a mechanism through which the rewards of aerospace technology can be shared for the benefit of all mankind. P.G.

A69-35104 *#

SECONDARY USES OF AEROSPACE BIOMEDICAL TECHNOLOGY.

Theodore D. Browne (Denver, University, Denver Research Institute, Denver, Colo.).

IN: SPACE, TECHNOLOGY, AND SOCIETY; CANAVERAL COUNCIL OF TECHNICAL SOCIETIES, SPACE CONGRESS, 6TH, COCOA BEACH, FLA., MARCH 17-19, 1969, PROCEEDINGS. VOLUME 1. Edited by L. E. Jones, III.

Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1969, p. 18-1 to 18-4. 7 refs.

NASA-sponsored research.

Description of certain research findings resulting from a project for the analysis of technology transfer. Although this research has encompassed information usage by businesses, government, and academic institutions, the focus of this presentation is the biomedical field. The meaning of spinoff and reasons why the public expects secondary benefits from aerospace expenditures are discussed. It is shown how aerospace technology might contribute to the medical field. The manner in which aerospace technology has been transferred from the originator to secondary

A69-35086 *#
MANAGEMENT CONTRIBUTIONS OF SPACE TECHNOLOGY - AN ANALYTICAL REPORT.
J. Gordon Milliken (Denver, University, Denver Research Institute, Denver, Colo.).
IN: SPACE, TECHNOLOGY, AND SOCIETY; CANAVERAL COUNCIL OF TECHNICAL SOCIETIES, SPACE CONGRESS, 6TH, COCOA BEACH, FLA., MARCH 17-19, 1969, PROCEEDINGS. VOLUME 1.
Edited by L. E. Jones, III.
Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1969, p. 6-9 to 6-16. 31 refs.
NASA-sponsored research.

Results of an effort to improve understanding of the technology transfer process, transfer barriers, and methodology successful in promoting transfer. All aspects of technology are under study, including the broadly applicable area of management. Several recent cases of transfer of space-related management technology found during the research problem are described and analyzed, as well as certain cases from the literature. The transferred management techniques are widely diverse in subject matter. To aid analysis and understanding, they have been subdivided into four categories: conceptual contributions, planning contributions, administrative methods, and evaluation methods. The progress made to date in transferring aerospace management techniques is evaluated, and the prospects for future transfer are discussed. F.R.L.

A69-35078 *#
EVALUATION OF INSTRUCTIONAL MONOGRAPHS IN UNIVERSITY AND INDUSTRIAL USE.
Kenneth A. McCollom (Oklahoma State University, Stillwater, Okla.).
IN: SPACE, TECHNOLOGY, AND SOCIETY; CANAVERAL COUNCIL OF TECHNICAL SOCIETIES, SPACE CONGRESS, 6TH, COCOA BEACH, FLA., MARCH 17-19, 1969, PROCEEDINGS. VOLUME 1.
Edited by L. E. Jones, III.
Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1969, p. 3-15 to 3-19.
NASA-supported research.

Evaluation of a pilot program in instructional monographs for providing up-to-date instructional material derived from current research as rapidly and as efficiently as possible for use in engineering education. An analysis of the evaluation forms has shown a very positive response in acceptance of the instructional monograph concept. Further development of the concept appears to be needed to refine this method of speeding new technology into use. M.M.

A69-34542
THE HIGH TECHNOLOGY TRAP - TOO MUCH, TOO SOON.
Warren E. Kraemer (Warren E. Kraemer Associates, Inc., New York, N.Y.).
Innovation, May 1969, p. 20-28.

Consideration of the possible contribution of major breakthroughs in aircraft production technology to present and potential economic setbacks in the aircraft industry. It is pointed out that while aircraft manufacturers have pushed the production of a radically new generation of jumbo aircraft, with minimum approach speeds, maximum cruise speeds, minimum balanced field requirements, and maximum payload ranges, simply because they possess sufficient technology and equipment to do so, they have not taken into account real passenger and cargo requirements, in the air and on the ground, nor adjusted to the needs of the operating environment. The insertion of major innovations into an existing spectrum of technology which is barely beginning to be amortized by its users is seen as a serious error in timing. A shift from airframe thinking to the application of technology to the full spectrum of transportation needs, above, below, and on land and sea is recommended, not only for the urgency of its need, but as being more economically profitable. Some specific examples of major commercial aircraft designs that were economic failures are discussed. B.H.

A69-34045 *
DEVELOPMENT OF NEEDED TECHNOLOGY.
Raymond L. Bisplinghoff (Massachusetts Institute of Technology, Cambridge, Mass.) and John L. Sloop (NASA, Washington, D.C.).
IN: COMMERCIAL UTILIZATION OF SPACE; AMERICAN ASTRONAUTICAL SOCIETY, ANNUAL MEETING, 13TH, DALLAS, TEX., MAY 1-3, 1967, PROCEEDINGS.
Edited by J. R. Gilmer, A. M. Mayo, and R. C. Peavey.
Tarzana, Calif., American Astronautical Society (Advances in the Astronautical Sciences. Volume 23. Lloyd V. Berkner Memorial Volume), 1968, p. 459-476.

Examination of the benefits of technology in general and of space technology in particular, and consideration of the various factors tending to promote their development. The need for federal action in support of basic research, and to provide venture capital and strong leadership in selected circumstances is stressed. The manner in which the space program has influenced developments in other fields is also briefly touched upon. V.P.M.

A69-34042
DESIGNING A SPACE PROGRAM.
Raymond L. Bisplinghoff (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.).
IN: TECHNOLOGY AND SOCIAL PROGRESS: SYNERGISM OR CONFLICT?; AMERICAN ASTRONAUTICAL SOCIETY, GODDARD MEMORIAL SYMPOSIUM, 6TH, WASHINGTON, D.C., MARCH 12, 13, 1968, PROCEEDINGS.
Edited by P. K. Eckman.
Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 18), 1969, p. 147-158.

Discussion of a suitable approach for designing a space program. General principles for technological development are discussed and sectors are cited in which there is a compelling need for federal action. It is proposed that NASA centers should be reorganized along common technological themes, and some problem areas are listed where NASA could provide R&D support. Some support by NASA is recommended in fields of life sciences unrelated to aeronautics and space. G.R.

A69-34041
DIRECT AND INDIRECT EFFECTS OF LARGE TECHNOLOGY PROGRAMS.
Leonard S. Silk.
IN: TECHNOLOGY AND SOCIAL PROGRESS: SYNERGISM OR CONFLICT?; AMERICAN ASTRONAUTICAL SOCIETY, GODDARD MEMORIAL SYMPOSIUM, 6TH, WASHINGTON, D.C., MARCH 12, 13, 1968, PROCEEDINGS.
Edited by P. K. Eckman.
Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 18), 1969, p. 51-60.

Examination of the effect of expenditures for research and development upon the American economy. Three types of direct, positive effects upon the economy are cited. It is pointed out that the stimulative effects of new technology can also be socially and economically disturbing. Efforts to trace the full impact of technological change on specific sectors of the economy are discussed. Indirect effects of large-scale technological programs are examined. It is concluded that slashing research and development spending in the U.S. would endanger its long-term real growth, its export position, and its leadership in civilian, military, and space technology. G.R.

A69-32430 *
RATIONALE OF THE NASA BIOMEDICAL APPLICATIONS PROGRAM.
Melvin S. Day (NASA, Office of Technology Utilization).

(Association for the Advancement of Medical Instrumentation, Annual Meeting, 3rd, Houston, Tex., July 1968.)
Association for the Advancement of Medical Instrumentation, Journal, vol. 3, Mar. 1969, p. 91-93.

Application of techniques developed in aeromedical research by the Biomedical Applications Team of NASA to other branches of medicine. These techniques include space miniaturization techniques applied to transmitters for cardiac sensors, methods developed originally for sterilizing spacecraft components and then applied to the sterilization of surgical rooms and instruments, and a NASA design for air bearings in rocket guidance systems, adapted for use in a large ballistocardiograph that floats a man, free of stray vibrations, while his heartbeat is measured. B.H.

A69-29157
CITY PLANNING AND NOISE.
Dorn C. McGrath, Jr. (U.S. Department of Housing and Urban Development, Div. of Metropolitan Area Analysis, Washington, D.C.).
IN: NOISE AS A PUBLIC HEALTH HAZARD; AMERICAN SPEECH AND HEARING ASSOCIATION, CONFERENCE, WASHINGTON, D.C., JUNE 13, 14, 1968, PROCEEDINGS.
Edited by W. D. Ward and J. E. Fricke.
Washington, D.C., American Speech and Hearing Association (ASHA Reports, No. 4), 1969, p. 347-359. 23 refs.

Urban noise control as a metropolitan, rather than a local problem. Aircraft, highway traffic, and other transport systems that operate beyond the purview of local noise ordinances are discussed. Proposals for controlling metropolitan noise are examined. B.H.

A69-23392 *
CONTROLLING THE POTENTIAL HAZARDS OF GOVERNMENT SPONSORED TECHNOLOGY.
Michael Wollan (George Washington University, National Law Center, Washington, D.C.).
George Washington University Law Review, vol. 36, July 1968, p. 1105-1137. 70 refs.
Grant No. NGL-09-010-030.

Analysis of case studies to determine how the government controls the potential hazards of federal technology programs. The questions raised are: (1) who assesses the impacts of these programs, (2) for what purposes, (3) through what means, mechanisms and procedures, and (4) with what results. It is concluded that the federal government's vested interests in the continuation of its technological programs limit its ability to provide adequate technological assessment. In the field of weather modification, agencies are held to be reluctant to explore in depth the need for regulation of their own operational programs. In the SST project, the Federal Aviation Agency is considered to be unable to ask the kinds of questions about engine noise that might challenge basic assumptions about the aircraft the agency is developing. The creation of a Technology Assessment Board that would help Congress perform its technology assessment functions more effectively is discussed. The role of private groups, operating outside the framework of government, in persuading the government to place more emphasis on reducing and eliminating the potential hazards of technology, is considered. Technological hazard and the law are reviewed, and the desirability of legislation that would protect the public without impeding technological and scientific progress is stressed. B.H.

A69-17068 *#
COOPERATION THROUGH THE EXCHANGE OF SCIENTIFIC AND TECHNICAL INFORMATION.
Melvin S. Day (NASA, Washington, D.C.).
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95317. 9 p.

Review of the NASA scientific and technical information program for building a repository of technical data and literature to support the work of scientists, engineers, and technical managers, and for exchanging this information with other countries. The activities and functions of IAA (International Aerospace Abstracts), and STAR (Scientific and Technical Aerospace Reports) are described, and two experimental programs in the process of development are reported - namely, SDI (Selective Dissemination of Information) and SCAN (Selected Current Aerospace Notices). B.H.

A69-13427 *
NASA'S DEVELOPING STRATEGY OF SPACE APPLICATIONS.
Donald P. Rogers (NASA, Office of Space Science and Applications, Washington, D.C.).
TRW Space Log, vol. 8, Fall 1968, p. 3-11.

Discussion of the Space Application Program of NASA, emphasizing the need for various teams of experts to develop specific objectives of applications missions. Following the successful single-purpose Echo, Relay, Telstar, and Syncom Programs, the communications R&D program broadened its base in the Applications Technology Satellite (ATS) Program. The trend of the NASA R&D program has obviously been toward more complexity and more versatility, and toward multidisciplinary use of the larger spacecraft classes that an increased launch vehicle capability has made possible. The sequential technology development stages from Relay through Syncom to Early Bird and from Tiros to ESSA satellites have established a possible pattern for future evolution from R&D to operational systems. P.v.T.

A69-11754
THE TRANSFERABILITY OF AEROSPACE MANAGEMENT TECHNOLOGY.
J. Gordon Milliken and John S. Gilmore (Denver, University, Denver Research Institute, Denver, Colo.).
IN: SPACE PROJECTIONS FROM THE ROCKY MOUNTAIN REGION; PROCEEDINGS OF THE SYMPOSIUM, DENVER, COLO., JULY 15, 16, 1968. VOLUME 2.
Symposium sponsored by the American Astronautical Society and the American Institute of Aeronautics and Astronautics.
Tarzana, Calif., American Astronautical Society, 1968. 20 p. 56 refs.

Discussion of the possibility of applying selected aerospace management contributions to urgent problems of other sectors of society and government by imitation, extrapolation, or analogy. The objectives of the NASA-sponsored Project for the Analysis of Technology Transfer (PATT) are outlined as (1) the documentation and evaluation of cases of transfer of space-related technology to other sectors, (2) the identification of incentives and barriers to transfer across organizational, sector, and disciplinary boundaries, (3) the establishment and maintenance of a Technology Transfer Data Bank for the use of researchers of the technology transfer process, (4) the development of criteria for selection of space-related technology which are most appropriate for dissemination to potential secondary users, and (5) the development of programs and mechanisms to help NASA in improving its Technology Utilization Program. The transferability of a number of specific items of aerospace management technology is evaluated. V.Z.

A69-10512 *#
THE GOVERNMENT ROLE IN TECHNOLOGY UTILIZATION PROGRAMS.
Richard L. Lesher (NASA, Washington, D.C.).
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95313. 21 p.

Discussion of the NASA Technology Utilization Program, its goals, operation, and degree of success. This program was initiated to provide for the widest practicable and appropriate dissemination of information concerning the activities of NASA and their results. This is accomplished through numerous publications, six Regional Dissemination Centers operated by universities and research institutions, conferences cosponsored with the Small Business Administration, and other efforts. Well thought-out flexible, evolutionary technology transfer programs have proven to be the best as measured by the returns of national investment in the form of new technology. P.G.M.

A69-10500 #
THE EFFECTS OF THE SPACE PROGRAM IN STIMULATING EDUCATION, SCIENCE AND ENGINEERING.
Raymond L. Bisplinghoff (Massachusetts Institute of Technology, Cambridge, Mass.).
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper. 20 p.

Discussion of the effects which can be discerned in education, science, and engineering as a result of space activities up to the present time and those which are estimated in the future. The impact on American educators of the launching of the first Soviet satellite in 1957 and the resultant development of American scientific educational efforts are noted. The stimulus provided by space research programs to the development of science is discussed, including astronomy, pure physics, chemistry, and applied mechanics. Space technology is also considered in relation to its effect on the development of engineering. It is concluded that there are many benefits of space exploration to society ranging over a broad sweep of activities. I. P.

A69-10490 #
THE IMPACT OF SPACE DEVELOPMENTS ON CIVIL AVIATION.
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968. Paper 68-95349. 8 p.

Discussion of the practical applications of space techniques to meet the existing and foreseen worldwide needs of civil aviation. These techniques include air-ground communications, navigation and monitoring of air traffic, and weather forecasting via satellite. The problems created by the common use of airspace by aircraft and space vehicles are considered along with the role of the International Civil Aviation Organization (ICAO) in supervising such use. P.G.M.

A69-10485 #
UNIVERSITY PROJECTS IN SPACE SYSTEM ENGINEERING AND THEIR POTENTIAL BENEFITS FOR DEVELOPING COUNTRIES.
William Bollay and Bruce B. Lusignan (Stanford University, Stanford, Calif.).
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95870. 15 p. 11 refs.

Description of the background, objectives, and some of the results of space system engineering courses presented at MIT and Stanford University during the past six years. These courses have dealt largely with the practical applications of space technology, including such topics as: (1) weather satellites, for the direct readout of cloud pictures, for the numerical weather data collection, and for a worldwide weather data collection and dissemination system; and (2) communication satellites, for relaying educational TV directly to each school, and for regional and international communication. During the current year, the Stanford class is studying a satellite system for performing earth-resource surveys. These topics are particularly important for countries which do not yet have extensive communication and weather networks. P. v. T.

A69-10471 #
CONTRIBUTIONS OF SPACE TECHNOLOGY TO SOLUTIONS OF MEDICAL PROBLEMS.
Quentin L. Hartwig (George Washington University, Washington, D.C.).
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95417. 18 p.

Description of the background, operations, and organization of the Biochemical Application Program of NASA. On this program, the Technical Utilization Division of NASA, using the existing "tools" of science, has been experimenting with the concept of interdisciplinary teams that serve as catalytic agents between scientific problem solvers and sources of potential solutions to these problems. Experience to date has shown that solutions originally designed for one purpose can play many other roles, thus giving greater return on the research investment. Although the Biomedical Application Program is in its infancy, it does provide an example of an aggressive infusion technique with feedback for program improvement. P. v. T.

A69-10467 *#
THE AEROSPACE STIMULUS TO TECHNOLOGICAL ADVANCE.
John L. Sloop and Mac C. Adams (NASA, Washington, D.C.).
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95321. 20 p.

Survey of some areas in which science and technology play a vital role in the economic and social benefits of people. Particular attention is given to the accomplishments of aerospace technology. The benefits which arise from aerospace technology and the stimulus which it provides for advancing technology useful in other fields are examined. V.P.

A69-10352 #
AVIONICS IN FOREST RESOURCE INVENTORIES.
L. Sayre Wittgenstein and A. H. Aldred (Department of Forestry and Rural Development, Forest Management Institute, Ottawa, Canada).
(Avionics Symposium, Ottawa, Canada, Jan. 16, 1968.)
Canadian Aeronautics and Space Journal, vol. 14, Oct. 1968, p. 315-317. 7 refs.

Forest resource managers are relying to an increasing degree on developments in avionics. A special radar altimeter for low-level aerial photography has been successfully designed. Other promising devices would include a double-recording radar altimeter and improved position indicators. (Author)

M7 MANAGEMENT POLICY & PHILOSOPHY

A69-42853 #
THE LUNAR LANDING DECISION AND AMERICAN DECISION-MAKING.
John M. Logsdon (Catholic University of America; George Washington University, Washington, D.C.).
American Astronautical Society and Operations Research Society of America, Joint National Meeting, Denver, Colo., June 17-20, 1969, AAS Paper 69-500. 16 p. 6 refs.

Review of the political background of the decision about the American lunar landing. The American space policy-making process in the years from 1957 to 1961 is analyzed with the aid of Huntington's (1961) model of the key elements of the innovation process. The stages involved in the preparation for the lunar landing are outlined, and the role of NASA is considered. It is shown that the lunar landing decision was a product of a long complex process, one typical of the way in which major national decisions are reached. P.G.

A69-31766
SPACE AGE MANAGEMENT: THE LARGE-SCALE APPROACH.
J. E. Webb.
New York, McGraw-Hill Book Co., 1969. 185 p. 36 refs. $6.95.

A comprehensive analysis of the principles and operating procedures required for the organization and execution of large-scale, complex projects is developed. The critical need for developing a scientifically valid and practicable approach to large-scale endeavors in an era of rapid and unpredictable change is considered, and some specific experiences, including the organization and functioning of NASA, are analyzed in detail as prototypes for the future. The function of management and the role of the executive are discussed in terms of developing standards and requirements for effectiveness. The impact on society and the requirements of the democratic process

as they affect the carrying out of large-scale projects involving far-reaching decisions are examined, and the need for increased emphasis on research to provide a greater knowledge and deeper understanding of what successful administrators in large endeavors really do, why they do it, and what effect it has is emphasized. B. H.

A69-20197 #
THE PROCESS OF ADAPTATION AND ITS IMPLICATIONS FOR MANAGEMENT.
A. Porter (Toronto, University, Dept. of Industrial Engineering, Toronto, Canada).
(Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Management in the Fields of Aerospace Meeting, Montreal, Canada, July 8, 9, 1968, AIAA Paper 68-807.)
Canadian Aeronautics and Space Journal, vol. 15, Feb. 1969, p. 41-46.

The paper treats the evolution of management systems from the point of view of basic control system philosophy. Management systems constitute sets of complex interfaces between subsystems in which interaction is carried out through dialogue which is central to the adaptive process. An elementary model of adaptive behavior is outlined with particular reference to the processes of pattern generation and "probing the interfaces." It is stressed that the environment for management must necessarily be a "learning environment" - which explains the importance of the adaptive process. Of particular importance is the role of the computer and information networks in modern management - the computer is usually a central component in the model of an adaptive system. Finally, it is stressed that the characteristic of adaptation, which is fundamental in the management process, is also fundamental in the highly complex biological process of "managing the human body." (Author)

M8 ECONOMICS

A69-42814 #
FISCAL FORECASTING FOR SPACE SYSTEMS.
John D. Graham (Martin Marietta Corp., Orlando Div., Data Analysis Section and Cost Modeling Section, Orlando, Fla.).
American Astronautical Society and Operations Research Society of America, Joint National Meeting, Denver, Colo., June 17-20, 1969, AAS Paper 69-166A. 20 p.

Description of approaches for forecasting fiscal requirements for future space programs. It is pointed out that a major portion of the job of cost prediction involves data analysis. A computer data bank for the employment of sophisticated analysis techniques is discussed. Problem definition, data analysis techniques, typical pricing methodologies, and types of cost models are considered. Detailed attention is paid to multiple regression analysis, a general-purpose estimating equation, and to a means for recognition of commonality and proportionality between components of individual space systems. G.R.

A69-28933
LET'S INTERNATIONALIZE DEFENSE MARKETING.
Robert E. McGarrah (Massachusetts, University, Amherst, Mass.).
Harvard Business Review, vol. 47, May-June 1969, p. 146-155.

Improved contracting procedures could enable governments to build new international common markets for defense. The formation of international consortia of industrial companies to design and produce certain widely used defense systems is proposed. Some examples of the application of such organizations are given to illustrate their advantages. Specific suggestions for assigning contracts to such consortia are discussed. B. H.

A69-23353
RESCUING POLICY ANALYSIS FROM PPBS.
Aaron Wildavsky (California, University, Center for Planning and Development Research and Dept. of Political Science, Berkeley, Calif.).
Public Administration Review, vol. 29, Mar.-Apr. 1969, p. 189-202. 23 refs.

Examination of the nature of policy analysis (analysis aimed at providing information that contributes to making an agency politically and socially relevant). Drawbacks to the concept of the planning-programming-budgeting system (PPBS) are pointed out, and advantages of disengaging policy analysis from PPBS are treated. Because policy analysis is not concerned with projecting the status quo, but with tracing out the consequences of innovative ideas, it is a variant of planning. Complementing the agency's decision process, policy analysis is a tool of social change. P. v. T.

A69-23352
SYSTEMS POLITICS AND SYSTEMS BUDGETING.
Allen Schick (Brookings Institution, Washington, D. C.).
(American Political Science Association, Annual Meeting, Washington, D. C., Sept. 3-7, 1968.)
Public Administration Review, vol. 29, Mar.-Apr. 1969, p. 137-151. 31 refs.

Study of the process-systems dichotomy in the old style and new style politics and budgeting. With this dichotomy as a pivot, an attempt is made to (1) identify the distinctive and contrasting elements of old and new; (2) analyze the persistence of process politics and the challenge of systems politics; (3) assess the preparedness of politics and budgeting for the systems view; and (4) develop a taxonomy of political process deficiencies. P. v. T.

A69-23351
THE NEW SYSTEMS BUDGETING.
Bertram M. Gross (Wayne State University, Detroit, Mich.).
(American Political Science Association, Annual Meeting, Washington, D. C., Sept. 3-7, 1968.)
Public Administration Review, vol. 29, Mar.-Apr. 1969, p. 113-137. 90 refs.

Examination of the "breakthrough" announced in 1965 by President Johnson in methods of planning, programming, and budgeting (PPB) throughout the Federal Government and its agencies - the methods being called collectively the planning-programming-budgeting system (PPBS). Based on the traditional methods of budgeting, PPBS is new in that it employs systems analysis. Topics treated include the new microeconomics and nonpartisan "Technipol" politics. The works of Schick (1966) and Gross (1965) are among those considered. P. v. T.

M9 GENERAL

A69-17831 #
THE MANAGEMENT OF LARGE EUROPEAN INTERNATIONAL PROGRAMMES.
A. H. C. Greenwood (British Aircraft Corp., Ltd., London, England).
(Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Management in the Aerospace Fields Meeting, Montreal, Canada, July 8, 1968.)
Canadian Aeronautics and Space Journal, vol. 15, Jan. 1969, p. 1-7.

Review of the Concorde civil supersonic transport and the Jaguar Military Strike/Trainer Anglo/French programs. The governmental and industrial administrative organizations are reviewed, and the political, economic, and industrial factors relating to the initiation and fulfilment of these joint ventures are assessed. The advantages and disadvantages of such forms of international collaboration are studied, and the future pattern of European international program management is considered. The paper concludes with an opinion of the future impact of European aviation industrial collaboration upon the military and civil aircraft markets throughout the world. (Author)

A69-10506 * #
THE NASA UNIVERSITY PROGRAM.
Francis B. Smith (NASA, Washington, D. C.).
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper 68-95413. 15 p.

Discussion of the major role the universities have played in developing the U. S. Aerospace programs and of their essential part in future aeronautical and space research. It is believed that mission-oriented government agencies must have a close and direct relationship with universities and that universities are dependent on this relationship to maintain a viable link with the rapidly advancing world of science and technology. Neither project-oriented nor institution-oriented research alone provides an adequate basis for productive relationships between governmental agencies and universities. The innovative approaches used by NASA through the Sustaining University Program are making possible important advancements, both in aerospace research and in the universities themselves. It is believed that the principles underlying NASA's total university program offer a sound approach to government-university relationships in a wide variety of social-political environments. P. v. T.

A69-10468 #
THE MANAGEMENT OF A NATIONAL SPACE PROGRAM.
Robert C. Seamans, Jr.
United Nations, Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, Austria, Aug. 14-27, 1968, Paper. 51 p.

Review of the policy, program, and administrative decisions which characterize the activity of NACA and the ensuing NASA, during the last decade. The steps that were taken to evolve from an amalgamation of aeronautical research, missile research, and development organizations into a cohesive team are outlined. Particular attention is given to the program planning for a manned lunar landing, the organizational activities involved in a lunar mission, the management procedure, and program flexibility and responsibility. V. P.

DDC ENTRIES

M1 PROGRAM & PROJECT MANAGEMENT

RECONNAISSANCE STUDY - SUBSISTENCE MANAGEMENT.
Logistics Management Inst Washington D C

Jun 69, 57p
Contract SD-271

Descriptors: (*Armed Forces operations, Food dispensing), Food, Armed Forces supplies, Armed Forces procurement, Material control, Kitchens, Kitchen equipment+ supplies, Efficiency, Cost effectiveness, Personnel management, Transportation.
Identifiers: *Food services management.

The reconnaissance study examines the whole area of subsistence management but concentrates particularly on elements of subsistence support, such as procurement, direct vs. contract operations, distribution, transportation, storage, and related activities. Immediate action recommendations call for (1) better methods of accumulating present costs, (2) consolidated messes in those areas where such action would not interfere with operational capabilities, (3) the use of Brand Name resale items as part of contingency stocks, (4) the increased emphasis on Food Management Teams, (5) the preparation of a regional annual food plan, (6) the elimination of reimbursement among the Services for subsistence, (7) the expansion of the cyclical master menu, (8) development of more flexibility at the local mess level, and (9) the presentation of several alternatives which could lead to a degree of systems management in the subsistence function.
AD-692 405

OPTIMUM ALLOCATION OF RESOURCES IN THE PURCHASE OF SPARE PARTS AND/OR ADDITIONAL SERVICE CHANNELS.
Research rept.,
California Univ Berkeley Operations Research Center
Leonard J. Jacobson. May 69, 39p* Rept no. ORC-69-12
Contract Nonr-3656 (18), Grant NSF-GK-1684

Descriptors: (*Management engineering, Inventory analysis), (*Spare parts, *Inventory control), Procurement, Maintenance, Warehouses, Replacement theory, Stock level control, Money, Time, Mathematical models, Queueing theory, Probability, Algorithms, Efficiency, Optimization, Operations research.
Identifiers: *Allocation models, Failure rate, Repair shop capacity.

The manager of a warehouse and repair facility must decide how many spares of each of many different part types to store in inventory so as to insure, in some sense, the efficiency of the facility's operations. Having a budget constraint, and using information on the failure rates of the parts, the relative importance of each part of the other parts, and the amount of time necessary to repair a failed part, the manager must decide how to optimally allocate his resources in purchasing these spare parts. Furthermore, he might also consider allocating some of his funds in an effort to increase the capabilities of his repair facility. The paper first formulates various mathematical models and then, in each case, shows how one can obtain a sequence of undominated solutions. (Author)
AD-692 395

PROJECT MODELLING: A TECHNIQUE FOR ESTIMATING TIME-COST-PERFORMANCE TRADE-OFFS IN SYSTEM DEVELOPMENT PROJECTS,
Rand Corp Santa Monica Calif
E. V. W. Zschau. Jul 69, 104p Rept no. RM-5304-PR
Contract F44620-67-C-0045

Descriptors: (*Air Force operations, Systems engineering), (*Management planning, Mathematical programming), Time studies, Cost effectiveness, Performance (Engineering), Decision making, Scheduling, Specifications, Design, Mathematical models.
Identifiers: *Project planning, Decomposition method.

A methodology is outlined for estimating time-cost-performance tradeoffs to help in planning weapon system development projects. Techniques are given for developing a mathematical programming model of the project, solving it, and performing marginal analyses on it to derive the desired tradeoff possibilities. Models are based on the major design equations of the system being developed, the time precedence relationships among the major project activities, and estimates from responsible project personnel of the time and resources needed to do various technical jobs. Information derived from the models should be useful not only in the initial planning stages of a project, but during the actual development work when effective replanning is necessary. Consideration is also given to certain important methodological problems that must be solved to make the project modeling approach operational.
AD-691 810

RESOURCE ALLOCATION TECHNIQUES FOR LOGISTICS MANAGEMENT,
Rand Corp Santa Monica Calif
Craig C. Shelbrooke. Jul 69, 16p Rept no. P-4139

Descriptors: (*Logistics, *Cost effectiveness), Air Force, Mathematical models, Management planning, Optimization, Maintenance, Operational readiness, Armed Forces budgets, Armed Forces procurement, Armed Forces supplies, Inventory analysis, Stock level control, Queueing theory, Numerical analysis, Partial differential equations, Computers.
Identifiers: *Allocation models, Bayes theorem.

The paper describes a portion of the RAND logistics effort in resource allocation during the past six years. The objective is to demonstrate that the family of models discussed here (six in all) is applicable to all military services, to hardware contractors who are serious about integrated logistics support (ILS), and to non-military users such as the airlines. It appears that some of the models and many of the research techniques are even general enough to be used by medium-sized companies engaged in manufacturing and distribution. The models themselves might be described as supply related, but in the broadest sense to include maintenance and operations. They address the problems of asset management including what and when to buy, where to place materiel, and where and when to repair. Each model runs on a computer, but the computer time is kept to a minimum because each model is analytic; none use simulation. The models are all normative in the sense that they can analyze alternative support postures. (Author)
AD-690 847

RECENT DEVELOPMENTS IN STOCHASTIC INVENTORY THEORY.
Technical rept.,
Stanford Univ Calif Dept of Operations Research
Donald L. Iglehart. Jun 69, 20p Rept no. TR-4
Contract N00014-67-A-0112, Grant NSF-GP-8790

Descriptors: (*Inventory analysis, Stochastic processes), Dynamic programming, Mathematical models, Optimization, Costs.
Identifiers: Stochastic inventory theory, Stationary analysis.

The paper surveys recent work in stochastic inventory theory. Areas emphasized include multi-product models, multi-echelon models, and stationary analysis of inventory models. Some concluding remarks are made about the future of the subject. (Author)
AD-690 490

STATIONARY PROPERTIES OF A TWO-ECHELON INVENTORY MODEL FOR LOW DEMAND ITEMS,
Rand Corp Santa Monica Calif
R. M. Simon. May 69, 43p Rept no. RM-5928-PR
Contract F44620-67-C-0045

Descriptors: (*Inventory control, Mathematical models), Replacement theory, Maintenance, Cost effectiveness, Supply depots, Probability density functions, Optimization, Procurement, Armed forces supplies.
Identifiers: Poisson density functions.

The paper gives a description of a two-echelon inventory model with exact expressions for the stationary distributions of stock-on-hand and backorders at the various facilities. Items are completely recoverable, completely consumable (non-recoverable), or recoverable with a positive condemnation rate. Repair is performed at base or depot levels, and repair and transportation times are assumed to be determiniatic. The model applies to items with reasonably low base demand rates since it is assumed that the bases use continuous review replenishment policies and the depot uses a general policy unless the item is completely recoverable. A solution algorithm enables the construction of a cost-effectiveness curve of inventory investment vs. expected base backorders under an optimal allocation. Because the model yields exact results, it can be used to check other techniques that are developed to treat positive condemnation rates or low demand consumable items.
AD-689 765

USES AND LIMITATIONS OF SYSTEMS ANALYSIS,
Rand Corp Santa Monica Calif
Clay Thomas Whitehead. Sep 67, 182p Rept no. P-3683

Descriptors: (*Management engineering, *Decision making), Systems engineering, Department of Defense, Industries, Analysis, Behavior, Theory, Organizations, Logistics, Programming (Computers), Predictions.
Identifiers: *Systems analysis.

The study considers the role of systems analysis in a strategic planning decision process in an organization. Its focus is on the interaction of systems analysis with the broader decision process, including the bargaining environment. Two case studies are included from the Department of Defense, with the thesis as a whole is being considered applicable to

commercial and non-profit organizations as well as governmental. (Author)
AD-689 053

SCHEDULING JOBS ON A COMPUTER (CURSORY REVIEW OF THE 'STATE-OF- THE-ART').
Technical rept.,
Army Tank-Automotive Command Warren Mich Managemant and Data Systems Directorate
Irwin F. Goodman. May 69, 22p Rept no. S-1005

Descriptors: (*Data processing systems, Scheduling), Computers, Time sharing, Management planning.

A cursory review of the state-of-the-art regarding the scheduling of jobs on computers is accomplished based upon a review of visits to ten computer facilities. During each visit the following type of information was gathered: How, operationally are the jobs scheduled on a day-to-day basis on the computer.; What sort of Mathematical logical theory is currently being used or contemplated for in the future for determining optimum sequencing of jobs on the computer.; What is the philosophy of management regarding the scheduling of jobs on the computer. (Author)
AD-688 048

WHERE IS SYSTEMS ANALYSIS,
Center for Naval Analyses Arlington Va
C. J. DiBona. 3 Apr 68, 14p Rept no. CNA-Research Contrib-30
Contract N00014-68-A-0091
Presented at the Military Operations Research Symposium (20th), held at National Bureau of Standards, Gaithersburg, Md., 12 Dec 67.

Descriptors: (*Armed forces procurement, Systems engineering), Decision making, Mathematical prediction, Mathematical models, Uncertainty, Mathematical analysis, Costs, Effectiveness, Management planning, Armed forces research, State-of-the-art reviews.
Identifiers: *Systems analysis.

The paper is a discussion of the present state of systems analysis.
AD-686 702

CAPITAL ACCUMULATION IN A RISKLESS ENVIRONMENT,
California Univ Los Angeles Western Management Science Inst
Steven A. Lippman. Mar 69, 25p Rept no. WMSI-Working Paper-148

Descriptors: (*Economics, Theory), (*Money, Decision making), Environment, Probability, Time, Predictions, Mathematical models.
Identifiers: Investments, Capital accumulation, Risk, Income.

We consider the problem of making an investment decision at the beginning of each of a finite number N of time periods so as to maximize VN, the total cash on hand at time N when we have one dollar on hand at time zero. We assume that the same set of investment projects is available in each time period and that each project is riskless and divisible. The rate of growth of VN and the relaxation of the stationarity assumption are also investigated. In the last section, we assume that the income stream of each project is non-positive except for its last period. By taking a suitable transformation of the income stream and defining the internal rate of return in terms of this transformed income stream, we are able to derive the results obtained when the income stream was assumed to be nonnegative. (Author)
AD-686 396

A DISCRETE PROBABILITY CHANCE-CONSTRAINED CAPITAL BUDGETING MODEL.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
R. F. Byrne, A. Charnes, W. W. Cooper, and K. O. Kortanek. 1 Jan 69, 70p Rept no. RR-155
Contract Nonr-760 (24), Grant NSF-GK-5181
Prepared in cooperation with Pittsburgh, Univ., Pa., Texas Univ., Austin, and Cornell Univ., Ithaca, N. Y.

Descriptors: (*Linear programming, Management planning), (*Management planning, *Budgets), Probability, Decision theory, Costs, Statistical distributions, Multivariate analysis.
Identifiers: Integer programming, Duality theory, Capital budgeting.

Aspects of the duality theory for semi-infinite programming are extended to fields with properties of non-Archimedean order. Emphasis is on nonstandard semi-infinite programming problems in Hilbert's Field. The ideas of regularization are generalized to include powers of the relative infinites in terms of the indeterminates. (Author)
AD-686 394

PROBLEMS IN LIFE CYCLE SUPPORT COST ESTIMATION,
General Electric Co Santa Barbara Calif Tempo
A. S. Goldman. 1969, 11p
Availability: Pub. in Naval Research Logistics Quarterly, v16 n1 p111-120 Mar 69.

Descriptors: (*Logistics, Costs), (*Maintenance, Costs), Decision making, Budgets, Cost effectiveness, Inventory control, Weapon systems, Spare parts, Naval equipment, Strategic materials, Army equipment, Theory.
Identifiers: *Life cycle costing.

The objective of the study is to attempt to outline the difficulties in costing out support. These problems dominate the discussion: The influence of management decisions of users (divided into policy and operating decisions) on support costs. The partitioning of the support system in which depot level support (supply, overhaul, and repair) is guided by criteria which are only indirectly related to operational support and end unit effectiveness. Support system stocks of resources are influenced by initial investiment in support, which tends to be insensitive to many types of individual engineering design decisions. (Author)
AD-685 586

WORKLOAD FORECASTING AND ALTERNATIVE OVERHAUL SCHEDULES FOR NAVY AIRCRAFT AND AIRCRAFT ENGINES.
Logistics Management Inst Washington D C

Jan 69, 115p
Contract SD-271

Descriptors: (*Naval aircraft, Maintenance), (*Aircraft engines, Maintenance), Scheduling, Naval operations, Predictions, Management planning.
Identifiers: Forecasting.

The report proposes systems to improve the planning, scheduling, and management of the overhaul and repair of Navy aircraft and aircraft engines. General descriptions of these systems are provided as management overviews for the Naval Air Systems Command executive level. An appendix is provided which (1) describes in general terms the overall process by which the overhaul and repair of aircraft and engines are planned and scheduled and (2) indicates those particular processes which are addressed by the report. (Author)
AD-685 280

HEDGING AND FORECASTING IN INVENTORY MANAGEMENT.
Technical rept.,
Florida Univ Gainesville Dept of Industrial and Systems Engineering
James F. Burns. Mar 69, 45p* Rept no. THEMIS-UF-TR-3 AROD-T-1:25-RT
Contract DAHC04-68-C-0002

Descriptors: (*Management planning, *Inventory control), (*Inventory control, Mathematical programming), Production control, Stock level control, Replacement theory, Decision theory, Linear programming, Industrial psychology, Consumption.
Identifiers: Themis project.

A multi-echelon production-distribution system is one in which the user and the producer of an item are linked together by one or more intermediate suppliers (for example, a chain of depots in a military system or a chain of distributors in an industrial system). An Industrial Dynamics simulation model exhibits a strong characteristic of such a system -- namely, small variations in the consumption rate at the user level can produce much larger variation in the order rate reaching the producer or factor level. This amplification is due to the ordering policies of the intermediate suppliers who convert the usage rate into a factory order rate. The ordering policy used in the simulation model for each intermediate level was reduced to a linear decision rule involving three parameters. Signal flow graph and transform techniques were then used to express the amplification effect in terms of these parameters for certain changes in the underlying usage rate at the bottom of the system. (Author)
AD-684 810

AN EMPIRICAL STUDY IN CHARTING THE INTERRELATIONSHIPS IN THE PROJECT MANAGEMENT ENVIRONMENT.
Master's thesis,
Air Force Inst of Tech Wright-Patterson AFB Ohio School of Engineering
Robert E. Bowen. Sep 67, 215p Rept no. GSM/SM/67-3

Descriptors: (*Management planning, Problem solving), Personnel management, Operations research, Industrial research, Industrial psychology, Organizations, Performance (Human), Management control systems, Effectiveness, Theses.

Implementing the program management concept has its advantages, but it can also create some problems. Most of these problems can be resolved by developing an organizational framework, explicitly depicting the interrelationships required to get the job done. Further, resolving 'deliberate conflict' by using a negotiation process can provide flexibility in the organization and can assist in integrating the authority of the program and functional managers. These resolutions must remain within the desired organization framework, however. The Management Responsibility Guide is a technique which may aid management in developing the required organization framework and may also provide a means of resolving conflict. (Author)
AD-684 538

DOD SYSTEMS AND EQUIPMENT PRODUCTION PLANNING GUIDE.
Logistics Management Inst Washington D C

Feb 69, 170p*
Contract SD-271

Descriptors: (*Department of Defense, Logistics), (*Management planning, Production), Handbooks, Decision making, Production control, Systems engineering, Design, Manufacturing methods, Test methods, Installation, Standards, Costs, Quality control.
Identifiers: *Logistics management, *Management information systems, Criteria.

The document describes typical project management activities and key decision points essential to effective production planning for the manufacture, test, delivery, installation, demonstration, and industrial support of DoD systems and equipment. It outlines a systems approach to the planning and integration of systems and equipment design, production, and logistics support. It describes typical relationships among project management and subordinate elements throughout the equipment life cycle. The guide is intended for use by production specialists and other interfacing program personnel. It is designed to assist production managers in defining plans, actions, and interfaces tailored to specific programs. (Author)
AD-683 678

PROGRAM BUDGETING AS AN ANALYTICAL TOOL FOR SCHOOL DISTRICT PLANNING,
Rand Corp Santa Monica Calif
S. A. Haggart, and M. B. Carpenter. Feb 69, 7p
Rept no. P-4031

Descriptors: (*Education, Management planning), Budgets, Effectiveness, Decision making.
Identifiers: School districts, School district programs, Program budgeting.
AD-683 251

A PRODUCTION MANAGEMENT OPERATING SYSTEM SIMULATION.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Charles H. Kriebel. Jan 69, 84p* Rept no. RR-150
Contract Nonr-760 (24)

Descriptors: (*Management planning, Production control), (*Production control, Teaching methods), Inventory control, Decision making, Scheduling, Predictions, Computer programs, Simulation.
Identifiers: *Production management, Sales, Computerized simulation.

The report gives a detailed description of a modular simulation model of a production management operating system. The description includes a case discussion of the plant environment, detailed operating data for the computer model, a variable dictionary and Fortran IV (level G) program listing, operating instructions for implementing the simulation with OS/360, and a commentary on practical experience using the simulator. The simulation is completely self-contained and provides a system for exploratory analysis in sales forecasting, aggregate planning or production smoothing, scheduling and inventory control, and management information reporting. (Author)
AD-681 717

A MANAGERS GUIDE TO THE ACQUISITION OF DOD SYSTEMS AND EQUIPMENT.
Logistics Management Inst Washington D C

Jan 69, 41p*
Contract SD-271

Descriptors: (*Department of Defense, Logistics), Handbooks, Flow charting, Management planning, Production control, Optimization, Cost effectiveness, Decision making, Budgets.
Identifiers: *Logistics management, *Management information systems.

The guide identifies and provides summary descriptions of the key activities, decision points, and responsibilities essential to effective acquisition management. It is oriented toward identifying the management functions that are needed to successfully accomplish most acquisition programs. It describes the interrelationships among system design, production, and logistics support that must be established and maintained to provide a basis for acquiring the most effective systems and equipment in terms of performance, readiness, and cost. It emphasizes the conduct of trade-offs and the recording of alternative approaches and supporting rationale for the selected concepts and plans. The guide is designed as an executive brief for both government and industry. (Author)
AD-681 700

WATERSHEDS AND INFORMATION FLOW.
Interim rept.,
Air Force Office of Scientific Research Arlington Va Directorate of Information Sciences
Rowena W. Swanson. Jan 69, 29p* AFOSR-69-0082TR

Descriptors: (*Technical information centers, *Information retrieval), Data processing systems, Management engineering, Data, Standards, Reviews.
Identifiers: *National information systems, National Standard Reference Data System.

The report discusses a plan for a national information system. It reviews the findings of a survey of scientific and technical data activities in the United States. Comments are included on prevalent problem areas involved in system and network construction that concern personnel, finances, equipment, administration, input data, and coordination. Organizational structures and human competencies appear over-extended in terms of their abilities to effectively accommodate evolving data management and data handling needs. Alleviation of the situation does not appear imminent, since the individuals and organizations affected are only beginning to recognize its gravity. Characteristics of the NBS National Standard Reference Data System are described in exemplification of an information system network format. Information flow is considered with respect to physical, physiological, and behavioral potentials and limitations. The successful realization of complex information networks is considered possible. (Author)
AD-681 130

NEW DIRECTIONS IN ORGANIZATION THEORY,
Rand Corp Santa Monica Calif
Timothy Hallinan. Sep 68, 15p Rept no. P-3936

Descriptors: (*Management engineering, Theory), Organizations, Sociology, Economics, Bibliographies, Cost effectiveness, Optimization, Decision making, Management planning, Environment.
Identifiers: Organizational theory.
AD-675 167

NEWS REPORT.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Abraham Charnes, William W. Cooper, J. K. Devoe, David B. Learner, and Lawrence Light. 17 May 68, 26p Rept no. RR-126
Contract Nonr-760 (24)
Prepared in cooperation with Northwestern Univ., Evanston, Ill. Systems Research Group Contracts Nonr-1228 (10), DA-31-124-ARO (D)-322. Rept. SRM-205.

Descriptors: (*Management planning, *Commerce), Public relations, Distribution (Economics), Cost effectiveness, Decision making, Scheduling, Regression analysis, Mathematical models.
Identifiers: NEWS (New Product Early Warning System), New product early warning system, Advertising.

A set of recursive relations called NEWS (for New-Product Early Warning System) is here presented in its own right as a separable part of the DEMON System for marketing new products. NEWS is designed to distinguish the variables and relations that are usually of interest for market-planning by reference to data availability and the decisions that might be made advertising promotions and product properties. Other uses and possible further extensions are examined by reference to planning media schedules and related dynamic applications. (Author)
AD-674 408

M2 CONTRACT MANAGEMENT

CONTRACTOR BASIC ACCOUNTING RECORDS AS A DATA SOURCE FOR COST ANALYSIS,
Rand Corp Santa Monica Calif
Joseph String, Jr. Jun 69, 15p Rept no. P-4115

Descriptors: (*Management planning, Costs), Analysis, Contracts, Feasibility studies, Classification, Identification, Effectiven
Identifiers: Aerospace programs, Comparison, Contractors.

An aerospace program cost reporting system is currently under investigation. It is based on the facts that (1) all major aerospace contractors use electronic data processing and magnetic tape to store cost accounting records, and (2) contractors may submit copies of basic cost accounting tapes in lieu of paper reports. The paper reports preliminary results of this investigation. First, current reporting systems are characterized; second, they are contrasted with a reporting system based on magnetic tape; and third, some experimental efforts with accounting tapes are summarized. (Author)
AD-689 290

DEFENSE PROCUREMENT OUTCOMES IN THE INCENTIVE CONTRACT ENVIRONMENT.
Technical rept.,
Stanford Univ Calif Dept of Industrial Engineering
David Leigh Belden. May 69, 159p Rept no. TR-69-2
Doctoral thesis.
Availability: Paper copy available from Department of Industrial Engineering, Stanford, Calif. 94305.

Descriptors: (*United States Government, Contracts), Department of Defense, Costs, Labor, Government procurement, Theses, Wages.
Identifiers: Profits, *Incentive contracts, *Fixed price contracts, *Cost plus contracts, *Cost overruns.

The primary purpose of the thesis research is to examine the results of the dramatic shift by the Department of Defense and the National Aeronautics and Space Administration in the use of contracts containing automatic cost and profit sharing incentives. The use of capital and labor resources, over time, are compared for defense and other large firms. The outcomes of a large sample of recently completed incentive and fixed-fee contracts are analyzed. Extra-contractual factors are postulated and discussed. (Author)
AD-688 561

RECONNAISSANCE STUDY OF SERVICE CONTRACT METHODOLOGY.
Logistics Management Inst Washington D C

Apr 69, 53p
Contract SD-271

Descriptors: (*Contracts, *Army procurement), Sources, Selection, Operations research, Maintenance, Military requirements, Costs.

The report examines and discusses a number of general problems in the area of contracting for support services. Most of the study findings and recommendations are applicable for supply contracts as well, since the DoD generally follows the same policies and procedures for procurement of both supplies and services. Briefly, the discussion concentrates on source selection and proposed evaluation problems in contracting for services. The major recommendation of the report is that the DoD categorize services into discrete functional classes and assign specific classes of services to the military departments, which will act as the single DoD advisor on assigned classes. The military departments will then be in a position to specialize in assigned areas and to accumulate detailed information for use by others in writing and administering service contracts. (Author)
AD-687 451

AN EVALUATION OF INCENTIVE CONTRACTING EXPERIENCE,
Rand Corp Santa Monica Calif
I. N. Fisher. 1969, 22p
Availability: Pub. in Naval Research Logistics Quarterly, v16 n1 p63-83 Mar 69.

Descriptors: (*Government procurement, Costs), United States Government, Costs, Performance (Human), Efficiency, Statistical analysis.
Identifiers: *Incentive contracts.

The study examines the effectiveness of incentive contracts as a means for controlling defense procurement costs. The study considers the various effects that incentive contracts may have on both contractors' performance and contract costs, and presents empirical evidence suggesting that these contracts may not have accomplished their intended goal of increased efficiency and lower procurement costs. (Author)
AD-685 117

DEFENSE INDUSTRY PROFIT REVIEW.
Logistics Management Inst Washington D C

Mar 69, 179p*
Contract SD-271

Descriptors: (*Industries, Money), (*Management planning, Contracts), (*Department of Defense, Industrial procurement), Department of Defense, Reviews, Money, Motivation, Optimization, Costs, Correlation techniques, Control, Statistical data, Military requirements.
Identifiers: Profits.

The Department of Defense (DoD) must employ contracting policies and methods that create an environment for profit opportunities. Just where the profit range should fall is a matter of judgment and a point on which there probably will always be disagreement. This report is intended to serve as a partial basis for DoD management's assessment of the adequacy of defense business profits, as part of their continuing evaluation of contracting policies and methods. (Author)
AD-685 071

THE CONTRACT AUDIT/CONTRACT ADMINISTRATION INTERFACE.
Logistics Management Inst Washington D C

Mar 69, 101p
Contract SD-271

Descriptors: (*Department of Defense, Logistics), (*Management engineering, Contracts), Organizations, Interfaces, Friction, Problem solving, Interactions, Effectiveness, Management control systems.
Identifiers: Recommendations, Defense Contract Audit Agency, Defense Contract Administration Services, *Logistics management.

The report evaluates a number of problems identified in the Department of Defense (DoD) contract audit/contract administration interface area. The study confirmed the existence of some serious, continuing problems in the working relationships among DoD procuring contracting officers (PCOs), administrative contracting officers (ACOs) and contract auditors of the Defense Contract Audit Agency (DCAA). The report recommends that the DCAA and the Defense Contract Administration Services (DCAS) be merged organizationally in an agency reporting to the Secretary of Defense in two steps. It also recommends that the ASPR be revised to simplify the flow of documents in the field review of contractors' proposals and to reestablish the ACO as the 'team captain' of the field contract pricing team. (Author)
AD-683 679

M3 RESEARCH & DEVELOPMENT

COMPARISON OF 1968 DOD AND NATIONAL SURVEYS OF COMPENSATION PAID TO SCIENTISTS AND ENGINEERS.
Management analysis rept.,
Office of the Director of Defense Research and Engineering Washington D C Office for Lab Management
E. M. Glass. 30 Jul 69, 54p Rept no. ODDRE-MAR-69-3

Descriptors: (*Department of Defense, Scientific research), (*Scientific personnel, *Wages), Job analysis, Manpower studies, United States, Statistical analysis, Distribution, Classification.
Identifiers: Scientific degree levels, Management information systems, *Salaries.

The study compares the characteristics and compensation of Department of Defense (DoD) activities in research, development, test and evaluation with those reported in the 1968 National Survey of Compensation conducted by the Columbus Laboratories of the Battelle Memorial Institute (BMI). The information in both surveys was as of 15 September 1968, and essentially the same data elements were used. Characteristics such as salary patterns, degree levels, disciplines, occupations and maturity are compared, together with their interrelationships. (Author)
AD-694 940

JOINT PROGRAM OF THE CIVIL SERVICE COMMISSION AND THE DEPARTMENT OF DEFENSE TO RESOLVE PROBLEMS IN THE MANAGEMENT OF DEFENSE IN-HOUSE LABORATORIES.
Management analysis memo.
Office of the Director of Defense Research and Engineering Washington D C Office for Lab Management
30 Jun 69, 69p Rept no. ODDRE-MAM-69-2

Descriptors: (*Department of Defense, Laboratories), (*Laboratories, Management engineering), United States government, Personnel management, Recruiting, Budgets, Education, Training.
Identifiers: Overtime, Travel expenses, Civil Service Commission.

Contents: Tabulation of problems, recommendations and action agents; Presentation: CSC/DoD joint program to resolve problems in the management of department of defense in-house laboratories; and Status of problems identified by the Civil Service Commission.
AD-694 449

DECISIONMAKING UNDER AGGREGATE UNCERTAINTY: THE ENGINEERING DECISIONS IN A SYSTEM DEVELOPMENT PROJECT.
Final rept.,
California Univ Los Angeles Graduate School of Business Administration
Frederic S. Timson. Jun 69, 220p
Contract N00014-67-A-0111
Doctoral thesis.

Descriptors: (*Systems engineering, *Decision making), Models (Simulations), Probability, Contracts, Statistical analysis, Correlation techniques, Theses.
Identifiers: Incentive contracts.

The report presents a technique for analyzing decisionmaking under aggregate uncertainty. The technique is constructed in such a way that it can be used as a tool to evaluate policies for decisionmaking or to evaluate the influence of multiple incentive contracts. The technique combines engineering and decisionmaking analyses into a simulation model of system development. The simulation model has two parts: a model of a system development project; and a model of the decision and information processes in system development. (Author)
AD-693 213

OVERCOMING BARRIERS IN R AND D COUPLING,
Office of Aerospace Research Arlington Va Office of Scientific and Technical Information
Arthur A. Ezra. 14 Mar 69, 15p Rept no. OAR-69-0005

Descriptors: (*Research program administration, Manufacturing methods), Management engineering, Specifications, Costs, Scheduling, Symposia.
Identifiers: *Technological change, Transfer of technology.

The purpose of the paper is to share the lessons learned from a real-life effort of seeking practical applications of new technology resulting from research efforts under an ARPA contract. The paper identifies numerous obstacles that must be overcome by a proponent of a technological application; the manufacturing barriers of specifications costs, cost accounting systems and risks in innovation; the engineering barriers of configuration control, schedule and costs; the management barriers of risks and costs; development barriers of training and technology transfer, procurement and survival. The impact of these barriers is that the innovation process is a complex, multidisciplinary one, requiring many diverse skills - marketing, selling, finance, law and even psychology. Certain implications are pointed out for R and D management; the need for

proper timing of the coupling process, the proper selection of the technology to be coupled, the need for the organization of the coupling programs, and a need for testing of some hypotheses. (Author)
AD-686 430

A STUDY OF MANAGEMENT CRITERIA NECESSARY FOR EFFECTIVE DIRECTION OF RESEARCH ACTIVITIES,
General Dynamics/Astronautics San Diego Calif
C. E. Burgi. 25 Apr 62, 43p Rept no. GDA-AE62-0448
PORTIONS OF THIS DOCUMENT ARE ILLEGIBLE. SEE INTRODUCTION SECTION OF THIS ANNOUNCEMENT JOURNAL FOR CFSTI ORDERING INSTRUCTIONS.

Descriptors: (*Research program administration, *Management engineering), Budgets, Selection, Commerce.

This paper is directed towards the top management people who know their organizations must engage in substantial research, but who feel the need for better yardsticks by which to measure this increasingly costly segment of their business. Five criteria will be presented which are essential to the successful management of research. The criteria to be presented are; setting corporate research objectives, selection of research projects, determination of research budgets, evaluating research results, and utilizing an integrated approach to research. (Author)
AD-686 427

DIRECTED RESEARCH CENTERS AND PUBLIC PROBLEMS,
Rand Corp Santa Monica Calif
Daniel J. Alesch. Feb 69, 6p Rept no. P-4040

Descriptors: (*Research program administration, Management engineering), Technical information centers, Problem solving, Public relations, Sociometrics, Environment, Leadership, Effectiveness.
Identifiers: Directed research centers.

The paper holds that research centers which develop analytic mechanisms and conduct policy research into community and environmental problems should give attention to learning how to bring about institutional and process changes requisite to implementing the mechanisms and deciding on policy options. (Author)
AD-684 521

OAR PROGRESS '68.
Office of Aerospace Research Arlington Va

1968, 143P* Rept no. OAR-68-0007
Availability: Paper copy available from Superintendent of Documents (GPO), Washington, D. C. 20402 $1.75.
Descriptors: (*Air force research, Reviews), Research program administration, Physics, Management engineering, Manpower, Logistics, Nuclear physics, Chemistry, Mathematics, Electronics, Materials, Mechanics, Energy conversion, Geophysics, Atmosphere, Astronomy, Biology, Medicine, Psychology, Social sciences, Environment.
Identifiers: Defender project, Vela Uniform.

The report covers aspects of management, including finances, manpower, logistics, research information activities, and planning, and highlights some OAR achievements in the Defense Research Sciences and Exploratory Development. A bibliography is included to aid readers in obtaining detailed information on the research programs described. (Author)
AD-679 700

PLANNING RESEARCH AND DEVELOPMENT AND EXPERIMENTAL DESIGN WORK,
Foreign Technology Div Wright-Patterson AFB Ohio
M. L. Bashin. 28 Dec 67, 140p Rept no. FTD-HT-23-1247-67
Edited trans. of mono. Planirovanie Nauchno-Issledovatelskikh i Opytno-Konstruktorskikh Rabot, Moscow, 1966 p1-215.

Descriptors: (*Management planning, *Research program administration), Experimental design, Production control, Scheduling, Economics, Budgets, Costs, USSR.
Identifiers: Translations.

The problems of planning scientific research (henceforth research and development) and experimental design work have not as yet been satisfactorily illuminated in the economic literature. The book by M. L. Bashin is an attempt to correlate the experience in planning and accounting of the leading research and development and design organizations of those machine-building and instrument-making industries which are now profit-oriented. This experience pertains to planning and accounting of research and development and experimental design work. The book examines the sequence of developing and approving long-range and annual project plans, typical project stages, methodology of topic project planning, and calculations of the labor time which goes into the work and production estimates. It also illuminates the problems of planning the work of programming departments, laboratories, pilot plants, information services of research institutes and design offices. The book utilizes the available instruction materials.
AD-677 022

PLANNING PHENOMENA-ORIENTED RESEARCH IN A MISSION-ORIENTED ORGANIZATION.
Air Force Office of Scientific Research Arlington Va
Howard M. Vollmer, John K. Galt, Guilford L. Hollingsworth, Donald C. Pelz, and William J. Price. Sep 68, 59p Rept no. AFOSR-68-1759
Papers presented at the Institute on Research Administration (12th) 24-27 Apr 67, Washington, D. C.

Descriptors: (*Scientific research, *Management planning), Research program administration, Scientific personnel, Decision making, Interactions, Social communication, Mobility, Motivation, Symposia.

This volume represents presentations and associated remarks and commentary on scientific research planning from an organizational standpoint. Various aspects considered included research goals and products, strategy of operation; choice of program areas and projects; staff recruitment and career development; relationships to corporate and organizational structure; decision making processes; research communication; and motivation of scientists and engineers.
AD-675 991

AEROSPACE RESEARCH, UNITED STATES AIR FORCE,
Office of Aerospace Research Arlington Va
Currie S. Downie, and Ernest P. Luke. Jun 68, 31p* Rept no. OAR-68-0013

Descriptors: (*Information retrieval, *Problem solving), (*Research program administration, *Documentation), Scientific research, Industrial research, Dissemination, Selection, Identification, Social communication, Management planning, Abstracts.
Identifiers: Technological barriers documentation project, Selective dissemination of information, Investments, Transfer of technology.

The paper discusses the underlying theory and describes the activities, results and future plans of the Technological Barriers Documentation Project. The project consists of a study which tests the hypothesis that the pay-off from an agency's investment in research can be increased by systematically identifying its technological barriers, by describing such barriers on one-page Problem Resumes and selectively disseminating them to knowledgeable scientists as 'knowledge want-ads.' Procedures under development provide for analysis of capability objectives into successively lower levels of subobjectives, the definition of technological problems involved in attaining such objectives, and documentation of both the objective breakdown structure and individual problems. The prime function of the Problem Resume is to trigger establishment of direct person-to-person contact between the individual or organization with the problem and scientists who are the sources of knowledge for its solution. A repository of such problem resumes can also serve as an additional source of information for research planning. (Author)
AD-674 050

M4 MANAGEMENT TOOLS & TECHNIQUES

CRITERIA FOR EVALUATING FORECASTS.
Technical rept.,
Northwestern Univ Evanston Ill Dept of Psychology
Thomas W. Milburn. May 69, 25p Rept no. TR-5
Contract N00014-67-A-0356

Descriptors: (*Predictions, Analysis), Management planning, Advanced planning, Probability.
Identifiers: *Evaluation, *Forecasting.

Planners find it necessary to make projections of trends or other forecasts of probable events or changes from the present state. Sometimes they must emphasize improbable events relevant to their missions. The growing interest in forecasting suggests a need for principles or criteria for better as contrasted with worse ones. Some criteria are suggested along with an example which appears to be consonant with them. (Author)
AD-696 091

A RESEARCH METHODOLOGY FOR STUDYING COMPLEX SERVICE SYSTEMS,
California Univ Los Angeles Western Management Science Inst
Rosser T. Nelson. 1969, 13p Rept no. WMSI-Reprint-64
Contract N00014-69-A-0200
Availability: Pub. in AIIE Transactions on Industrial and Engineering Research and Development, v1 n2 p97-105 Jun 69.

Descriptors: (*Management engineering, Production control), (*Production control, Operations research), Systems engineering, Management planning, Management control systems, Scheduling, Decision making, Costs, Labor, Inventory, Quality control, Decision making, Mathematical models, Industrial research.

The article describes a research methodology for studying problems of analysis, design, and control in complex service systems. The proposed methodology is based upon the total systems point of view in the sense that the physical and decision-making aspects of the service system are considered and are related to environmental factors. An example is included to illustrate the methodolo-

gy as a way to approaching real problems. While field studies may be expected to present challenges because of the identification, modeling, and data requirements which will arise in actual situations, the methodological plan presented here focuses attention on these requirements as an integral part of systems analysis. (Author)
AD-696 019

PERSPECTIVES ON INFORMATION PROCESSING IN MANAGEMENT INFORMATION SYSTEMS.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Charles H. Kriebel. Aug 69, 32p Rept no. RR-171
Contract Nonr-760 (24)
Presented at the Scandinavian-G.S.I.A. Joint Faculty Seminar, Aspenasgarden, Lerum (Sweden), 3-16 Aug 69.

Descriptors: (*Data processing systems, *Management engineering), Mathematical models, Decision making, Man-machine systems, Numerical analysis, Information theory, Computers, Problem solving, Symposia, Management engineering.
Identifiers: *Management information systems, Computer models, Dialectic problem solvers, Evaluation.

There is considerable speculation concerning the role, direction, and characteristics of information processing systems in the future. There is a gap between the technological state of the art in computer-based information processing and today's applied practices in management information systems. In this essay information systems in the future are given a considerably expanded role in managerial problem solving processes, augmenting and in some cases replacing the analytical skills which today reside in the decision maker. Some implications of this argument are illustrated by a discussion of DPS (dialectic problem solver), an interactive man-computer decision analysis model currently under development. (Author)
AD-695 767

WHY NOT GO NUMERICAL CONTROL.
Special publication,
Edgewood Arsenal Md
Lyle L. Dauber. Sep 69, 15p* Rept no. EA-SP-600-6

Descriptors: (*Manufacturing methods, Control systems), (*Automation, Numerical methods and procedures), Reviews, Economics, Time, Quality control, Management planning, Industrial training, Programming (Computers), Optimization.
Identifiers: Floor space, Paperwork.

The report gives a number of reasons why one should adopt numerical control (N/C) manufacturing techniques. (Author)
AD-695 611

ON MODELING A PLANNING, PROGRAMMING AND BUDGETING SYSTEM,
Naval Postgraduate School Monterey Calif
Carl R. Jones. 15 Jul 69, 49p Rept no. NPS-55Js9072A

Descriptors: (*Management planning, *Economics), (*Management control systems, Mathematical models), Budgets, Costs, Cost effectiveness, Sociology, Research program administration, Decision making, Transformations (Mathematics), Advanced planning, Operations research.
Identifiers: PPB (Planning Programming and Budgeting), Planning programming and budgeting, *Management information systems, Cost estimating.

A model of the planning and programming aspects of a PPB system is formulated. It incorporates the component parts of a PPB system structure and the multiplicity of benefit and cost measures, both commensurable and incommensurable, so associated. Decision rules characterizing the choice of an efficient program package are derived. These rules indicate the usefulness of a program package numeraire. The comparative statics technique is applied and efficiency substitution and benefit effects derived. A program package cost-benefit function is developed. For a given program package decision, the expansion-contraction paths are also derived and characterized. (Author)
AD-694 921

A MODEL OF ADMINISTRATIVE CHOICE IN THE SYSTEMS ANALYSIS ENVIRONMENT.
Research rept.,
Naval Postgraduate School Monterey Calif
Carl R. Jones. 10 Jun 69, 34p Rept no. NPS-55Js9061A

Descriptors: (*Systems engineering, Management planning), (*Management planning, Decision making), Mathematical models, Costs, Cost effectiveness, Sociology, Numerical analysis, Economics, Budgets, Operations research.

In this paper a mathematical model of governmental decisionmaker's problem of choice from a set of alternative cost-benefit streams is presented. The choice objects, costs, and benefits are considered to be defined physically/socially in time, in space, and by a state-of-nature. The decisionmaker's preferences with respect to costs and benefits are represented by a utility index of the standard type except that costs are assumed to be a disutility-causing entity. The set of alternatives from which choice is described is represented by a cost-benefit surface. The decision problem is formulated as a maximization problem. Decision rules are derived. Comparative statics results are given. (Author)
AD-694 920

THE ECONOMICS OF COMPUTERS,
Rand Corp Santa Monica Calif
William F. Sharpe. Aug 69, 581p* Rept no. R-463-PR
Contract F44620-67-C-0045
Availability: Paper copy available from The Rand Corporation, 1700 Main St., Santa Monica, Calif. 90406. $4.00.

Descriptors: (*Computers, *Economics), (*Data processing systems, Management engineering), (*Management engineering, Industrial procurement), Computer storage devices, Input-output devices, Programming (Computers), Decision making, Management planning, Scheduling, Cost effectiveness, Time sharing.

The book attempts to provide and apply a set of concepts from economic theory that may prove valuable to those who are now or may become decisionmakers in the selection, financing, and/or use of computers. Only theory relevant for such decision-makers is presented here. It deals with microeconomic theory: the focus is on the small (industry, firm, computer) and not the large (gross national product, consumer price index, unemployment). The book is intended to appeal to three groups of readers: those who now manage or set policy for computer installations, students in programs leading to degrees in computer science (or information science), and economists interested in the computer industry.
AD-694 764

DELPHI AND VALUES,
Rand Corp Santa Monica Calif
Nicholas Rescher. Sep 69, 21p Rept no. P-4182

Descriptors: (*Management planning, Decision making), (*Decision making, Group dynamics), (*Group dynamics, Attitudes), Reasoning, Reaction (Psychology), Public opinion, Performance (Human), Questionnaires, Feedback.
Identifiers: Delphi method.

The Delphi method is a process for the controlled elicitation of group opinion by an iterative use of questionnaires with a selective feedback of earlier group responses as an informational input for later reference by group members. Recently the suggestion has begun to be voiced that Delphi might also prove a useful tool of inquiry in the area of values, in contrast to its traditional applications in the factual domain. The primary aim of the present discussion is to sketch some theoretical background considerations for the application of the Delphi method in the value area.
AD-693 002

SYSTEMS ANALYSIS FOR DEVELOPMENT DECISIONS: APPLICABILITY, FEASIBILITY, EFFECTIVENESS AND EFFICIENCY,
Rand Corp Santa Monica Calif.
Yehezkel Dror. Aug 69, 28p Rept no. P-4159
Presented at U. S. National Conference on Public Administration (1969), Miami, Fla. 19-21 May 69. Prepared in cooperation with The Hebrew Univ., Jerusalem (Israel).

Descriptors: (*Foreign aid, Decision making), (*Decision making, Analysis), Operations research, Management planning, Government (Foreign), Feasibility studies, Effectiveness.
Identifiers: *Developing countries, Systems analysis.

Systems analysis is more and more regarded as an important aid for improving crucial development decisions. Aid-giving organizations located in modern countries especially seem to be eager both to use systems analysis in making program decisions and to help development countries to use systems analysis for their own decision processes. Evaluation of the potential uses of systems analysis for development decisions involves examination of four distinct issues: criteria for applicability to development decisions of systems analysis in its present and near-future-state-of-the-art; requisites of feasibility of systems analysis; requirements of effectiveness; and conditions of efficiency.
AD-693 001

COMPUTERIZING A GOVERNMENT DATA SYSTEM: A MANAGEMENT OVERVIEW OF THE STEPS REQUIRED AND THE TIME NEEDED.
Mitre Corp Bedford Mass
M. V. Jones. Jul 69, 50p Rept no. MTR-877 ESD-TR-69-279
Contract F19628-68-C-0365

Descriptors: (*Management planning, Data processing systems), (*Data processing systems, United States Government), Automation, Computers, Computer personnel, Time studies, Training, Government procurement, Programming (Computers), Information retrieval, Decision making, Costs.

The paper discusses what must be done and how long it will take to convert a manual data system in a government agency to a computerized system. Seven major tasks are identified, 78 steps involved in carrying out these major tasks are enumerated, and 50 considerations that can affect the time required for accomplishing these tasks in specific cases are described. Minimum and maximum time

estimates for completing each major task are also included. The paper aims to provide a relatively brief, non-technical overview of the topics covered and is addressed primarily to the thousands of managerial personnel at all levels of government (federal, state, and local) who have had relatively little prior experience with electronic computers. (Author)
AD-692 784

THE NEW ROLE OF MANAGEMENT INFORMATION SYSTEMS.
Data management series no. 3,
Mitre Corp Mclean Va
John A. Gosden, and Eugene Raichelson. Apr 69, 26p Rept no. MTP-332
Contract F19628-68-C-0365
See also Data management series no. 2, AD-684 707.

Descriptors: (*Management planning, *Data processing systems), Programming (Computers), Reviews.
Identifiers: *Management information systems, Data management.

The report discusses the problems of 'fourth generation' information systems and treats two basic problems: diversity of users and diversity of data. The paper concludes with a description of the characteristics needed in future information systems. (Author)
AD-691 834

NON-CONTINUOUS ACTIVITIES IN PROJECT -- AND PARPS.
Master's thesis,
Missouri Univ Columbia Dept of Industrial Engineering
Richard Lawrence Weber. Jan 69, 321p

Descriptors: (*Programming languages, Management planning), Networks, Linear programming, Probability, Decision making, Scheduling, Instruction manuals, Theses.
Identifiers: PERT, PARPS programming language, Network flows.

The development of a method by which the usual PERT/CPM project analysis technique can be extended to include both continuous and non-continuous activities in the same project network is described. By permitting the analyst or researcher to type each activity as to whether it is to be worked on any day (continuous) or only on working days (non-continuous) a greater degree of reliability, accuracy, and realism can be attained when such is determined to be necessary. Algorithms and procedures are presented with which existing computer assisted project analysis systems can be readily modified to permit the inclusion of non-continuous activities. Also described is the development of PARPS, a computer programming language for project analysis that is directed towards the researcher, but will also find application in virtually all areas of endeavor. Twenty-five commands are provided with which the user can control the processing of his network. Activities can be specified as continuous or non-continuous and durations can be deterministic or probabilistic. (Author)
AD-691 820

IMPROVED FORECASTING METHODS FOR ITEM MANAGEMENT AND MAINTENANCE MANPOWER REQUIREMENTS,
Rand Corp Santa Monica Calif
George S. Fishman. Jun 69, 109p Rept no. RM-6010-PR
Contract F44620-67-C-0045

Descriptors: (*Supply depots, Management planning), (*Stock level control, Predictions), (*Maintenance personnel, *Manpower studies), Maintenance, Time studies, Replacement theory, Jet engines, Aircraft, Mathematical prediction, Flow charting, Programming (Computers), Algorithms.

The paper gives a description of improved methods for forecasting depot maintenance manpower requirements and depot item repair levels to facilitate effective long-term depot logistics planning. These methods improve on those currently used by making better use of available data and by being more responsive to specialized needs such as providing item forecasts for a single weapon system when the item is common to more than one weapon system. Flowcharts and computing algorithms are provided to assist in implementing the suggestions without a major revamping of the present system. The study concludes with a suggestion for comparing the present method with the proposed method based on real-life data.
AD-691 809

TASK EXTENSION AND RESPONSIBILITY FOR RESOURCE DEPLOYMENT.
Working paper,
California Univ Berkeley Human Factors in Technology Research Group
E. R. F. W. Crossman. Mar 69, 15p Rept no. HFT-69-3
Contract N00014-67-A-0114

Descriptors: (*Management engineering, *Job analysis), Statistical analysis, Measurement, Personnel management, Time studies, Management control systems, Costs, Decision making, Supervision, Distribution theory.
Identifiers: *Resource allocations, Range (Extremes).

Methodological deficiencies revealed in field trials of Jaques' Time-span of Discretion instrument, point to a need to include resource-deployment as a second dimension in measuring level of organizational work. This can be achieved by estimating resources allocated by the superior to performance of each task for which task-extension is measured. Unitary models and estimators of resource-deployment span and capacity are developed for proposed use in further field studies. These promise better statistical properties than time-span of discretion. It is suggested that mean resource-deployment rate may be estimated as the aggregate of five distinct types of resource rate, viz., own time, workforce time, rate of overhead service usage, rate of raw material usage, cost of capital equipment, cost of maintaining inventory. (Author)
AD-691 759

PROGRAM BUDGETING AND EXECUTIVE COMMITMENT,
Rand Corp Santa Monica Calif
J. B. Benton, and A. J. Tenzer. Jul 69, 39p Rept no. P-4143

Descriptors: (*Management planning, Urban areas), (*Budgets, Urban areas), Reviews, Costs, Decision making, Organizations, Systems engineering.
Identifiers: New York (New York), *Program budgeting systems.

The City of New York was assisted in the development and implementation of program-budgeting systems in several City agencies. One of the objectives of that effort was to discover whether the theory of program budgeting could be reduced to practice in a large metropolitan city, and if so, how. (Author)
AD-691 479

PROSIM V: STUDENT MANUAL.
Technical rept.,
Auburn Univ Ala
Joe H. Mize, Bruce E. Herring, Clifford L. Cook, and Charles R. White. Jun 69, 62p Rept no. THEMIS-AU-T-4
Contract DAAH01-68-C-0296

Descriptors: (*Industrial training, Production control), (*Production control, Simulation), Programming (Computers), Mathematical models, Cost effectiveness, Decision making, Training devices.
Identifiers: *Computerized simulation, Themis project, *PROSIM 5 production system simulator.

A production system simulator has been developed which is capable of simulating a wide variety of realistic manufacturing environments. The simulator is used as an aid in teaching the concepts of designing production control systems and as a research vehicle for investigating various aspects of control theory for production systems. This report contains the Student Manual which explains to the student how the simulator works and how it can be used to assist him in the design of a complex control system. (Author)
AD-691 449

THE DELPHI METHOD, II: STRUCTURE OF EXPERIMENTS,
Rand Corp Santa Monica Calif
B. Brown, S. Cochran, and N. Dalkey. Jun 69, 137p* Rept no. RM-5957-PR
Contract F44620-67-C-0045

Descriptors: (*Management planning, Decision making), (*Decision making, *Group dynamics), Reasoning, Reaction (Psychology), Predictions, Public opinion, Questionnaires, Feedback, Performance (Human), Test construction (Psychology), Iterations.
Identifiers: *Delphi method, Judgment.

The paper presents compilation of the experimental designs, questionnaires, and resulting group response data representing the raw materials of a Rand evaluation of Delphi procedures. (Analysis of the data and major conclusions are presented in AD-690 498). The Delphi technique uses an anonymous, orderly program of sequential individual interrogations, with controlled feedback from respondents between interrogations, to elicit and refine group judgments where exact knowledge is unavailable. Different experiments tested different hypotheses. One was designed to compare the relative accuracy of group answers obtained by the Delphi questionnaire-feedback method with those obtained by a structured, face-to-face discussion.
AD-690 988

A GENERAL SIMULATION MODEL FOR INFORMATION SYSTEMS: A REPORT ON A MODELLING CONCEPT,
Rand Corp Santa Monica Calif
A. L. Buchanan, and R. B. Waina. Jul 69, 18p Rept no. P-4140

Descriptors: (*Management engineering, Data processing systems), Simulation, Systems engineering, Design.
Identifiers: Information systems, *Management information systems.

The report is concerned with the design of large-

scale management information systems (MIS). A special design methodology was created, along with a design model to complement it. The purpose of the paper is to present the model.
AD-690 839

PPBS AND FUTURE TRENDS IN OUR SOCIETY,
Mitre Corp Bedford Mass
Michael J. Flax. Apr 69, 28p Rept no. M69-51-1

Descriptors: (*Management planning, Sociology), Advanced planning, Transformations, Classification, Organizations, Budgets, Interactions, Automation, Human engineering, Predictions.
Identifiers: PPBS (Planning Programming Budgeting System), Planning programming budgeting systems, Technological change, Systems analysis, Trends.

A relationship is shown between some of the predicted changes in our society caused by rapid technological progress and the introduction of PPBS (Planning, Programming, Budgeting System) throughout government. A description of some of these changes and a review of the history and functional evolution of the PPBS methodology is provided as background for a discussion of this relationship. (Author)
AD-690 531

THE DELPHI METHOD: AN EXPERIMENTAL STUDY OF GROUP OPINION,
Rand Corp Santa Monica Calif
Norman C. Dalkey. Jun 69, 88p Rept no. RM-5888-PR
Contract F44620-67-C-0045

Descriptors: (*Management planning, Decision making), (*Decision making, *Group dynamics), Predictions, Reasoning, Reaction (Psychology), Public opinion, Information theory, Iterations, Feedback, Accuracy, Effectiveness, Performance (Human), Learning, Verbal behavior, Errors, Probability, Special functions (Mathematical), Statistical data, Statistical distributions.
Identifiers: *Delphi method, Judgment.

A report of results of experimentation on the effectiveness of Delphi procedures, which incorporate anonymous response, iteration and controlled feedback, and statistical group response to elicit and refine group judgments where exact knowledge is unavailable. In spring 1968, Rand conducted 10 experiments using over 150 university students. Questions related to almanac-type information. Results showed that controlled feedback, compared with face-to-face discussion, improved the accuracy of group estimates, thus validating the use of Delphi techniques in areas of partial information. Insight was gained into group information processes. A meaningful estimate of the accuracy of a group response to a given question can be obtained by combining individual self-rating of competence on that question into a group rating. Adding this result to an observed relationship between accuracy and standard deviation makes it possible to attach accuracy scores to the products of a Delphi exercise. (Author)
AD-690 498

THE ESSENTIALS OF A PLANNING-PROGRAMMING-BUDGETING SYSTEM,
Rand Corp Santa Monica Calif
P. A. DonVito. Jul 69, 21p* Rept no. P-4124

Descriptors: (*Management planning, Decision making), Management control systems, Budgets, Operations research, Costs, Cost effectiveness, Documentation, Data, Predictions, Models (Simulations).
Identifiers: Project management, Objectives, Resource allocations, Management information systems.

The Planning Programming Budgeting System (PPBS) is an integrated management system that places emphasis on the use of analysis for program decision making. The purpose of PPBS is to provide management with a better analytical basis for making program decisions, and for putting such decisions into operation through an integration of the planning, programming and budgeting functions. (Author)
AD-690 394

DECISIONS ABOUT DATA COLLECTION STRATEGIES,
George Washington Univ Alexandria Va Human Resources Research Office
Eugene A. Cogan. Jun 69, 16p Rept no. HUMRRO professional paper-23-69
Contract DAHC19-69-C-0018
Presented at the Annual U. S. Army Operations Research Symposium (8th), Durham, N. C., May 69.

Descriptors: (*Operations research, Information retrieval), Decision making, Costs, Effectiveness, Confidence limits, Simulation, Data.
Identifiers: Data acquisition.

'Pure' academic research rules on data collection do not apply directly to operations research. OR data collection should be viewed in terms of objective, cost, and effectiveness. For the model formulation objective, proper data strategies emphasize multiple views of the operating system to identify the 'relatednesses' to be depicted. For the objective of estimating parameters or testing predictions, bias, precision, and level of confidence of results are effectiveness concepts to be balanced against cost. Decision and utility theory, sensitivity analysis, and sequential analysis apply to OR data collection strategies and employ operational parameters to define data needed and, hence, minimize costs.
AD-689 948

ON THE DECISION MATRIX AND THE JUDGMENT PROCESS: A DEVELOPMENTAL DECISION EXAMPLE,
Rand Corp Santa Monica Calif
Benjamin Pinkel. Jun 69, 17p Rept no. P-3620

Descriptors: (*Systems engineering, Decision making), Management planning, Scheduling, Cost effectiveness, Mission profiles, Reliability, Mechanical properties, Installation.
Identifiers: *Judgement.

The paper points out that in a decision task involving the selection of a system from a number of competing systems, a single number or figure of merit is usually inadequate to describe the merits of a given system and that a matrix of numbers representing the important parameters is required. A description is given of the parameters in this matrix. Rules are given for reducing the matrix and for drawing conclusions from the reduced matrix. An example involving a developmental decision is included to illustrate the process. (Author)
AD-689 797

INVENTORY SYSTEMS WITH IMPERFECT DEMAND INFORMATION.
Technical rept.,
Decision Studies Group Palo Alto Calif
Richard C. Morey, and Donald L. Iglehart. 1 May 69, 39p
Contract Nonr-4457 (00)

Descriptors: (*Inventory, *Costs), (*Data transmission systems, Errors), Impact, Management engineering, Mathematical models, Statistical processes, Inventory analysis, Stock level control.
Identifiers: Requisition errors, Inventory models, Dynamic programming.

The report studies inventory systems in which demand information can be incorrectly transmitted from the field to the stockpoint. Keypunching errors and improper preparation of requisitions are examples of the types of causes that may give rise to such a situation. The main effect of such errors is that supply points may process demands which are considerably different than the true demands, and hence increase the total systems operating cost. A study of the increased cost as a function of the variability of the errors is necessary to determine the amount and direction of effort that should be spent to deal with them. Two main types of analyses are presented. The first is a dynamic programming approach which determines the optimal ordering procedure for the general n period problem. A second approach has used a steady state analysis to assess the dollar impact of the errors. (Author)
AD-689 562

REDUCING LEAD-TIME THROUGH IMPROVED TECHNOLOGICAL FORECASTING: SOME SPECIFIC SUGGESTIONS FOR MORE USEFULLY FORMULATED PROJECTIONS OF TECHNOLOGICAL AVAILABILITY,
Rand Corp Santa Monica Calif
David Novick, and Frederick S. Pardee. Jun 69, 17p Rept no. P-4122

Descriptors: (*Lead time, *Management engineering), Urban planning, National defense, Military engineering, Uncertainty, Problem solving, Scheduling, Analysis.
Identifiers: *Technological lags.

In new military systems, the development time required must be made as short as possible. In examining this critical problem, perhaps it is useful to first attempt to separate those elements of lead-time of an organizational or administrative nature from those primarily associated with technology. This paper recognizes the importance of administrative lag factors, but focuses its attention on suggestions for more realistically estimating technological lags. (Author)
AD-689 246

EVOLUTIONARY OPERATION: A METHOD FOR INCREASING INDUSTRIAL PRODUCTIVITY,
Harvard Univ Cambridge Mass Graduate School of Business Administration
George E. P. Box, and Norman R. Draper. Apr 69, 249p* AFOSR-69-1532TR
Contract AF 49 (638)-1608
Prepared in cooperation with Wisconsin Univ., Madison, Dept. of Statistics.
Availability: Paper copy available from John Wiley and Sons, Inc., 605 Third Avenue, New York, N. Y. 10016.

Descriptors: (*Management engineering, *Industrial production), (*Production control, *Statistical processes), Operations research, Philosophy, Training, Analog systems, Statistical distributions, Mathematical models, Optimization, Feedback, Organizations, Automation.
Identifiers: Operation evolutionary.

The book is about the philosophy and practice of evolutionary operation (EVOP), a simple but powerful statistical tool with wide application in industry. Experience has long shown that statistical methods, sometimes quite sophisticated in character, can be of great value in improving the efficiency of laboratory and pilot-plant investigations made by specially trained chemists and en-

gineers. What originally motivated the introduction of EVOP, however, was the idea that the widespread and daily use of simple statistical design and analysis during routine production by process operatives themselves could reap rewards. (Author)
AD-688 974

PROJECT MANAGEMENT USING GPSS/360,
Florida Univ Gainesville Dept of Industrial and Systems Engineering
Philip E. Hicks, and Suresh K. Jain. May 69, 25p
Rept no. THEMIS-UF-TR-19 AROD-T-1:32-RT
Contract DAHC04-68-C-0002

Descriptors: (*Management engineering, *Computer programs), Simulation, Digital computers, Mathematical models.
Identifiers: Themis project, GPSS (General Purpose Simulation System), General purpose simulation system, Project management, Network analysis (Management), Management information systems.

A number of examples of complex procedence relationships in project management networking are considered employing the GPSS/360 program. The examples illustrate that GPSS/360 can be employed to develop project management information not readily attainable employing standard project management programs. (Author)
AD-688 954

PREDICTION-ALLOCATION-MATHEMATICAL MODELING MAINTAINABILITY (M) QUANTITATIVE DESIGN PARAMETERS,
Genge Industries Inc Sherman Oaks Calif Scientific and Consulting Div
George W. Dauncey. 1969, 21p

Descriptors: (*Management planning, Logistics), (*Maintenance, Mathematical models), Predictions, Decision making, Cost effectiveness, Operational readiness, Malfunctions, Probability density functions.
Identifiers: Integrated logistics support.

This presentation is a challenging Maintainability (M)Engineering discipline technique which provides a dynamic and simplified method for management visibility of the maintenance action times and frequency of maintenance tasks involved in the establishment of the M quantitative constraints required to be designed into system equipments. The prediction technique is used to develop the M design parameters of means and maximum times and the standard deviation of maintenance times requirements and allocations to be designed into equipments to satisfy the operational mission downtime constraints imposed or desired. The effectivity of the predictions of these basic parameters is shown to be the basic requirements for the establishment of the Integrated Logistic Support (ILS) planning and its associated minimization of the life cycle support costs. The visibility provides a basis for evaluation of the M/ILS demonstrations and the design changes effects on the M constraint requirements. (Author)
AD-688 723

PLANNING AND SCHEDULING JOBS ON A COMPUTER USING CPM.
Final rept.,
Army Tank-Automotive Command Warren Mich Management and Data Systems Directorate
Irwin F. Goodman. May 69, 55p Rept no. S-1006

Descriptors: (*Inventory control, Vehicles), (*Programming (Computers), Scheduling), Time sharing, Flow charting, Time, Algorithms, Sequences, Optimization, Army operations, Assembling.
Identifiers: Computer scheduling, CPM (Critical path method), Critical path method, Job scheduling, PERT.

The report presents by example the application of the critical path method (CPM) for the planning and scheduling of jobs on a computer. It provides a step-by-step preparation and analysis of a network representation of a computer system application. Also included is a glossary of relevant terms and a fairly comprehensive bibliography on the subject of CPM/PERT, scheduling and sequencing. (Author)
AD-688 652

GUIDEBOOK FOR SYSTEMS ANALYSIS/COST-EFFECTIVENESS.
Arinc Research Corp Annapolis Md
Mar 69, 451p* Rept no. 800-01-01-957
Contract DAAB07-68-C-0056

Descriptors: (*Army operations, Systems engineering), (*Cost effectiveness, *Handbooks), Management planning, Decision making, Effectiveness, Models (Simulations), Mathematical programming, Queueing theory, Game theory, Statistical analysis.
Identifiers: *Systems analysis.

The purpose of the guidebook is to provide Army personnel with a text and reference material in Systems Analysis and Cost-Effectiveness. It is intended for those technical, scientific, management, and administrative personnel who are responsible for preparing information, making decisions or reviewing decisions made by others regarding lifecycle cost, system effectiveness (availability, dependability, capability), or technical feasibility of a system or equipment at any phase in its life cycle. It is immediately useful to personnel who are familiar with a system or equipment under study but are not familiar with the methodology and techniques of Systems Analysis and Cost-Effectiveness. (Author)
AD-688 154

THE ROLE OF COST DISCOUNTING IN WEAPON SYSTEMS EVALUATION.
Technical rept.,
Army Materiel Systems Analysis Agency Aberdeen Proving Ground Md
William Baker, and Robert Williamson, Jr. Mar 69, 41p Rept no. AMSAA-TR-2

Descriptors: (*Department of Defense, Industrial procurement), (*Contracts, Economics), Department of Defense, Cost effectiveness, Costs, Weapon systems, Decision making, Advanced planning, Management planning.
Identifiers: *Cost discounting, Interest rate of return, Expenditures, Cost analysis, Forecasting.

This study describes the utility of discounting in cost effectiveness studies and develops appropriate discount rates. The study begins with the theory of discounting describes the uses of discount theory in weapon systems evaluations, and introduces a method for computing the discount rate. (Author)
AD-688 121

NETWORK/BLOCK DIAGRAM REPRESENTATION OF A REQUISITIONING SYSTEM.
Technical rept.,
Army Tank-Automotive Command Warren Mich Managemant and Data Systems Directorate
Irwin F. Goodman. May 69, 31p Rept no. S-1004
PORTIONS OF THIS DOCUMENT ARE ILLEGIBLE. SEE INTRODUCTION SECTION OF THIS ANNOUNCEMENT JOURNAL FOR CFSTI ORDERING INSTRUCTIONS.

Descriptors: (*Inventory control, Models (Simulations)), Effectiveness, Time studies, Lead time, Management planning.
Identifiers: Requisitioning, Computerized simulation.

A network/block diagram representation of a requisitioning system has been prepared as part of an overall larger effort to model, quantify, and simulate a computerized inventory management system. Also parameters for establishing and evaluating the model are presented. (Author)
AD-688 047

RANKING AND SELECTION METHODS FOR CAPITAL INVESTMENT DECISIONS IN PRIVATE AND PUBLIC SECTORS,
Rand Corp Santa Monica Calif
Keith V. Smith. May 69, 46p Rept no. P-4060

Descriptors: (*Management planning, Economics), (*Cost effectiveness, Decision making), Commerce, Uncertainty, Money, Statistical analysis.
Identifiers: Ranking, Fixed investment, Finance.

The paper surveys and illustrates various analytical methods for assisting the capital investment decision process. Attention is limited to capital investments made by firms--referred to collectively as the private sector--and those made by governmental organizations within the public sector. Even though such a dichotomization is not complete--as witnessed by the governmental regulation, and sometimes control, of private entities--it does serve as a usable framework for the various methodologies discussed in this paper. The scope of private investment decisions includes new fixed assets, replacement of existing fixed assets, make or buy decisions, buy or lease decisions, new product lines, and changes in distribution systems. Alternatively, governmental investment decisions could involve such public areas as health, education, transportation, recreation, and even space.
AD-687 335

ALTERNATIVE APPROACHES TO USING PEACETIME AND WARTIME COSTS IN LIMITED WAR COST-EFFECTIVENESS STUDIES,
Rand Corp Santa Monica Calif
John J. Surmeier. Apr 69, 14p Rept no. P-4052

Descriptors: (*Limited war, Cost effectiveness), Replacement theory, Statistical data, Standards, Decision making, Probability, Correlation techniques, Logistics.

The paper presents some of the problems discovered in the use of peacetime and/or wartime costs in limited war cost-effectiveness studies. Two basic costing methods currently in practice and how they relate to the question of peacetime and wartime costs are discussed. An additional costing method for limited war systems analysis is suggested. (Author)
AD-687 334

AN INDUSTRIAL DYNAMICS APPROACH TO FACILITIES PLANNING,
Florida Univ Gainesville Dept of Industrial and Systems Engineering
James F. Burns, and Philip E. Hicks. Apr 69, 32p
Rept no. THEMIS-UF-TR-14 AROD-T-1:27-RT
Contract DAHC04-68-C-0002

Descriptors: (*Industrial production, *Management planning), Mathematical models, Nonlinear systems, Feedback, Decision making, Simulation, Programming (Computers), Theses.
Identifiers: Themis project, Computerized simulation, Capital equipment, Industrial dynamics.

A computer simulation model is developed for testing alternative facilities planning policies within an industrial environment. A field survey was conducted to determine the structure and information inputs of facilities planning policies representative of current industrial practice. The company

modelled in the study is a hypothetical medium-sized manufacturing plant, typical of the firms contacted in the field survey. Six major model sectors were considered: production-distribution, capital equipment, facilities planning, system evaluation, customer ordering, and exogenous input. Within the capital equipment sector, five distinct facility types were also recognized: production equipment, storage space, office space, plant space, and auxiliary facilities. Many interactions often suppressed by analytic models were explicitly considered; for example, customer ordering was partially dependent upon the company's delivery delay rather than being specified exogenously. The policies tested varied in terms of whether facilities were ordered as needed or periodically, whether or not a minimum order was specified, and whether need for facilities was based upon the current or the anticipated level of business. Using after-tax corporate profits as the criterion variable, the best policies were those that expanded capacity in anticipation of future growth. Policies responding only to existing needs stagnated because the current business level was limited by present capacity while capacity expansion required a substantial increase in current business. (Author)
AD-687 299

USE OF COMPUTERIZED COST MODELS IN COST ANALYSIS,
Electronic Systems Div L G Hanscom Field Mass
Walter G. Hartung. Apr 69, 43p Rept no. ESD-TR-69-120

Descriptors: (*Costs, *Mathematical prediction), (*Armed forces operations, Costs), Cost effectiveness, Mathematical models, Regression analysis, Programming (Computers), Armed forces budgets, Maintenance, Armed forces procurement, Armed forces supplies, Manpower studies, Military training, Jet transport planes.
Identifiers: Cost analysis, Computerized simulation.

Cost analysis is a major function within the Department of Defense. Its application in cost effectiveness studies of large and complex military systems frequently requires the use of computerized cost models. This paper defines a cost model and discusses several important considerations in the development and use of such models. Models most useful in cost studies have all of the required computational algorithms, possess definitions for each cost element covered, and have the capability to differentiate variations in cost among several systems by considering parameters peculiar to each system. A system operating cost model for military jet transport aircraft is presented both to illustrate the format and content of a cost model and to indicate the applications of such models to cost studies. The input parameters and cost estimating relationships of this model are presented. (Author)
AD-686 746

EVALUATION AS FEEDBACK IN THE PROGRAM DEVELOPMENT CYCLE,
Rand Corp Santa Monica Calif
Marjorie L. Rapp. Apr 69, 8p Rept no. P-4066
Presented in part at the Association of California Administrators in Compensatory Education, Los Angeles, Calif., 23-26 Mar 69 and at the Conference of Miller Mathematics Specialists, San Diego, Calif., 23-25 Mar 69.

Descriptors: (*Education, Management planning), Feedback, Experimental design.
Identifiers: Evaluation.

Evaluation used as a navigational aid can keep a program headed for its destination at the same time that it corrects for the necessary deviations from the projected course, not all of which could have been anticipated during the planning stages. By freeing us from over-commitment to our original idea which, after all, can be no more than an attempt to reach a destination by a specified route, process-oriented evaluation wisely used can ensure that we correct as we proceed and help us to arrive at our goals. (Author)
AD-686 412

ON A NEW APPROACH TO THE ANALYSIS OF STATIONARY INVENTORY PROBLEMS,
Massachusetts Inst of Tech Lexington Lincoln Lab
Oscar A. Z. Leneman, and Frederick J. Beutler.
Mar 69, 16p
Prepared in cooperation with Michigan Univ., Ann Arbor. Sponsored in part by Advanced Research Projects Agency, Washington, D. C. and National Aeronautics and Space Administration, Washington, D. C.
Availability: Pub. in Naval Research Logistics Quarterly, v16 n1 p1-15 Mar 69.

Descriptors: (*Inventory control, *Statistical processes), Mathematical models, Stock level control, Distribution functions.
Identifiers: *Stationary processes.

The paper demonstrates that the theory of stationary point processes is a useful tool for the analysis of stationary inventory systems. In conventional inventory theory, the equilibrium distributions for a specified inventory policy are obtained, whenever possible, by recursive or limiting procedures, or both. A different and more direct approach, based on stationary point processes, is proposed here. The time instants at which stock delivery is effected are viewed as points of the stationary point process, which possesses uniform statistical properties on the entire real axis; hence the equilibrium statistics of the inventory process can be calculated directly. In order to best illustrate this approach, various examples are given, including some that constitute new results. (Author)
AD-685 118

DATA MANAGEMENT SYSTEMS SURVEY.
Data management series no. 2,
Mitre Corp Mclean Va
James P. Fry, Samuel Bramson, David C. Fried, Walter P. Grabowsky, and John Jeffries, Jr. Jan 69, 198p* Rept no. MTP-329
Contract F19628-68-C-0365
See also Data management series no. 1, AD-684 706.

Descriptors: (*Data processing systems, State-of-the-art reviews), Programming languages, Information retrieval, Maintenance, Digital computers.
Identifiers: *Data management.

This report presents the results of a survey of salient characteristics of a representative set of state-of-the-art data management systems. It is part of an effort to identify the state-of-the-art capabilities of data management systems for third-generation computer systems. Section I of the report includes general descriptions of the systems surveyed and establishes the terminology for logical organization of data used in the survey. Section II describes the capabilities surveyed and presents the survey results in tabular format. (Author)
AD-684 707

SURVEY OF MANAGEMENT INFORMATION SYSTEMS AND THEIR LANGUAGES.
Data management series no. 1,
Mitre Corp Mclean Va
James P. Fry, and John A. Gosden. May 68, 32p*
Rept no. MTP-313
Contract AF 19 (628)-5165
See also Data management series no. 2, AD-684 707.

Descriptors: (*Data processing systems, State-of-the-art reviews), Programming languages, Digital computers.
Identifiers: *Data management.

Significant data management systems available on third-generation hardware are considered. Three types of user interface are discussed: Own DML (Data Management Language) Systems, Forms Controlled Systems and POL Embedded Systems. Typical systems within each category are presented and their salient features are highlighted. (Author)
AD-684 706

APPLICATIONS OF MATHEMATICAL CONTROL THEORY TO ACCOUNTING AND BUDGETING. I. THE CONTINUOUS WHEAT TRADING MODEL.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Yuji Ijiri, and Gerald L. Thompson. Jan 69, 26p*
Rept no. RR-152
Contract Nonr-760 (24)

Descriptors: (*Budgets, Management control systems), (*Management planning, Wheat), Inventory control, Costs, Calculus of variations, Boundary value problems, Hamiltonian, Optimization.
Identifiers: *Control theory,. *Accounting, Maximum principle, Two point boundary value problems, Switching functions.

A brief introduction to continuous mathematical control theory is presented. A model having two state variable accounts, cash and wheat, is defined by means of differential equations. Adjoint functions, the Hamiltonian function, and the optimum (bang-bang) policy are derived. Interpretations of the Hamiltonian and switching functions and a numerical example are given. The results are extended to the case where transaction costs and spoilage costs are incurred. (Author)
AD-684 079

PLANET: PART V. REPORTS AND ANALYSIS LIBRARY,
Rand Corp Santa Monica Calif
B. J. Voosen, S. Glaseman, R. J. Young, and Judy Judd. Jan 69, 304p Rept no. RM-4663-PR
Contract F44620-67-C-0045

Descriptors: (*Air Force operations, Logistics), (*Programming (Computers), Logistics), Data processing systems, Mathematical programming, Cost effectiveness, Air Force equipment, Computer programs, Simulation, Armed forces transportation, Performance (Engineering), Maintenance, Management planning, Instruction manuals.
Identifiers: *PLANET (Planned Logistics Analysis and Evaluation Technique), Planned logistics analysis and evaluation technique, Computerized simulation, Resource allocation.

The report is a user's and programmer's manual for the 12 programs comprising the Reports and Analysis Library of PLANET (Planned Logistics Analysis and Evaluation Technique), a logistics prediction and estimating tool designed to help the manager of a system to understand its operation and to find a rationale for allocating resources efficiently. PLANET consists of four computer models that simulate Air Force logistics systems in a single or multibase environment. Part 1 of the Memorandum contains a brief description of each of the reports and the SIMSCRIPT instructions needed to initialize any of the report programs. Part 2 is the library of programs, including the initialization requirements, a program description oriented to the skilled SIMSCRIPT programmer, and a listing of the SIMSCRIPT SOURCE program.
AD-683 422

SOME THOUGHTS ON THE USE AND MISUSE OF STATISTICAL INFERENCE,
Rand Corp Santa Monica Calif
Ralph E. Strauch. Jan 69, 18p Rept no. P-3992

Descriptors: (*Statistical analysis, Mathematical prediction), Distribution theory, Decision theory, Mathematical models, Probability, Sampling.
Identifiers: *Statistical inference.

The basic principle underlying all statistical inference is that one attempts to distinguish the process actually being observed from alternative possible versions of that process on the basis of expected differences in the outcomes produced by these versions. The use of predictive models which do not describe the behavior of the alternatives among which we wish to distinguish, or of techniques based on such models, is a clear violation of this principle. (Author)
AD-681 109

CRITERION AND INDICATORS OF TECHNO-ECONOMIC EFFECTIVENESS OF INFORMATION UTILIZED IN PLANNING-DESIGN WORK,
Army Foreign Science and Technology Center Washington D C
S. N. Zvezhinskii. 13 Jan 69, 14p Rept no. FSTC-HT-23-433-68
Trans. of Nauchno-Tekhnicheskaya Informatsiya. Seriya I: Organizatsiya i Metodika Informatsionnoi Raboty (USSR) n6 p3-6 1967.

Descriptors: (*Management planning, Information retrieval), Technical information centers, Decision making, Cost effectiveness, Optimization, Systems engineering, Search theory.
Identifiers: Translations.

General requirements are formulated for criteria of effectiveness of the information activity. The problem of the correctness of selection of criterion of effectiveness is examined. Four indicators of effectiveness are proposed: raising the scientific-technical level of processing; raising the work productivity of the processor; lowering the cost of processing; reducing the processing time. Formulae are proposed for the quantitative definition of the indicators covered. Examples of calculation are offered.
AD-680 978

SOME CURVE-FITTING FUNDAMENTALS,
Rand Corp Santa Monica Calif
R. L. Petruschell. Dec 68, 149p* Rept no. RM-5766-SA
Contract DAHC15-67-C-0150

Descriptors: (*Analytic geometry, Curve fitting), (*Curve fitting, *Cost effectiveness), Transcendental functions, Least squares method, Mathematical prediction, Management planning, Decision making.
Identifiers: *Cost analysis, Parabolas.

A description is given of the curve-fitting process for the cost analyst. The study is characterized by intuitive discussions with illustrations of computational procedures, and treats the more complex relationships of cost analysis by an approach that integrates analytic geometry with curve-fitting methods. In order to develop an equation to describe a particular relationship, the approach combines the properties of specific functional forms--the straight line, the exponential, the power function, and the parabola--with the values of equation constants. Examples of curves fit to two-variable and multi-variable relationships are shown. Both linear and nonlinear cases are included. (Author)
AD-680 613

PROJECT SCHEDULING WITH RESOURCE CONSTRAINTS.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
Egon Balas. Jun 68, 28p* Rept no. RR-147
Contract Nonr-760 (24)
Presented at the NATO Conference on the Applications of Mathematical Programming Techniques, Cambridge (England), 24-28 Jun 68. Sponsored in part by IBM, New York Scientific Center.

Descriptors: (*Management planning, *Scheduling), Flow charting, Mathematical programming, Decision making, Problem solving, Optimization, Graphics, Theorems.
Identifiers: Resource constraints, Critical path method, Network flows, PERT.

Critical path and network flow techniques can solve project scheduling problems of a realistic size when there are no resource constraints; the introduction of the latter, however, changes the problem into one in which the number of variables and constraints depends on the number of time periods, and which existing methods can solve only for a very small size. The purpose of this paper is to reformulate the scheduling problem with resource constraints in a way that should eliminate the dependence of problem size on the number of time periods and should make this problem amenable to critical path - and network flow techniques. Thus, scheduling with resource constraints is shown to be equivalent to the problem of finding an optimal selection of arcs in a disjunctive graph with stability conditions. 'Simple' machine sequencing and machine sequencing with sets of identical machines are shown to be special cases of this model. The scheduling problem with resource constraints can thus be solved by generating a sequence of PERT networks which satisfy certain stability conditions. (Author)
AD-679 621

LONG RANGE FORECASTING METHODOLOGY.
Interim rept.,
Air Force Office of Scientific Research Arlington Va
Joseph P. Martino, and Thomas E. Oberbeck.
1968, 197p Rept no. AFOSR-68-0049
Present at the Symposium on Long Range Forecasting (2nd), Alamogordo, N. Mex., 11-12 Oct 67.

Descriptors: (*Management planning, Symposia), Population, Weather forecasting, Scientific research, New Mexico, Mathematical prediction, Electrical industry, Economics.
Identifiers: Numerical weather forecasting, *Technological forecasting.

The document consists of the Proceedings of the Second Symposium on Long Range Forecasting and Planning held at Alamogordo, New Mexico, 11-12 October 1967. The papers presented discussed technological forecasting, population forecasting and weather forecasting. Discussion of each paper is included. (Author)
AD-679 176

AN INDEX FOR USE IN THE SELECTION OF COST EFFECTIVE SYSTEMS,
Electronic Systems Div L G Hanscom Field Mass
Walter G. Hartung. Oct 68, 35p* Rept no. ESD-TR-68-426

Descriptors: (*Cost effectiveness, Advanced planning), Systems engineering, Management planning, Decision making, Life expectancy, Optimization, Probability, Economics, Maintenance, Reliability, Money.
Identifiers: Life cycle costs, Systems analysis.

Life-cycle cost alone is not sufficiently inclusive to be used as a yardstick for the selection of a cost effective system. Equal life-cycle cost does not imply equal cost effectiveness. An index is developed which in addition to life-cycle cost, includes cost effective life span, expenditure chronology, system phase-in structure, and the present equivalent cost of money expended at a future date. Although the index does not determine military effectiveness, it does permit the cost comparison of various systems or programs on a logically compatible and equivalent basis. (Author)
AD-678 514

PERT AND ITS ASSOCIATED MANAGEMENT SCIENCES.
Special pub.,
Edgewood Arsenal Md
M. M. Michie. May 68, 105p* Rept no. EA-SP-400-15

Descriptors: (*Management planning, Textbooks), Personnel management, Decision making, Public relations, Flow charting, Optimization, Graphics, Scheduling, Questionnaires, Costs.
Identifiers: *PERT, Critical path method.

The text is an introduction to PERT/TIME and its associated management sciences. The instruction is designed to give executives and project managers a basic understanding and appreciation of PERT. The familiarity acquired from the instructional material will permit the manager to work closely with PERT experts in the development of networks and their interpretation. From the author's experience, few project managers and engineers use a detailed analysis of activity time variances in the course of a project. Therefore, statistical probability theory is eliminated. This text includes basic instruction in project cost optimization within the PERT/TIME work breakdown structure, and therefore should give the manager familiarity with the advantages of PERT/COST. The content of this course may be covered in 12 hours of lecture seminar instruction, with 6 hours of outside work on the part of the participants. If more expertise in a particular area is desired, it is believed that this text will provide a foundation for comprehension of literature in specialized or more advanced areas of PERT systems. (Author)
AD-677 394

SIMPLE STOCHASTIC NETWORKS: SOME PROBLEMS AND PROCEDURES.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
D. P. Gaver, Jr., and John M. Burt, Jr. Jul 68, 42p Rept no. RR-142
Contracts Nonr-760 (24), Nonr-1228 (10)

Descriptors: (*Management planning, Graphics), Stochastic processes, Flow charting, Scheduling, Decision making, Transportation, Simulation, Monte Carlo method, Distribution functions, Exponential functions, Integral transforms.
Identifiers: *Stochastic networks, Exponential distributions, PERT.

The paper provides an analysis of 'stochastic networks,' that is networks whose underlying link times are expressed as random variables. Analytic and Monte Carlo methods for finding the distribution function (or parameters thereof) of the maximal time through such a network are discussed. The first section, which considers analytical procedures, emphasizes networks whose link times are given by probability functions from an exponential family. It is shown that the Markov property of the exponential distribution may be utilized to simplify analytic computations. In the second section Monte Carlo techniques are described which provide useful information on pro-

ject completion time distributions. It is argued that these easily applied techniques are more economical (fewer computations are required) than naive simulation. Throughout the paper, we suggest a blending of the analytical and simulation procedures into an efficient overall method for studying stochastic networks. (Author)
AD-676 891

A REAL TIME METRIC FOR THE DISTRIBUTION OF SERVICEABLE ASSETS,
Rand Corp Santa Monica Calif
Bruce L. Miller. Oct 68, 41p Rept no. RM-5687-PR
Contract F44620-67-C-0045

Descriptors: (*Inventory control, Air Force equipment), Management planning, Decision making, Military requirements, Supply depots, Stock level control, Turbojet engines, Mathematical models, Statistical analysis, Simulation, Scheduling, Maintenance.
Identifiers: Real time METRIC, *METRIC (Multi-Echelon Technique for Recoverable Item Control), *Multi-echelon techniques for recoverable item controls, J79-GE15 engines.

The memorandum describes a Real Time METRIC (a Multi-Echelon Technique for Recoverable Item Control) stockage model to aid decision makers in distributing recoverable spares between a depot and the bases it serves. Instead of using the current concept of base levels, RTM makes decisions about spares on an as-needed basis in continuous time, using current asset information. This approach requires information on the whereabouts of all spares in a system at any one time. Two RAND research efforts provided data that were used in simulations to compare RTM's effectiveness against that of the current concept of base levels: an F-4C and F-4D engine management study, and a 100-item distribution and depot scheduling model that was part of the Master Study Plan of the Advanced Logistics Systems Center. (Author)
AD-676 641

RESEARCH AND DEVELOPMENT EFFECTIVENESS PROGRAM 1969 (RDE 69) A MANAGEMENT TOOL TO ALLOCATE THE BUDGET OF A RESEARCH ORGANIZATION.
Technical rept.,
Aeronautical Systems Div Wright-Patterson AFB Ohio Deputy for Engineering
Robert R. Jurick, and James F. Bittle, II. Jul 68, 138p* ASD-TR-68-23

Descriptors: (*Computer programs, Budgets), (*Air Force operations, *Management planning), Optimization, Digital computers, Flow charting, Computer logic, Feasibility studies, Subroutines, Mathematical models, Programming (Computers), Punched cards, Cost effectiveness.
Identifiers: Computer analysis, FORTRAN.

A formulation and digital computer program is presented as a management tool to allocate the budget of a research organization. The value of a specific research task is defined and an optimization technique is employed to maximize the total value achieved for a given yearly budget constraint of the organization. A maximum of 250 research tasks may be considered. The program performs a yearly optimization for up to five years. It generates a number of reports which indicate the progress of each research task during the given time period and the effect of this progress on other organizational entities. (Author)
AD-676 269

M5 PERSONNEL MANAGEMENT

THE EFFECTS OF GROUP COMPOSITION AND WORK SITUATION UPON PEER LEADERSHIP.
Technical rept. 1 Oct 68-1 Oct 69,
Michigan Univ Ann Arbor Inst for Social Research
David G. Bowers. 30 Sep 69, 97p
Contract N00014-67-A-0181

Descriptors: (*Leadership, *Psychometrics), Management engineering, Group dynamics, Attitudes, Social psychology, Behavior, Decision making, Analysis of variance, Motivation, Interactions, Organizations, Statistical processes, Correlation techniques.
Identifiers: Satisfaction, *Peer groups.

Differences in perceptions of the comparative presence of peer leadership behaviors by persons in groups different in average personal background, organizational status, or operating function are examined. In addition, differences in the interrelationship of managerial leadership, peer leadership, satisfaction, motivational climate, and group decision-making are compared for groups which differ systematically in the ways described above. The implications of the findings for organizational development are discussed. (Author)
AD-694 994

WORK ORGANIZATIONS AS DYNAMIC SYSTEMS.
Technical rept. 1 Oct 68-1 Oct 69,
Michigan Univ Ann Arbor Inst for Social Research
David G. Bowers. 30 Sep 69, 30p
Contract N00014-67-A-0181

Descriptors: (*Industrial relations, Psychometrics), (*Group dynamics, Organizations), Leadership, Reliability, Employee relations, Supervision, Management engineering, Attitudes, Statistical processes, Correlation techniques, Behavior, Industries, Analysis of variance.
Identifiers: Work organizations.

A theory of organizational functioning which is conducive to the generating of action implications is described. Data from 24 organizations are used to examine the relationship of organizational climate to managerial behavior. (Author)
AD-694 993

A STUDY OF JOB CHARACTERISTICS AND JOB DIMENSIONS AS BASED ON THE POSITION ANALYSIS QUESTIONNAIRE.
Rept. no. 6 (Final),
Purdue Univ Lafayette Ind Occupational Research Center
Ernest J. McCormick, Paul R. Jeanneret, and Robert C. Mecham. Jun 69, 26p
Contract Nonr-1100 (28)

Descriptors: (*Job analysis, Classification), Questionnaires, Statistical analysis, Identification.
Identifiers: PAQ (Position Analysis Questionnaires), Position analysis questionnaires.

It was hypothesized that, across the spectrum of jobs, there is some underlying 'structure' of human work in terms of the human behaviors involved. The project was directed toward the identification of behaviorial job elements and of their organization into job dimensions, and the exploration of certain possible practical applications of job data based on such job elements or dimensions. The project involved the development of a job analysis instrument called the Position Analysis Questionnaires (PAQ) that included 189 job elements of a worker-oriented nature. Principal components analysis procedures were used in the analyses of two types of data based on the PAQ. One set consisted of job data for 536 jobs that were analyzed with the PAQ. The other consisted of 'attribute profiles' of the job elements; (These consisted of median ratings of the relevance of 67 human attributes to each job element). (Author)
AD-691 737

THE DEVELOPMENT AND BACKGROUND OF THE POSITION ANALYSIS QUESTIONNAIRE.
Technical rept.,
Purdue Univ Lafayette Ind Occupational Research Center
Ernest J. McCormick, Paul R. Jeanneret, and Robert C. Mecham. Jun 69, 66p Rept no. TR-5
Contract Nonr-1100 (28)

Descriptors: (*Job analysis, *Questionnaires), Psychometrics, Performance (Human).
Identifiers: PAQ (Position Analysis Questionnaires), Position analysis questionnaires.

The report deals with the background and the development of the Position Analysis Questionnaire (PAQ), which was used as the basic job analysis instrument in the research program. The PAQ (Form A) used in the study includes 189 job elements of an essentially 'worker-oriented' nature, these elements generally characterizing work activities of a behavioral nature (or that have strong implications in behavioral terms), and elements that characterize certain aspects of the context within which human work is performed. The job elements of the PAQ have been used as the basis for deriving various sets of job dimensions, and for studies of an exploratory nature that deal with the potential use of the PAQ as the basis for developing synthetically-derived job attribute requirements, and for job evaluation purposes. The report describes the development of the PAQ, Form A, from earlier job analysis instruments, and the more recent development of a modified version of the PAQ, Form B. (Author)
AD-691 736

THE USE OF DATA BASED ON THE POSITION ANALYSIS QUESTIONNAIRE IN DEVELOPING SYNTHETICALLY-DERIVED ATTRIBUTE REQUIREMENTS OF JOBS.
Technical rept.,
Purdue Univ Lafayette Ind Occupational Research Center
Robert C. Mecham, and Ernest J. McCormick. Jun 69, 24p Rept no. TR-4
Contract Nonr-1100 (28)

Descriptors: (*Job analysis, Psychometrics), Questionnaires, Statistical analysis, Performance tests.
Identifiers: PAQ (Position Analysis Questionnaires), Position analysis questionnaires, Job requirements.

A sample of 179 positions were used. These represented 90 'jobs' for which test score data were available from the U.S. Employment Service on most of the nine tests of the General Aptitude Test

Battery (GATB). For each such job, two criterion values were used as indications of the relevance of a given test to the job; one of these was the mean test score of people on the job, and the other was the coefficient of validity of the test. Two methods of deriving job requirements were used. One of these consisted of a regression analysis using scores to predict the two criteria; this method resulted in rather substantial multiple correlations with both criteria for most of the GATB tests. The other method consisted of deriving job attribute indexes for each of 67 attributes (these having been based on ratings), and subsequently correlating these across the 179 positions, with the two criterion values for each test. This method resulted in lower, and more variable correlations with both criteria. The results of the first analysis suggest quite strongly the possibility of being able to develop valid sets of job requirements on the basis of essentially job data such as that obtained with the Position Analysis Questionnaire (PAQ). (Author)
AD-691 735

THE USE IN JOB EVALUATION OF JOB ELEMENTS AND JOB DIMENSIONS BASED ON THE POSITION ANALYSIS QUESTIONNAIRE.
Technical rept.,
Purdue Univ Lafayette Ind Occupational Research Center
Robert C. Mecham, and Ernest J. McCormick. Jun 69, 30p Rept no. TR-3
Contract Nonr-1100 (28)

Descriptors: (*Job analysis, Classification), Wages, Questionnaires, Mathematical prediction, Statistical analysis.
Identifiers: PAQ (Position Analysis Questionnaires), Position analysis questionnaires, Evaluation.

The basic hypothesis was advanced that job-related behavior is importantly and predictably related to going rates of monetary compensation of jobs. To test this hypothesis, job data were obtained with the Position Analysis Questionnaire (PAQ), a structured job analysis format, for a sample of 340 jobs from 45 organizations. The job sample was randomly divided into two sub-samples (A and B) and three types of possible predictors were derived from the job analysis data obtained with the PAQ; these data were then subjected to a stepwise regression analysis to identify optimum sets of predictors of the wage or salary rates for these jobs. All three types of predictors yielded substantial multiple and cross-validation correlation coefficients with wage and salary rates for the jobs in the samples. In addition, it was generally found that predicted compensation rates more closely corresponded to observed rates at the lower end of the compensation scale, than at the upper end. It was suggested that with additional research, this general method might possibly be used as the basis for the development of an operational job evaluation system applicable on an across-the-board basis to jobs of many types. (Author)
AD-691 734

THE JOB DIMENSIONS OF 'WORKER ORIENTED' JOB VARIABLES AND OF THEIR ATTRIBUTE PROFILES AS BASED ON DATA FROM THE POSITION ANALYSIS QUESTIONNAIRE.
Technical rept.,
Purdue Univ Lafayette Ind Occupational Research Center
P. R. Jeanneret, and Ernest J. McCormick. Jun 69, 123p Rept no. TR-2
Contract Nonr-1100 (28)

Descriptors: (*Job analysis, Classification), Statistical analysis, Identification, Personnel management, Questionnaires.
Identifiers: PAQ (Position Analysis Questionnaires), Position analysis questionnaires.

The study was designed to investigate the hypothesis that there is some structure underlying the domain of human work, and that this structure can be defined in terms of one or more sets of job dimensions. The basic approach to the derivation of these dimensions involved the characterization of job activities and work situations in behavioral or 'worker-oriented' terms using a job analysis instrument known as the Position Analysis Questionnaire (PAQ). Two major data sources were developed and structured in terms of the behavioral job elements comprising the PAQ. One set of data consisted of 536 jobs analyzed with the PAQ, while the second set of data consisted of the ratings of the relevance of 67 different human attributes to each of the job activities and work situations described in the PAQ. Three different multivariate procedures were used to construct several sets of job dimensions. There were noticeable similarities between all of the dimensions, and it was concluded that there is a certain structure to the world of work that can be identified. Implications for the use of such dimensions, particularly in the synthetic validity context, are noted. (Author)
AD-691 733

PROGRAMMED INSTRUCTION IN TECHNICAL TRAINING.
Research rept.,
Naval Personnel Research Activity San Diego Calif
G. Douglas Mayo. Jun 69, 34p* Rept no. NPRA-SRR-69-28

Descriptors: (*Technicians, Naval training), (*Naval aviation, Programmed instruction), Management planning, Textbooks, Display systems, Teaching machines, Programming (Computers), Test construction (Psychology), Performance (Human), Correlation techniques, Classification, Retention, Costs, Time.
Identifiers: Self instruction.

The report summarizes research findings pertaining to programmed instruction and experience gained in the use of programmed instruction in the Naval Air Technical Training Command over a six year period ending in 1969. Overall evaluation of the program indicates that programmed instruction has made a major contribution to training efficiency during the period and that considerable potential for further gains exists. (Author)
AD-690 897

LABORATORY SIMULATION OF ORGANIZATIONAL STRESS,
Denver Univ Colo Dept of Sociology
Thomas E. Drabek, and J. Eugene Haas. 1969, 18p AFOSR-69-1736TR
Grant AF-AFOSR-1307-67, Contract AF-AFOSR-572-65
Presented at the Annual Meetings of the American Sociological Association, Miami Beach, Fla., Sep 66. Prepared in cooperation with Colorado Univ., Boulder.
Availability: Pub. in American Sociological Review, v34 n2 p223-228 Apr 69.

Descriptors: (*Organizations, Disasters), (*Decision making, Organizations), Stress (Psychology), Communication systems, Police, Simulation, Performance (Human).

With a research focus on organizational stress, such as might be precipitated by natural disaster, an attempt was made to 'bridge the gap' between the field and laboratory through 'realistic simulation.' Three teams of police communication room personnel participated in each of the three simulations with normal system demands. The teams then confronted system stress through a simulated disaster. Among the most important changes in group structure which increased system capacity was the gradual emergence of a display mechanism whereby intra-team activity became more shared. (Author)
AD-690 677

THE SUPERVISOR'S KEY ROLE IN FAIR EMPLOYMENT,
Rand Corp Santa Monica Calif
Jerry J. Jensen. Jun 69, 7p Rept no. P-4123

Descriptors: (*Supervisory personnel, *Management planning), (*Employment, Standards), Selection, Training, Industrial psychology, Group dynamics, Leadership, Attitudes, Effectiveness, Personnel management, Performance (Human).
Identifiers: Fair employment practices, Minority groups, Counseling.

The first-line supervisor is the key man in the continued success of any company's fair employment program; the personnel department can initiate and audit programs, but it cannot make them work. These new responsibilities tighten the first-line supervisor's traditional man-in-the-middle vise, so, with these added pressures, he has every right to a conscious and continuing assist from management beyond mere policy directives. (Author)
AD-690 182

BEHAVIORAL OBJECTIVES AND INDIVIDUALIZATION OF INSTRUCTION,
George Washington Univ Alexandria Va Human Resources Research Office
William H. Melching. May 69, 13p Rept no. HUMRRO professional paper-18-69
Contract DAHC19-69-C-0018
Presented at annual meeting of Southwestern Psychological Association (16th), Austin, Tex., Apr 69.

Descriptors: (*Education, Teaching methods), Problem solving, Behavior, Attitudes, Systems engineering, Applied psychology, Students, Instructors, Interactions.
Identifiers: Educational psychology, Frustration, Cooperation.

Implementation of a strong movement in education today toward individualization of instruction can be facilitated by a systems approach, sometimes referred to as 'The New Technology.' The careful delineation of a set of behavioral objectives as an early step is required. The ability to specify objectives is deemed especially critical for the college instructor. In fact, it is contended that a partial solution to the frustrations voiced by today's student is one in which responisbility for determining instructional goals is shared by student and instructor. (Author)
AD-688 819

USE OF JOB AND TASK ANALYSIS IN TRAINING.
George Washington Univ Alexandria Va Human Resources Research Office

Jan 69, 44p Rept no. HUMRRO professional paper-1-69
Contract DA-44-188-ARO-2
Presented at Headquarters, U. S. Continental Army Command, Fort Monroe, Virginia, Oct 68.

Descriptors: (*Job analysis, Military training), Teaching methods, Standards, Performance tests, Documentation, Tanks (Combat vehicles), Human engineering, Simulation, Officer personnel, Psychometrics, Maintenance, Air Force training,

Army training, Theory.
Identifiers: Objectives, Battalion commanders.

The paper records four presentations on the use of job and task analysis in training made at a briefing at Headquarters, U. S. Continental Army Command. The presentations specifically describe job and task analysis and its role in curriculum engineering. (Author)
AD-688 810

PERSONNEL POLICIES--1980,
Rand Corp Santa Monica Calif
David A. Lederer, Jr. May 69, 17p Rept no. P-4098

Descriptors: (*Management engineering, *Personnel management), Advanced planning, Predictions, Environment, Attitudes, Aging (Physiology), Classification, Training, Wages, Sociometrics, Problem solving, Cost effectiveness.
Identifiers: Policymaking, Abilities.

The document is concerned with the role of the manager and administrator of the future. Management's ability to stay one jump ahead of change is called the most important factor for successful future operations. Many administrators are said to be behind-the-scenes citizens in universities and research organizations, operating strictly as staff and service people, while life revolves around the faculty member or scientist. This passive role is viewed as being outmoded by new dynamic requirements of the future. (Author)
AD-688 597

OPERATIONS RESEARCH ANALYST TRAINING PROGRAM.
Technical rept.,
Army Tank-Automotive Command Warren Mich Management and Data Systems Directorate
Irwin F. Goodman. May 69, 22p Rept no. S-1002

Descriptors: (*Army training, *Operations research), Programming (Computers), Government employees, Inventory analysis, Management engineering, Decision making, Queueing theory, Statistical analysis.
Identifiers: Personnel development.

An operations Research Analyst training program is presented for preparing an individual for the journeyman level. Subject program includes topics for research/study and available DoD training facilities relevant to operations research. (Author)
AD-688 045

GROUP STRUCTURE AND THE MEASUREMENT OF POTENTIAL LEADER INFLUENCE.
Technical rept.,
Illinois Univ Urbana Group Effectiveness Research Lab
Gordon E. O'Brien. Mar 69, 29p* Rept no. TR-72

Contract Nonr-1834 (36), ARPA Order-454

Descriptors: (*Psychometrics, Group dynamics), (*Leadership, Effectiveness), Measurement, Theory, Interactions, Personality, Models (Simulations), Correlation techniques, Statistical analysis.
Identifiers: *Group structure, Leadership potential, Organizational structure.

Since a leader's effectiveness depends on the degree to which the group situation allows him to influence group members, it is argued that advances in leadership theory must await a satisfactory measure of potential leader influence. One method of defining leader influence is presented. That concept of potential leader influence or 'favorability' is shown to have a number of limitations in its description of the relationship between leader influence and group structure. An improved method for measuring leader influence is presented using the concepts of structural role theory. (Author)
AD-685 639

FLEET PERFORMANCE OF PROJECT 100,000 PERSONNEL IN THE AVIATION STRUCTURAL MECHANIC S (STRUCTURES) RATING.
Final rept.,
Naval Personnel Research Activity San Diego Calif
George D. Mayo. Feb 69, 29p Rept no. NPRA-SRR-69-17

Descriptors: (*Performance (Human), Measurement), (*Technicians, Performance (Human)), Shipborne, Reports, Correlation techniques, Manpower studies, Statistical processes, Classification, Psychometrics.
Identifiers: Evaluation, 100000 project.

The fleet performance of a small group of Project 100,000 (low aptitude) personnel was assessed by means of an evaluation form completed by their supervisors after the men had been on board for approximately seven months. The men previously had been trained for the Navy rating, Aviation Structural Mechanic S (Structures), AMS. The performance of non-Project 100,000 personnel working in the AMS rating, who had been attached to the same squadrons for a comparable period of time, also was assessed for purposes of comparison. Statistically significant differences between the two groups were not found, although all measures showed a small difference favoring the non-Project 100,000 group. The performance of Project 100,000 personnel in the AMS rating ranged from above average to unsatisfactory. On the whole, the study suggests that the use of Project 100,000 personnel in the AMS rating is not in the best interest of the Navy, unless dictated by a manpower shortage or other non-military considerations. (Author)
AD-685 601

PROBLEMS, PROBLEM-SOLVING AND HUMAN COMMUNICATION. A laboratory approach to training in interpersonal communication.
Final rept.,
Oregon Univ Eugene Coll of Education
Forrest L. Brissey, Fred R. Fosmire, and R. Jean Hills. Feb 69, 207p AFOSR-69-0623TR
Grant AF-AFOSR-1055-66

Descriptors: (*Social communication, *Training), (*Problem solving, Social communication), Learning, Symbols, Decision making, Interactions.

Part I of the report proposes a conceptual treatment of communication in which the human being is viewed as a goal-attainment system. Signs and representations (symbols) are treated both as determinants and products of problem-solving behavior. The goal-attainment problem is defined as a discrepancy between the current state of the system and a specified goal state. Detecting and reducing the discrepancy requires solutions for designative, prescriptive and appraisive subproblems. When problem-solving (a process of selection) is mediated by the semiotic behavior of another system, the systems are semiotically coupled, or interdependent. Several forms of the communicative relationship are outlined. Part II describes an approach to communication training referred to as Task-Directed Learning (TDL). Participants generate and critically examine specimens of their own interpersonal communication in relation to selected measures of effectiveness in solving laboratory problems. Brief descriptions of TDL problems and related materials (Vocom Problems) are included. Part III summarizes objective performance data (time, error and recall) for selected Vocom problems and presents some informal suggestions for research in interpersonal communication. (Author)
AD-684 630

A LINEAR PROGRAMMING APPROACH TO POSITION-SALARY EVALUATION IN SCHOOL PERSONNEL ADMINISTRATION,
Rand Corp Santa Monica Calif
James E. Bruno. Feb 69, 29p* Rept no. P-4039

Descriptors: (*Education, Job analysis), (*Job analysis, Linear programming), Costs, Professional personnel, Instructors.

How much should a person with a given set of qualifications be paid so that his salary is consistent with other salaries in an organization. The purpose of this document is to explore the possible utilization of linear programming techniques for answering the above question in job-salary evaluation. Specifically, a linear programming model is used to analyze a hierarchical salary structure in a school district. The model is used to determine the relative importance of each of the compensable elements of each function (position) in a school district. In addition, monetary equivalents to these elements are derived from the model in order to develop a consistent scale of compensation within a school district. The proposed type of job-salary evaluation scheme might have wide application in the Air Force as well as civilian sector, since it could be of important use in determining discrepancies or in determining those positions in the Air Force which seem 'out of line' in terms of salary or grade classification. The development of utility objective functions, so factors of a job which are considered crucial, receive higher relative weights would tend to increase the flexibility of the salary schedule in responding to the changing needs and demands of the organization. (Author)
AD-684 387

THE RATED ATTRIBUTE REQUIREMENTS OF JOB ELEMENTS IN THE POSITION ANALYSIS QUESTIONNAIRE,
Purdue Univ Lafayette Ind Occupational Research Center
Robert C. Mecham, and Ernest J. McCormick. Jan 69, 30p Rept no. 1
Contract Nonr-1100 (28)
PORTIONS OF THIS DOCUMENT ARE ILLEGIBLE. SEE INTRODUCTION SECTION OF THIS ANNOUNCEMENT JOURNAL FOR CFSTI ORDERING INSTRUCTIONS.

Descriptors: (*Performance (Human), Predictions), (*Job analysis, Effectiveness), Questionnaires, Personnel management, Reliability, Standardization, Selection, Personality, Physical fitness, Statistical processes, Naval research.
Identifiers: Evaluation.

The report describes one phase of a research program which is, in part, directed toward synthetically establishing job requirements by the use of a structured job analysis format and the rated attribute requirements of each of the job elements comprising the format. The phase described in this report involved: (1) the selection of human attributes relevant to job performance; (2) the obtaining of ratings of the relevance of those attributes to the job elements of the position analysis questionnaire; (3) the analysis of the reliability of

such ratings; and (4) the derivation of attribute requirements profiles for the individual job elements on the basis of several sets of ratings. (Author)
AD-682 490

A CAREER DEVELOPMENT PROGRAM FOR ADP PERSONNEL AT NAVCOSSACT.
Technical rept.,
University of Southern California Los Angeles Electronics Personnel Research Group
Joseph W. Rigney, Raymond M. Berger, and Anthony K. Mason. Jan 69, 37p Rept no. TR-61
Contract Nonr-228 (22)

Descriptors: (*Computer personnel, *Personnel management), Programmers, Data processing systems, Government employees, Civilian personnel, Professional personnel, Training.
Identifiers: Personnel development.

The report describes a Career Development Plan for ADP personnel at the Naval Command Systems Support Activity, Washington, D. C. In the report, ADP career program considerations, the career development plan, and program administration, implementation and evaluation are discussed. (Author)
AD-681 772

THE IMPACT OF MANPOWER REQUIREMENTS AND PERSONNEL RESOURCES DATA ON SYSTEM DESIGN.
Final rept. 1 Jun 67-31 May 68,
Bunker-Ramo Corp Canoga Park Calif Systems Effectiveness Dept
David Meister, Dennis J. Sullivan, and William B. Askren. Sep 68, 247p* AMRL-TR-68-44
Contract F33615-67-C-1650

Descriptors: (*Management planning, Systems engineering), (*Systems engineering, Manpower studies), Impact, Launch vehicles (Aerospace), Propellant transfer, Pressurization, Simulation, Design, Human engineering, Personnel management, Cost effectiveness, Man-machine systems.
Identifiers: Titan 3, Subsystem design.

The purpose of this study was to determine the effect on system design of using manpower requirements (MR) and personnel resources data (PRD) as design requirements. Equipment and personnel inputs, e.g., quantity and skill level of manning and task information, were presented incrementally to six design engineers in a simulation of the Phase 1A/1B development of the Titan 3 propellant transfer and pressurization subsystem. Subjects were required to create a complete subsystem design, including schematics, equipment descriptions, drawings and bills of material. Cost effectiveness measures were applied to the data. The results of the study indicate that if personnel factors are to be incorporated into design, it is necessary to supply PRD inputs as design requirements to the engineer in his initial statement of work. The analyses upon which MR and PRD inputs are based must be performed prior to the issuance of a Request for Proposal and not delegated to a development contractor. (Author)
AD-678 864

CATALOG OF PERSONNEL COST DEFINITIONS AND CONCEPTS FOR THE DERIVATION OF MAN/MACHINE FUNCTION ALLOCATION FORMULAE.
Final rept.,
Naval Personnel Research Activity San Diego Calif
Marilee N. Connelly. Oct 68, 49p* Rept no. NPRA-SRM-69-8

Descriptors: (*Personnel management, *Cost effectiveness), Man-machine systems, Handbooks, Costs, Statistical data, Substitutes, Numerical methods and procedures, Job analysis, Attrition, Models (Simulations), Information retrieval, Wages, Programming (Computers), Reliability, Uncertainty, Training, Probability, Symbols, Bibliographies.
Identifiers: Definitions, Criteria, Objectives, Trade offs.

This project is directed toward the development of a personnel cost/effectiveness methodology for use in man/machine function primarily during the early stages of equipment system design. The specific purpose of this report is to define and to present a catalog of cost, personnel, and function allocation concepts which are relevant to the development of the cost analysis parameters for man/machine function allocation. (Author)
AD-678 347

DEVELOPMENT OF PERFORMANCE EVALUATIVE MEASURES. PERSONAL PSYCHOPHYSICS: TERMINAL THRESHOLD AND SIGNAL DETECTION THEORETIC APPLICATIONS TO PERFORMANCE ASSESSMENTS.
Technical rept.,
Applied Psychological Services Inc Wayne Pa Science Center
Arthur I. Siegel, M. A. Fischl, and Mark G. Pfeiffer. Sep 68, 62p
Contract N00014-67-C-0107

Descriptors: (*Psychophysics, Performance (Human)), (*Naval training, Reliability), Thresholds (Physiology), Performance tests, Mathematical analysis, Personnel management, Electronics, Signals, Detection, Test construction (Psychology), Predictions, Management planning, Correlation techniques.
Identifiers: Trouble shooting, Evaluation.

Two separate, but related, studies into the development of advanced techniques for performance and training evaluation are described. In the first study, the application of method of limits procedures to the evaluation of electronic trouble-shooting performance was investigated. The results indicated that the technique produced meaningful results and was sensitive to the level of training/experience of the technician and to different types of thinking. The second study demonstrated that application of variables derived from theory of signal detection possess merit for discriminating between groups at various levels of training/experience, for predicting academic success, and as tools for increasing academic and on-the-job performance ability. (Author)
AD-676 326

M6 TECHNOLOGICAL RESOURCES

IMPACT OF NUMERICAL CONTROL ON MANAGEMENT,
Special publication,
Edgewood Arsenal Md
Paul A. Longo. Aug 69, 18p Rept no. EA-SP-600-5

Descriptors: (*Management engineering, Automation), Computers, Production control, Machine tools, Industrial equipment, Industrial production, Management planning, Army research.
Identifiers: *Numerical control, *Automatic control.

As a result of the integration of computer controls into the machine tool complexes and the use of various forms of energy for processing metal, management and the manufacturing engineer have been placed into a new industrial environment. The paper discusses the impact of new manufacturing technology on organization and management. It also reports the positive actions being pursued by the Army in exploiting numerical control technology and the progress that has been made in this area since 1967. Numerical control equipment acquisition growth rate and trends in the Army and in industry in the acquisition of numerical control tools are portrayed and compared by graphical illustration. (Author)
AD-695 612

TRANSFER OF TECHNOLOGY FUNCTIONS EXTENDED: THE GERMAN CASE,
Howard Univ Washington D C Dept of Economics
Daniel L. Spencer, and Alexander Woroniak. Jul 69, 80p AFOSR-69-1627TR
Grant AF-AFOSR-533-67

Descriptors: (*Economics, Information retrieval), (*Documentation, Dissemination), Scientific research, Commerce, Industrial production, Statistical analysis, West Germany.
Identifiers: *Transfer of technology.

The report is a result of research on international transfer of technology. In a previous study of transfer of technoloty using the case of Japan, a first attack was made on the development of some macro-economic relationships called transfer of technology functions. The theory underlying these studies is that transfer of technology is (1) a continuous, cumulative process operating within a circular feedback system; (2) that it is achieved by a complex of factors working as a group and interacting with one another; (3) that by a process of quantitative experimentation, decisive variables can be identified which facilitate and/or accelerate the operation of the transfer mechanism, and the absorption of borrowed technology. A series of informed experiments with German data representing hypothetical strategic factors in fostering technology transfer was performed as an extension of previous experimentation with similar Japanese data. After lengthy iterative processes three decisive explanatory variables stand out: International Liquidity (IL), Depreciation Allowances (DE), Antennae (A), the latter meaning German business representatives abroad. In addition, experimentation with German data, in contrast to Japanese, lends itself to the selection of one strategic variable related to technological transfer in non-linear formulations. (Author)
AD-695 117

IMPROVING DECISIONMAKING ABOUT PRIORITIES IN STATE GOVERNMENT,
Rand Corp Santa Monica Calif
D. J. Alesch. Sep 69, 15p* Rept no. P-4187

Descriptors: (*Political science, Decision making), (*Urban planning, Political science), Problem solving, Management planning, Decision theory, Sociology, Budgets, Models (Simulations), Substitutes, Organizations.
Identifiers: *State government, *State planning and development, Priority making, Government policies, Participative management.

Contents: Levels of prioritymaking; Trends requiring improved processes for prioritymaking; An approach to prioritymaking among functions; Requirements for improving prioritymaking; Implications of the problem-opportunity approach to priorities.
AD-693 648

EOC DISPLAY REQUIREMENTS STUDY.
Technical memo.,
System Development Corp Santa Monica Calif
R. J. Miller. 28 Mar 69, 105p Rept no. SDC-TM-3966/003/00
Prepared in cooperation with Stanford Research Inst., Menlo Park, Calif.

Descriptors: (*Civil defense systems, Display systems), Management control systems, Disasters, Warning systems, Design.
Identifiers: Emergency operations centers, Municipalities.

The documents presents information requirements specified by municipal officials charged with the management of disaster response operations. The specified information requirements concern both the disaster situation itself and available resources for coping with it. Design requirements and suggested design parameters are presented for a display system to present this information to the managers of emergency operations. Design requirements include the information contents of each display (display elements) and the number of gradients that must be differentiable for each element. (Author)
AD-688 853

A LOOK AT TECHNOLOGIES VIS-A-VIS INFORMATION HANDLING TECHNIQUES,
Air Force Office of Scientific Research Arlington Va
Rowena W. Swanson. May 69, 22p Rept no. AFOSR-69-1205TR

Descriptors: (*Information retrieval, Reviews), Data processing systems, Automation, Records, Management control systems, Production control, Technical information centers, Time sharing, Man-machine systems, Interfaces.
Identifiers: Data bases.

The paper examines several ideas for information handling implemented with new technologies that suggest directions for future development. These are grouped under the topic headings: handling large data banks, providing personalized information packages, providing information specialist serivices, and expanding man-machine interaction. Guides in planning information handling systems are discussed. A brief bibliography of readings is appended. The author suggests that systems be designed and modified from the point of view of making them interactive with other systems where possible to most fully exploit the investment required in money, manpower, and time.
AD-688 558

A MIX-OF-MODES EVALUATION MODEL FOR TRANSPORTATION SYSTEMS,
Rand Corp Santa Monica Calif
Keith V. Smith. May 69, 30p Rept no. P-4059
Preliminary version presented at the National Meeting of the Operations Research Society of America (34th), Philadelphia, Pa., 6 Nov 68.

Descriptors: (*Transportation, Mathematical models), Systems engineering, Urban planning, Air transportation, Railroads, Passenger vehicles, Cargo vehicles, Roads, Traffic, Cost effectiveness, Predictions, Decision making.
Identifiers: *Transportation models.

An important focus of a meaningful evaluation model for transportation systems is to evaluate alternatives within the context of the entire package or mix of transportation services. More specifically, it is the evaluation of the incremental benefits and costs from adding a modified or new transportation mode to the existing mix. The purpose of the paper is to develop a methodology which conceptually may be useful in evaluating alternative transportation systems within such a mix-of-modes context. An important characteristic of the suggested methodology is that alternatives are evaluated along several important dimensions so as to reflect users of transportation systems, business firms that are involved in providing transportation services, and also the general public. In order to concentrate on the more important aspects of the problem, it is convenient to confine attention to intercity transportation along a single link between two metropolitan areas. The suggested model is adaptable, however, to the larger problem of transportation within a network of large cities.
AD-687 214

INFORMATION ENTREPRENEURSHIP AND EDUCATION....PRESCRIPTIONS FOR TECHNOLOGICAL CHANGE.
Interim rept.,
Air Force Office of Scientific Research Arlington Va Directorate of Information Sciences
Rowena W. Swanson. Mar 69, 47p AFOSR-69-0458TR

Descriptors: (*Economics, Transformations), (*Documentation, Dissemination), (*Education, Transformations), Research program administration, Communication systems, Programming (Computers), Information retrieval, Systems engineering, Training.
Identifiers: Information systems, *Technological change, Entrepreneurship, Transfer of technology.

The paper considers two interdependent vehicles for producing and promoting technological change. One pertains to the realm of information handling -- systems for storing and retrieving information, and entrepreneurs for disseminating it and stimulating its scientific and economic exploitation. The other pertains to the role of education as a prime mover in creating a climate for change. (Author)
AD-686 093

INTRODUCING TECHNOLOGICAL CHANGE IN A BUREAUCRATIC STRUCTURE,
Rand Corp Santa Monica Calif
R. W. Archibald, and R. B. Hoffman. Feb 69, 32p Rept no. P-4025
Prepared in cooperation with State Univ. of New York, Buffalo. Presented at the Annual Meeting of the Academy of Management, 1968.

Descriptors: (*United States Government, Public relations), (*Management engineering, Urban areas), Transformations, Problem solving, Decision making, Attitudes, Motivation, Police, Fire safety, Symposia, Organizations, Public relations.
Identifiers: Bureaucracies, Public services, *Technology utilization, *Technology transfer.

The paper describes some problems encountered in attempting to introduce technological change into an urban protective service agency. The reward structure in a quasi-military bureaucracy was held as essential to successful introduction of technological change. (Author)
AD-683 771

COMPUTERS AND THE DELIVERY OF MEDICAL CARE,
Rand Corp Santa Monica Calif
E. C. DeLand, W. F. Raub, R. W. Stacy, and B. D. Waxman. Feb 69, 21p Rept no. P-4019
Availability: Pub. in Computers in Biomedical Research, v3 Introduction, Academic Press 20p 1965.

Descriptors: (*Public health, *Data processing systems), (*Hospitals, Automation), Biochemistry, Medical examination, Hospitals, Monitors, Medical personnel, Medical research, Models (Simulations), Man-machine systems, Biometry, Mathematical analysis, Learning machines.
Identifiers: Medical records.

The volume is intended to be illustrative of the degree to which the computer is being effectively used in the delivery of medical care. (Author)
AD-682 952

PROJECTION OF SCIENTIFIC EVOLUTION AND TECHNICAL PROGRESS--ITS ROLE IN SOCIETY,
Rand Corp Santa Monica Calif
Roger E. Levien. Nov 68, 27p Rept no. P-3995

Descriptors: (*Scientific research, Reviews), Technical information centers, Predictions, Satellites (Artificial), Deterrence, Game theory, Guided missiles.

The report discusses the past and present activities of a technical information center devoted to research and development on scientific problems.
AD-680 749

KNOWLEDGE PRODUCTION AND UTILIZATION IN CONTEMPORARY ORGANIZATIONS.
Professional paper.
System Development Corp Santa Monica Calif
Launor F. Carter. 9 Oct 67, 30p Rept no. SP-2976

Descriptors: (*Scientific research, Effectiveness), Research program administration, Federal budgets, Education, Symposia, Transfer of training, Federal communication, Problem solving, Organizations.

The report discusses the problem of knowledge production and utilization as one of the major concerns facing the intellectual community. (Author)
AD-661 738

M7 MANAGEMENT POLICY & PHILOSOPHY

THE UTILIZATION OF BEHAVIORAL SCIENCE RESEARCH FOR AN APPLIED PROBLEM: THE MANAGEMENT OF CRISES.
Technical rept.,
Northwestern Univ Evanston Ill Dept of Psychology
Thomas W. Milburn. 15 May 69, 49p Rept no. TR-2
Contract N00014-67-A-0356

Descriptors: (*Stress (Psychology), Control), Management engineering, Applied psychology, Behavior, Decision making, Creativity, Interactions, Costs, Errors, Problem solving, Emotions, Analysis.
Identifiers: *Crises, Emergency planning.

The document is concerned with crises, which may be regarded as complex stressors that involve threat, decision pressure, and a need to improvise. It considers some of the stress literature relevant to the study of crises, and refers to laboratory and simulation studies. Crisis management is held to involve information (uncertainty), the selection and training of personnel, and control either for purposes of attenuation or for exploitation. (Author)
AD-695 809

CONFLICT MANAGEMENT IN INTERAGENCY PROJECTS.
Special technical rept. no. 3,
Harvard Univ Cambridge Mass Graduate School of

Business Administration
Richard E. Walton. Jun 69, 25p AFOSR-69-1291TR
Contract F44620-69-C-0040
Report on Studies of the Role of Third Parties in Conflict Resolution and Control. Presented to the Symposium on Program Management, Massachusetts Inst. of Tech., Cambridge, 15-16 May 69. See also Special technical rept. no. 2, AD-689 563.

Descriptors: (*United States Government, Research program administration), (*Research program administration, *Management engineering), Decision making, Effectiveness, Urban planning, Foreign policy, Social sciences, Contracts, Industries, Organizations, Personnel, Personnel management, Production control, Attitudes, Motivation.
Identifiers: *Government agency projects, *Project management, Values.

The paper focuses on one particular aspect of project management: conflict and its resolution. Part I briefly describes four illustrative interagency projects designed to deal with social problems. Part II analyzes basic characteristics of project organizations and hypothesize the forces toward conflict and collaboration which they typically contain. Part III identifies some of the changes in structure, reward-motivation systems, and information systems which would reduce the level of conflict in interagency projects to a manageable level and thereby promote the effectiveness of project management. (Author)
AD-693 322

POLICY ANALYSIS: A THEORETIC FRAMEWORK AND SOME BASIC CONCEPTS,
Rand Corp Santa Monica Calif
Yehezkel Dror. Jul 69, 26p Rept no. P-4156

Descriptors: (*Political science, Leadership), Theory, Decision making, Decision theory, Social psychology, Sociology, Social sciences, Management planning, Reasoning, Problem solving, Interactions, Substitutes, Feasibility studies, Universities, Public relations, Analysis.
Identifiers: *Policy analysis, *Public policymaking, Government policies, Systems analysis.

The paper is a preliminary attempt to appreciate the meanings and significance of policy analysis. Policy analysis is presented within a broad theoretic framework, some basic concepts of policy analysis are explored, and a few main implications of the development of policy analysis for political science and for politics are indicated. (Author)
AD-692 577

SOCIAL INDICATORS IN PERSPECTIVE,
System Development Corp Santa Monica Calif
Nake M. Kamrany, and Alexander N. Christakis.
23 Jul 69, 27p* Rept no. SDC-SP-3392/000/01

Descriptors: (*Sociometrics, Standards), (*Management planning, Environment), Problem solving, Economics, Group dynamics, Public opinion, Decision making, Statistical distributions, Models (Simulations).
Identifiers: *Social indicators, National well being, Evaluation, Ekistics.

The paper discusses the need for the development of an adequate barometer (social indicators) to measure the overall well-being of nations. It expounds upon the major dimensions of a social indicator. It proposes a conceptual framework for a practical approach embodying social indicators in a framework of national policy planning and priority setting. (Author)
AD-691 332

POLICY ANALYSIS IN THE NATIONAL SPACE PROGRAM,
Rand Corp Santa Monica Calif
B. W. Augenstein. Jul 69, 103p* Rept no. P-4137

Descriptors: (*Management planning, *Space flight), Federal budgets, Public relations, Attitudes, Efficiency, Costs, Scientific research, Military requirements, Sociometrics, Decision making, Communication systems, Space stations, Satellites (Artificial), Predictions.
Identifiers: National space program, Space program policy, Objectives, International relations.

The discussion of this paper is concentrated on some of the decisions needed to validate or reformulate our national space policy for the next decade. Two general aspects of the decision process have been emphasized: (a) The need for continued development of cost and schedule estimation procedures, to display multi-year cost streams for accomplishments of individual space projects proposed to be undertaken. (b) The desirability of an extended public discussion to help shape space program policy for the next decade.
AD-690 187

INTERORGANIZATIONAL DECISION MAKING AND IDENTITY CONFLICT.
Special technical rept. no. 2,
Harvard Univ Cambridge Mass Graduate School of Business Administration
Richard E. Walton. Mar 69, 27p AFOSR-69-0571TR
Contract F44620-69-C-0040, ARPA Order-834
Report on Studies of the Role of Third Parties in Conflict Resolution and Control. Presented to the Conference on Interorganizational Decision Making, Northwestern Univ., 2-4 Feb 69. See also Special technical report no. 1, AD-683 785.

Descriptors: (*Decision making, Management engineering), (*Social communication, *Attitudes), Problem solving, Behavior, Interactions, Group dynamics, Organizations, Effectiveness.
Identifiers: Roles (Behavior).

The paper focuses on interorganizational relations, using illustrations from interagency ventures in foreign affairs and in the urban field. Two decision processes, problem solving and bargaining, are instrumental to the formal purposes of the relationship. Two social processes, identity reinforcement and identity conflict, are expressive of the way parties view themselves, compared with how they are viewed by each other. The paper conceptualizes relationships with different mixtures of these four processes. It hypothesizes the effect of each process on each of the other three processes and indicates conditions which minimize these effects. Thus each organization and its members are often keenly interested in establishing or maintaining some preferred organizational identity; and these identity concerns complicate decision making. If the preferred identities are compatible, the parties are better able to exploit the integrative potential which inheres in their respective goals and resource pools. If the preferred identities conflict, the parties are not only less effective at problem solving but also their bargaining is more likely to result in miscalculations, impasses and default outcomes. Identity concerns also contribute to a tendency for organizations to avoid interdependency and for their representatives to deliberately defeat the very joint decision processes to which they are participants.
AD-689 563

PLANT LOCATION UNDER ECONOMIES OF SCALE FOR THE STOCHASTIC WORLD OF A MULTI-NATIONAL MANUFACTURER.
Research rept.,
Carnegie-Mellon Univ Pittsburgh Pa Management Sciences Research Group
David P. Rutenberg. May 69, 17p* Rept no. RR-157
Contract Nonr-760 (24)

Descriptors: (*Industrial plants, Site selection), (*Mathematical programming, *Site selection), Management planning, Stochastic processes, Quadratic programming, Probability, Game theory, Statistical analysis, Economics, Costs, Transportation, Production, Production control, Distribution (Economics), Reliability.
Identifiers: *Multinational manufacturers, Heuristic methods, Demand (Economics), Marketing, Penalties, Revenue.

There are M national markets each with a target demand known only to a probability distribution. If this target demand is not supplied, a penalty is imposed, quadratically increasing in the amount of shortage. Conversely product can be supplied in excess of target demand, but the revenue it earns is quadratically decreasing in the amount dumped. P possible plant sites are under consideration, and at each the economies of scale are represented as a fixed cost plus a linear incremental cost in plant capacity. There is a probability that each plant will become unavailable (due to strikes, sabotage, etc.). The cost on each transportation route is similarly known only to a probability distribution (due to changes in import tariffs, and the occasional closing of routes such as Suez). The problem is formulated as a stochastic program with recourse in which the first stage decision is the choice of plant capacities, and the second stage decision sets production levels and distribution patterns. The second stage transportation problem has quadratic costs on variables depicting the penalties of failing to meet a market's target demand, and the revenue from dumping excess product in a market. A branch and bound approach handles the fixed costs of opening a plant, though an exhaustive search would unusually be replaced by simplifying heuristics. (Author)
AD-688 842

SYSTEMS ANALYSIS FOR DEVELOPMENT ADMINISTRATION: SOME PROBLEMS AND REQUISITES,
Rand Corp Santa Monica Calif
Yehezkel Dror. May 69, 21p Rept no. P-4086
Prepared in cooperation with Hebrew Univ., Jerusalem (Israel).

Descriptors: (*Management planning, Systems engineering), Problem solving, Effectiveness, Efficiency, Standards, Substitutes, Classification, Feasibility studies, Analysis, Decision making, Israel.
Identifiers: *Systems analysis, Developing countries, Evaluation.

The document considers systems analysis as one method of applying structured rationality and knowledge to problems. It has a limited domain of usefulness, circumscribed in terms of characteristics of problems with which systems analysis can or cannot usefully deal. Application of the usefulness domain of systems analysis to development administration problems permits identification of those problem areas in the treatment of which systems analysis is useful. Many requisites and requirements are not met in most development countries, reducing the significance of systems analysis as a problem-treatment approach -- unless accompanied by, and part of, broader systemic changes. What is needed, therefore, both in order to get significant benefits from systems analysis and -- more important -- better to treat the basic and critical problems of development administration, is a broad approach to the improvement of the public policymaking system of development countries. In such an approach, systems analysis is only one --

although quite an important -- component. (Author)
AD-687 614

THE ORGANIZATIONAL APPROACH VERSUS THE SOCIETAL APPROACH TO DEVELOPMENT IN EMERGING NATIONS,
Rand Corp Santa Monica Calif
Paul T. McClure. May 69, 33p Rept no. P-4058

Descriptors: (*Political science, *Management planning), Theory, Organizations, Sociometrics, Correlation techniques, Systems engineering, Problem solving, Decision making, Effectiveness.
Identifiers: *Developing countries, Public administration, Comparison.

Comparisons of public administrative systems on a national or regional level require much simplification, so that the descriptions and prescriptions which result may be too broad to be operational. The mission of the paper is to compare societal units with organizational units to determine which give a more appropriate focus point for analysis in order to achieve national development. (Author)
AD-687 318

THE SYSTEMS APPROACH AND PUBLIC POLICY,
Rand Corp Santa Monica Calif
E. S. Quade. Mar 69, 30p Rept no. P-4053

Descriptors: (*Management planning, Systems engineering), Models (Simulations), Statistical analysis, Decision making, Game theory.
Identifiers: Delphi technique.

The document considers that the analysts must further enlarge their concept of what constitutes acceptable analysis and seek ways to adapt it to a new decisionmaking environment; public officials must tie the systems approach into the policymaking system, giving it status and responsibility, and provide the support that is needed to make proper use of it. (Author)
AD-685 126

INTERPERSONAL PEACEMAKING: CONFRONTATIONS AND THIRD PARTY INTERVENTIONS.
Special technical rept. no. 1,
Harvard Univ Cambridge Mass Graduate School of Business Administration
Richard E. Walton. Dec 68, 140p* AFOSR-0457TR
Contract F44620-69-C-0040, ARPA Order-834

Descriptors: (*Humans, Interactions), (*Applied psychology, Effectiveness), Friction, Behavior, Attitudes, Motivation, Social communication, Theory, Models (Simulations).
Identifiers: Case histories, Conflict.

The report presents a theory and practice of constructive third party interventions into two party conflict. The empirical basis of the report are three case histories of interpersonal conflict in organizations and third party consultation, but the principles derived are more generally applicable. A diagnostic model distinguishes among several aspects of conflict cycles, namely, the issues, triggering events, tactical exchanges, and conflict consequences. Each is an alternate focus for third party control efforts. The analysis illustrates how third parties can favorably influence these conditions, particularly if the third party has optimum role attributes.
AD-683 785

SOME NORMATIVE IMPLICATIONS OF A SYSTEMS VIEW OF POLICYMAKING,
Rand Corp Santa Monica Calif
Yehezkel Dror. Feb 69, 26p Rept no. P-3991-1
Prepared in cooperation with Hebrew Univ., Jerusalem (Israel).

Descriptors: (*Management engineering, *Decision making), Systems engineering, Sociometrics, Performance (Human), Training, Feedback, Predictions.
Identifiers: Public policymaking.

The paper is devoted to an effort to use normatively some simple general systems concepts in order to explore approaches to the improvement of public policymaking. (Author)
AD-683 696

LET US HAVE SCIENTIFIC BASES FOR PLANNING,
Foreign Technology Div Wright-Patterson AFB Ohio
V. Arefev, and A. Blagodarnyi. 28 Aug 68, 9p Rept no. FTD-HT-23-600-68
Edited trans. from Izvestiya (USSR) p3, 5 Apr 68, by R. Moore.

Descriptors: (*Industrial research, *Management planning), Manpower studies, Scientific research, Optimization, Inequalities, Costs, Scheduling, USSR, Job analysis.
Identifiers: Cooperation, Translations.

The authors consider where the 'planners' fit in, in the scheme of things, and why so much is written on collaboration of science and industry. They feel planning should have a place in industry and that there should be an organized long term plan which would help scientists and industry. In doing so they say research could move at a sharper pace and excel in new experiments; in this way more economy for the country could be realized.
AD-683 142

M8 ECONOMICS

ECONOMIC ANALYSIS IN GOVERNMENTAL DECISIONMAKING,
Rand Corp Santa Monica Calif
William E. Hoehn. Oct 69, 23p Rept no. P-4222

Descriptors: (*United States Government, Decision making), (*Economics, Analysis), Costs, Inequalities, Records, Management engineering, Water supplies, Electric power production, Predictions, Problem solving.
Identifiers: Economic analysis, Interest rates, Alternatives, Investments, Discount rates.

The document is concerned with the role of interest or discount rates; the determination of economic lifetime; the assessment of non-quantifiable factors; the problem of the generation of real alternatives; and the role of analysis in resolving uncertainty and identifying critical parameters. There are also a few remarks about the problems of vested interests and bureaucracies. (Author)
AD-695 761

ECONOMIC STRUCTURE OF THE UNITED STATES USING THE COUNTY AS A FUNCTIONAL BASE.
Research paper,
Institute for Defense Analyses Arlington Va Program Analysis Div
Abner Sachs, and Judith A. Timmermans. Apr 69, 168p* Rept no. RP-P-511 IDA/HQ-69-10145
Contract OCD-PS-66-113

Descriptors: (*Civil Defense systems, Recovery), (*Economics, *United States), Mobilization, Passive Defense, Tables, Analysis, Population, Industries, Commerce, Agriculture, Minerals, Money, Cargo, Dams, Iron industry, Steel industry, Petroleum industry, Electric power production.
Identifiers: *Economic geography, *Regional planning, ZIP marketing areas, Resources, Natural gas, Livestock.

The paper presents population and other selected resource data using the county as the basic geographic unit. The economic measures were chosen with civil defense planning in mind. They include, among others: value added by manufacture, number of manufacturing establishments, iron and steel mills, petroleum refineries, electric generating stations, employment, retail trade sales, food sales, wholesale trade sales, agricultural acreage, value of crops and livestock sold, and value of mineral shipments. These data, arrayed by county, are compared to poulation bases consisting of the counties containing the first 20 to 60 percent of the total US population. The counties included in these population percentages are designated and analyzed as 'core' counties and the counties contiguous to them are also separated out for investigation. This 'core' and 'contiguous' county arrangement led to a structuring of economic regions as a proper frame for civil defense recovery operations. 'ZIP Marketing Areas' were found to be the most useful design for economic regions. (Author)
AD-692 876

EFFICIENCY, DISTRIBUTION, AND THE ROLE OF GOVERNMENT IN A MARKET ECONOMY.
Research paper,
Institute for Defense Analyses Arlington Va Program Analysis Div
Paul E. Feldman. Jun 69, 29p* Rept no. P-477 IDA/HQ-69-9618

Descriptors: (*Economics, *United States Government), Political science, Federal budgets, Money, Distribution, Standards, Analysis, Sociology, Wages, Efficiency, Production, Cost effectiveness.
Identifiers: *Marketing, *Government policies, *Wealth distribution, Economic development, Taxes, Socioeconomic status.

For years economists have been struggling with the problem of evaluating the benefits of government expenditures. They invariably conclude that the redistributive effects of government taxation and expenditures require the application of some ethical standard, an act which they recognize to be outside the realm of economic analysis. Economic analysis can be used, however, to demonstrate the implications of adopting any ethic. This paper assesses the implications of the ethical rule that newly created property should be distributed according to the marginal productivity of factors. The conclusion is reached that wherever market imperfections are found, government should act to correct the imperfections. Such actions may result in transferring income from the rich to the poor (to internalize externalities) as well as driving all markets to their competitive equilibria. However, all government actions must be evaluated in terms of securing distributive justice rather than in terms of allocational efficiency or national income. (Author)
AD-692 612

MILITARY-INDUSTRIAL COMPLEXITIES,
Rand Corp Santa Monica Calif
Charles Wolf, Jr. Sep 69, 17p Rept no. P-4177
Presented at the Air Force Academy, Colorado Springs, Colo., 11 Aug 69.

Descriptors: (*National defense, Decision making), Budgets, Organizations, Interactions, Problem solving, Sociometrics, Threat evaluation, Altitude.
Identifiers: Military industrial complexes.

The document holds that the so-called military-in-

dustrial complex involves a real problem; that the MIC is much more heterogeneous and divided than is conventionally believed; that budgetary controls have been developed and applied in the defense sector much more than in other public sector activities that also involve enormous resource allocations; and that the 'other industrial complexes' should also be examined carefully. (Author)
AD-692 609

ON DIFFERENT METHODS FOR ALLOCATING RESOURCES,
Rand Corp Santa Monica Calif
Martin Shubik. Jul 69, 11p Rept no. P-4161

Descriptors: (*Distribution (Economics), *Commerce), Scheduling, Bargaining, Costs, Political science, Procurement.
Identifiers: Prices, Demand (Economics), Supply (Economics), Resource allocation.

The paper discusses the various means of allocating resources within an economy. The following eight processes appear to be the major means for the allocation of resources: the economic market with a price system; voting procedures, bidding; bargaining; allocation by higher authority, fiat or dictatorship; allocation by force, fraud and deceit; allocation by custom, including gifts and inheritance; and allocation by chance.
AD-691 864

A SYSTEMS ANALYTIC APPROACH TO THE EMPLOYMENT PROBLEMS OF DISADVANTAGED YOUTH,
Rand Corp Santa Monica Calif
S. J. Carroll, and A. H. Pascal. Mar 69, 26p Rept no. P-4045

Descriptors: (*Adolescents, Urban areas), (*Employment, Problem solving), Systems engineering, Analysis, Inequalities, Economics, Mathematical models, Sociometrics.
Identifiers: Systems analysis, Low income groups.

The document presents a general model by means of which the economic prospects of low income urban youth can be appraised. On the conceptual level, the model facilitates the comparison of a number of phenomena which have been offered as explanations of the unsatisfactory economic futures which confront poor youth. Better understanding of the relative power of these various hypotheses and the ways in which they interact will aid in the search for program remedies. (Author)
AD-684 390

M9 GENERAL

ECONOMICS DEPARTMENT PUBLICATIONS, 1963-1969: AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS,
Rand Corp Santa Monica Calif
Harriett Porch. Jun 69, 128p* Rept no. RM-2800-2-Suppl-69
Supersedes Rept. no. RM-2008-2-Suppl dated Jan 68, AD-664 384.

Descriptors: (*Economics, *Bibliographies), Abstracts, Reports, Indexes.

This is an author index for RAND Economics Department publications issued between January 1, 1963 and May 31, 1969 that are available in the open literature. Titles and abstracts for publications from 1948 through 1962 may be found in RM-2800-2. Both that Memorandum and this supplement include monographs (books and 'Reports'), working papers that describe complete research or progress on continuing studies ('RAND Memoranda'), and professional contributions of the journal type ('Papers'). (Author)
AD-690 987

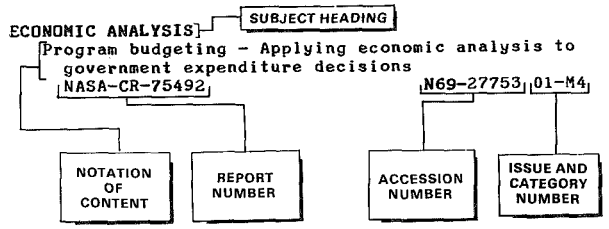
A FIFTEEN-YEAR FORECAST OF INFORMATION-PROCESSING TECHNOLOGY.
Final rept.,
Naval Supply Systems Command Washington D C Research and Development Div
George B. Bernstein. 20 Jan 69, 187p*

Descriptors: (*Data processing systems, Predictions), (*Documentation, Predictions), Management planning, Curve fitting, Mathematical prediction, Standardization, Programming (Computers), Computers, Input-output devices, Communication equipment.
Identifiers: SEER (System for Event Evaluation and Review), System for event evaluation and review, Technological forecasting.

During Round II a group of outstanding experts in information-processing was asked to evaluate the Round I data bank to identify events of importance and interrelationships between the events. This group was made up of more than 45 of the top names from government, industry, and academia. Round II was a direct application of the normative approach. It should be stressed that Round I (last year's effort) was an attempt to provide a data base; whereas, Round II was an attempt to refine, extend, and structure the data base to enhance the value of this forecast for planning and system design personnel. After receiving the inputs from the panel of Round II experts, a refined list of potential events was produced. This list was used to develop a menu of alternative potential short-, mid-, and long-range goals; and to identify supporting events which may be desirable or even necessary to make these goals achievable. A relevance display technique was used to document alternative pathways from the current state-of-the-art to where it will be in the future. (Author)
AD-681 752

Subject Index

Typical Subject Index Listing



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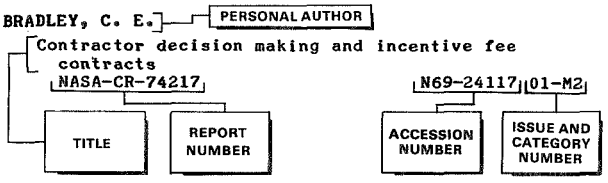

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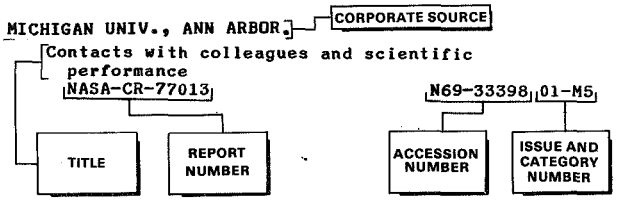
Corporate Source Index

Typical Corporate Source Index Listing



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A

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APPLIED PSYCHOLOGICAL SERVICES, WAYNE, PA.
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  AD-676326 N69-13788 04-M5

ARINC RESEARCH CORP., ANNAPOLIS, MD.
- Guidebook for systems analysis/cost-effectiveness
  AD-688154 N69-36421 04-M4

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  AD-695611 04-M4
- Impact of numerical control on management
  AD-695612 04-M6

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- PROSIM V - Student manual
  AD-691449 04-M4

B

BATTELLE MEMORIAL INST., COLUMBUS, OHIO.
- An analysis of the allocation of federal budget resources as an indicator of national goals and priorities, part 2
  NASA-CR-100436 N69-20988 04-M8
- An analysis of the allocation of federal budget resources as an indicator of national goals and priorities, part 1
  NASA-CR-100435 N69-20989 04-M8
- Selected space goals and objectives and their relation to national goals
  NASA-CR-105304 N69-35834 04-M7

BOSCH /ROBERT/ G.M.B.H., STUTTGART /WEST GERMANY/.
- Value engineering as a basis of methodical product development N69-34657 04-M1
- A special case of network planning in production planning N69-34658 04-M4

BUNDESMINISTERIUM FUER WISSENSCHAFTLICHE FORSCHUNG, BAD GODESBERG /WEST GERMANY/.
- Symposium on Project Management N69-21176 04-M1

BUNKER-RAMO CORP., CANOGA PARK, CALIF.
- The impact of manpower requirements and personnel resources data on system design Final report, 1 Jun. 1967 - 31 May 1968
  AD-678864 N69-17088 04-M5

C

CALIFORNIA UNIV., BERKELEY.
- Systems analysis as a technique for solving social problems - A realistic overview
  NASA-CR-99344 N69-18285 04-M6
- A critical review of systems analysis - The California experience
  NASA-CR-100029 N69-19251 04-M6
- Technologies transfer - A context for policy consideration

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